

```

{ 'heisenberg-ric2': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 0}},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'heisenberg'}}},
    'init_param': {'value': 'random'},
    'noise_profile': { 'noise_on_init_param': { 'status': False,
    'value': 0},
    'noise_prob': [0.001, 0.001, 0.001, 0.001],
    'status': False,
    'type': 'depolarizing'},
    'nqubits': 7,
    'observable': { 'coefficients': { 'bn': [ 1.0,
    1.0,
    1.0,
    1.0,
    1.0,
    1.0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 1}},
    'def': 'ising'},
    'output': { 'draw': {'fig_dpi': 100, 'status': True, 'type': 'png'},
    'file_name_prefix': 'heisenberg_noise_off'},
    'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
    'run': 'vqe',
    'state': 'dmatrix',
    'vqe': { 'iteration': 10,
    'optimization': { 'algorithm': 'SLSQP',
    'constraint': True,
    'status': True}},
    'zne': { 'data_points': None,
    'degree': 1,
    'method': 'richardson',
    'sampling': 'default'}}},
    'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 '
    'X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + '
    '1 Z 4 + 1 X 5 X 6 + 1 Z 5 + 1 Z 6',
    'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Y 0 '
    'Y 1 + 0.5 Z 0 Z 1 + '
    '0.5 X 1 X 2 + 0.5 Y 1 '
    'Y 2 + 0.5 Z 1 Z 2 + '
    '0.5 X 2 X 3 + 0.5 Y 2 '
    'Y 3 + 0.5 Z 2 Z 3 + '
    '0.5 X 3 X 4 + 0.5 Y 3 '
    'Y 4 + 0.5 Z 3 Z 4 + '
    '0.5 X 4 X 5 + 0.5 Y 4 '
    'Y 5 + 0.5 Z 4 Z 5 + '
    '0.5 X 5 X 6 + 0.5 Y 5 '
    'Y 6 + 0.5 Z 5 Z 6']},
    'output': { 'exact_sol': -8.56677223350563,
    'initial_cost_history': [ 6.121384846939922,
    6.150953723335025,
    6.28813394059272,
    6.195576097324661,
    5.996275986067059,
    6.155907118612996,
    6.197882180139617,
    6.276491195599097,
    6.126423666072617,
    6.100624170709524],
    'noise_details': { 'gates_num': [4, 1, 1, 0],
    'identity_factors': [0, 0, 0, 0],

```

```
'status': False,  
'value': 0},
```

```
        'noise_level': [0, 0, 0, 0],  
        'noise_profile': { 'noise_on_init_param': {  
  
            'noise_prob': [ 0.001,  
                            0.001,  
                            0.001,  
                            0.001],  
  
            'status': False,  
            'type': 'depolarizing'},  
  
        'odd_wires': 4},  
    'optimized_minimum_cost': [ -7.113819716474412,  
                                -6.821323437950204,  
                                -7.2322812477454015,  
                                -7.168061781988564,  
                                -7.037022966690968,  
                                -6.764659140688094,  
                                -6.70772123506257,  
                                -6.951929490175616,  
                                -6.765271591343842,  
                                -6.643370531408768],  
    'optimized_parameters': [ [ 0.010202312572582629,  
                                0.01020231257258252,  
                                0.010202312572582303,  
                                1.3908062838956354,  
                                1.3908062838956354,  
                                2.0164416760130464,  
                                2.592046705326477,  
                                2.592046705326477,  
                                2.592046705326477,  
                                3.724080378311745,  
                                3.724080378311745,  
                                4.739480012897176,  
                                4.739480012897176,  
                                5.945308900554525,  
                                5.945308900554525,  
                                5.945308900554525,  
                                5.945308900554525,  
                                6.51261715666153,  
                                6.516103684733277,  
                                7.99085874039394,  
                                7.99085874039394,  
                                8.16277333661163,  
                                8.99858956109671,  
                                9.406132081871055,  
                                9.406132081871055,  
                                9.406132081871055,  
                                10.1331640829029,  
                                10.184186623923145,  
                                11.15918741223016,  
                                11.16716557378114,  
                                2.8450840989270483,  
                                -0.611567672261254,  
                                -0.551095997013421,  
                                -1.0131107784954883,  
                                0.6825070788337171,  
                                -0.6162852792596847,  
                                0.053241771237976535,  
                                -0.12516614014524466,  
                                1.004304378969064,  
                                1.0874046621334863,  
                                -0.263039228744755,  
                                -0.10249623387196242,  
                                1.6330709573383448,  
                                0.7555807809408442,  
                                -1.304918472993802,  
                                -1.1870918453507433,  
                                -0.1330475605934714,  
                                -0.5047081392764299,  
                                0.7756728723196425,  
                                -0.49278801094288127,  
                                0.42847067786702214,  
                                0.5383171641852699,  
                                -0.1052976007723638,  
                                -1.2720333725347934,
```

0.1951924272458347,  
-0.04277330847061178,  
0.9574239041786494,  
-0.23071352324401823,  
0.594076188896681,  
0.34935689199185954,  
1.343124516909016,  
0.09733282827416712,  
0.30944030008743273,  
0.4457207862171129,  
-0.9683728985035202,  
-1.120837258235465,  
0.5707161794308084,  
1.2158524027070072,  
0.7958721804993727,  
-0.9645697723054423,  
-0.8960337800506504,  
0.19569442936859724,  
0.40224575611741115,  
0.043062302517518566,  
-1.1857970207577537,  
0.1737802328972237,  
-0.6433879386848066,  
-0.09230835161436789,  
-0.5865305292280132,  
-0.4370825940325887,  
-0.2558137517355887,  
0.0011609522641742864,  
0.6539099100207111,  
0.5336009667754404,  
-0.066252982145182,  
-0.5359243057678726,  
-1.3834098071980059,  
1.0212180272076503,  
0.5141425620577187,  
-0.3002279094652444,  
1.9431365651467594,  
1.0552610834283143,  
0.03764625526605462,  
1.0189467943495765,  
-1.1805772107399133,  
0.2812463759993353,  
1.4321423259624626,  
0.004331180480864721,  
-0.009722915333733264,  
0.6451162813005181,  
-1.3276490840851547,  
-0.022791981388308465,  
0.6904663535208042,  
-0.08291995023229079,  
-0.4292297662993819,  
0.08451212085763125,  
1.730745239172763,  
-0.4572165915626394,  
-0.5304437424739927,  
0.6917595603044201,  
-0.0834050618602206,  
-0.18753214427540912,  
0.03305271309241428,  
-2.06126875311761,  
1.5412249435528216,  
0.6658854058101124,  
-0.36436553183642006,  
-0.9193216873412987,  
-0.12900157901067746,  
0.00542745656150127,  
-2.171309732970475,  
0.7554637248132821,  
1.249093251376782,  
-0.6445658098419218,  
0.14255909437901,  
1.9827929295292588,  
1.7044112257377888,  
1.3052476731654217,  
-1.2421280078558083,

0.9803773552514545,  
0.624656679395339,  
1.5450717726138348,  
1.3377635200462674,  
1.6713162630334013,  
1.1434539739578018,  
0.7924845860796002,  
0.7488178629415702,  
-0.22907755928161938,  
0.02068614393688229,  
0.7608745118642098,  
-0.9304086893990576,  
0.32284859123973336,  
1.1891889033470526,  
-2.2276657670493667,  
-0.3847051133881006,  
0.34685342333136693,  
0.549782335235608,  
-0.741267714199706,  
0.26835698412135817,  
-0.3932040836252281],  
[ 0.1668593898896292,  
0.17040712573292452,  
0.1805381301837931,  
0.5412292500635668,  
0.5489811947718172,  
1.6527475146851556,  
2.55163116002801,  
2.5519072608250526,  
3.5532683674980303,  
3.6288880821260254,  
3.628888082126026,  
4.805536133422,  
4.805536133422,  
5.495812833389341,  
7.061809444427505,  
7.061809444427505,  
7.091809082073759,  
7.091809082073759,  
7.177303629807857,  
7.177303629807857,  
8.014949756247965,  
8.530162577551986,  
8.530162577551986,  
8.546061750342906,  
9.04867098177819,  
9.074898072060186,  
9.632422305371618,  
9.634373167303918,  
10.38794675566215,  
10.6266488059183,  
1.098346025464491,  
1.5064109656875124,  
-1.345000798816457,  
-1.0112785952191263,  
1.6300712383138607,  
0.8148371701480261,  
-0.28350002839102345,  
-0.33372360425933684,  
1.6208682076493302,  
0.8121027533840469,  
1.424723017228629,  
-2.424990019545176,  
0.082574342220046,  
1.5280227698708746,  
-1.15137171364767,  
0.8821561188139568,  
-1.0160789387304932,  
1.6746733218779515,  
2.4704340348759835,  
0.8258460042877822,  
0.21603078517896931,  
-0.05951632881852065,  
-0.38389794767629976,  
1.262782578763767,

0.2784323534326924,  
-1.1033559163681899,  
-0.6528860571486432,  
0.2962709573582783,  
0.7373896958863383,  
-0.19469473272588958,  
-0.5648694322067066,  
-0.2865513283590244,  
-0.1568370013695695,  
0.5493402156787225,  
-0.06660698090283595,  
-0.03359282593361995,  
2.386303225482439,  
2.5818639178838447,  
-0.2777126348162844,  
0.9824372498806634,  
-0.39422047955069633,  
-0.2578521646674435,  
-2.3189661125012333,  
3.704222502127313,  
0.0786550943979888,  
-0.4292299615806753,  
1.9657979836656132,  
-2.0589782426096743,  
0.5074656887310783,  
0.529845836294102,  
0.3333899546946687,  
-2.293287544626138,  
0.38495704078578347,  
0.11228231507748758,  
-0.5441382535456334,  
-0.10489456654410802,  
0.20011773016694326,  
0.2071371298105447,  
-2.3651747840346373,  
-4.642753244408169,  
0.31152670002610416,  
0.5022276983536407,  
0.868938175568576,  
0.20348366213849262,  
1.6475591691674232,  
0.3723999247005541,  
-0.6589367341470095,  
-1.1662574597011768,  
-0.6243580701563078,  
0.7131540586709431,  
0.1202680893039496,  
-0.035429417928639004,  
-0.764191314011073,  
1.2086109032075552,  
-1.051983148544319,  
0.9246153479653275,  
-1.1427863274072698,  
1.332115914696049,  
-0.27763903875773216,  
-0.8366665559266224,  
1.231317184155771,  
1.0584874216549616,  
-1.2625782973678872,  
-0.13344263101573678,  
-0.5438546353631553,  
0.32212207070493337,  
-1.303226737690094,  
-0.01337174800709397,  
1.5589050571537895,  
0.3479397882311206,  
-1.87970134892204,  
2.977494205144941,  
2.126179176803338,  
0.873413305092612,  
0.8500950046844986,  
0.23032349681334924,  
0.3909007718762141,  
1.27926383991169,  
0.4053229000380187,

0.18190897779649284,  
0.3777935390994293,  
0.16772342823060155,  
0.7412973026981022,  
0.639129360404442,  
0.018341913161260836,  
-1.4541884523192488,  
0.28134413046256895,  
2.4001077951469534,  
1.6611157476326641,  
0.7905510314185135,  
0.3404203970178551,  
2.183912805046456,  
-0.3997518053650227,  
0.053570896670028414,  
-0.357205442227867,  
2.465639862334342,  
0.5537972989863772,  
-0.39728466664110995,  
-0.027817223268321305,  
1.9807706991981826],  
[ 0.5951590437264768,  
0.5951597797898418,  
0.596302078053195,  
1.4089369768482796,  
1.4331037442558932,  
1.9334285070314567,  
3.062681311500457,  
3.0626813115004623,  
3.701592986553387,  
3.7015929865611663,  
4.692693983743045,  
4.692707272250184,  
4.692707272250258,  
4.692707272250313,  
5.273956511551061,  
5.2739565115534885,  
5.274711944180805,  
5.292162333185471,  
6.388031186249758,  
6.706092770308958,  
6.706092773942781,  
7.548703938317144,  
7.681022457823495,  
8.397974590110634,  
8.397974590138377,  
8.714530791128386,  
8.714530791128386,  
10.075092988071805,  
10.075092988073155,  
11.341131260513714,  
1.2164966908304873,  
0.5225196146354087,  
-0.34542368185043265,  
-1.252295733833459,  
1.5735101799719247,  
1.0464982053397573,  
1.2394468649734893,  
0.21595542567535536,  
0.6527940529325085,  
1.4145936861598034,  
-0.5380512317672027,  
-1.9014686324238337,  
1.451754133219536,  
2.1987565378949516,  
0.938092448651857,  
-1.6378088277288243,  
0.38538945046186207,  
1.1341127264381634,  
0.4639756379522118,  
0.6078279078278344,  
0.6166736770850927,  
-0.2105783577152824,  
-0.35613934438782024,  
0.019700965332415492,

-0.1607988588148763,  
2.193665487035956,  
-0.06423342915568941,  
-1.9546338684001463,  
-0.18633224680849803,  
0.7857721800679403,  
-0.6042593641712383,  
0.7490426193215785,  
-1.6440993970557098,  
0.1929003499686422,  
-0.13169470171686798,  
0.1181804780373785,  
0.15693401681144475,  
-0.28658811756127545,  
-0.20708135879200276,  
0.09230795188954338,  
-0.4114468277172402,  
-0.8587939345722652,  
-0.29108154529906144,  
0.5427012646910324,  
-0.25834402839896575,  
0.08607676608574079,  
-1.2954984273935897,  
0.1813204379953717,  
-0.34769281236878496,  
-0.09683800499273743,  
-0.9220596744797915,  
-0.67003274699539,  
0.4888752813745547,  
1.2659094572448748,  
0.11946751252820795,  
-0.2586531113468492,  
0.8859866115247531,  
1.5010226653220677,  
1.2253090413370418,  
-1.41480051306012,  
0.4438287250399343,  
1.1348546909542183,  
-0.26356600881424186,  
-2.0062796648632446,  
-1.5997185613370128,  
0.19365670408843416,  
1.9542746653083636,  
-1.16753432767107,  
-0.8341998310634118,  
-0.8078884986396416,  
1.057969787908329,  
0.11874076530060441,  
-0.37823536664235385,  
-0.26520820180860055,  
-0.05623142087332937,  
-0.6351447036627758,  
1.2477313546900863,  
0.09475828495367859,  
1.1570291529547316,  
-0.3159140153065273,  
-0.5798756886838644,  
0.5049917679316769,  
0.17933499272174766,  
-0.6452919120449363,  
0.3093583753904067,  
0.6269418409971109,  
0.536228963471926,  
-0.39297460666924544,  
-0.8585561386083093,  
0.42310038622809626,  
0.4625446959490829,  
0.46551290354297115,  
-0.006225430338097464,  
-0.9498487290783498,  
0.9283489563799108,  
0.5288015885952413,  
-0.6423745714782674,  
0.055608107183735184,  
-0.19141640271906557,

1.6106743132208,  
-0.930502866063725,  
0.13606233511650948,  
0.7450273046384331,  
-1.862998799714745,  
0.8639045442938115,  
2.2050766695222275,  
2.1209593580448147,  
1.5928713117159927,  
-0.646261951983125,  
0.18338232206466956,  
1.9195145046471642,  
0.9340015251080405,  
0.22314701152636945,  
0.22339358941062268,  
-0.49545999196264406,  
1.6497345768092624,  
-0.37841357670502584,  
0.19313501042389203,  
0.07433308037827455,  
1.831606295240235],  
[ 0.013945989287166007,  
0.014482887559355881,  
0.7020792700957467,  
1.2708090216179468,  
1.8771473361142745,  
1.898764043280349,  
2.8886374873795146,  
2.8887394286496386,  
2.889554540070078,  
2.8895545400700837,  
2.889778536891296,  
2.890175029071649,  
2.8901764691110965,  
3.881547037638128,  
4.589967577258263,  
4.916994542918821,  
5.4213951120408375,  
5.421396236977594,  
5.937049320865825,  
6.879796302074518,  
6.931299553407329,  
7.597215453538154,  
7.941093252873733,  
7.941093304737446,  
9.23283235128487,  
9.232832768748333,  
9.232832769084892,  
11.10587443204972,  
11.182791630116155,  
11.297769627933807,  
0.7007490003921656,  
0.8357798277265018,  
-0.006144500286149594,  
-2.002647677865005,  
0.3078229546122665,  
0.6497081019565148,  
-0.5263987300225429,  
-1.3591736982237872,  
0.4978537208919288,  
-1.0703987652029276,  
1.4894572070841317,  
0.10507602812754031,  
1.2060409491957005,  
0.37232709611155723,  
-0.9426439100006672,  
-0.36387040355717715,  
0.9248005896093184,  
1.0383864274136485,  
-0.2845687665108692,  
-1.3700022658840743,  
0.197561542582957,  
-0.32357133547759104,  
-0.5540850172472152,  
0.5749264875292693,



-0.8790799137852104,  
1.0945413836746756,  
0.3793043522465329,  
-0.4056052817915047,  
-0.03473792548266608,  
0.06466238365347084,  
0.06911551547308,  
0.1689218888799635,  
-0.24055379179177064,  
1.0229644579244672,  
-0.3032356624759471,  
0.7939776889924924,  
0.9000504980210274,  
1.1922086788205504,  
-0.09256238768786877,  
0.5764640092401906,  
0.20671868793560919,  
1.5137094250639866,  
-0.17335127063306519,  
0.8566284172009878,  
-0.14321647694006984,  
1.3125145841881363,  
1.3592268317355658,  
0.1512217749645529,  
0.40406540571588334,  
0.048383985681794354,  
0.19259007229061106,  
0.09976438753283409,  
-0.8546571821237718,  
0.6621369033183476,  
-0.1702351863826035,  
0.36026352288591695,  
-0.8538518608539489,  
0.5392868667124087,  
1.1279014251126462,  
-0.36128436957709814,  
0.388999106940785,  
0.6046833425816769,  
0.22322275018396126,  
0.19171695999278726,  
-0.909915166057891,  
0.21776193961543494,  
0.28996753900858246,  
-0.5842323028487328,  
-0.23864599488371552,  
0.5243326463982184,  
0.32056321937714066,  
0.5356836550343521,  
-0.3036011562711703,  
0.28802877152454115,  
-0.33781577627567244,  
0.7960023934710929,  
-0.34238272839391165,  
-0.755152052016237,  
-0.44352996180502197,  
0.07213680417312635,  
-0.10190373256064952,  
0.6647215855084265,  
-0.9303498099091333,  
0.9785859773141862,  
2.090431130104361,  
-0.3615944398761197,  
-0.05657593308707301,  
-0.4893006812698228,  
2.169089562284795,  
-0.2512716878005756,  
0.5324061192252376,  
-0.35101147654456727,  
0.809248070031391,  
1.4509839161975397,  
-0.14911304722907706,  
0.009330045236156378,  
0.16685413556340573,  
-1.0472061077948698,  
1.6539137014575498,

1.3611819463379937,  
-0.1612641139265809,  
-1.2962247052632323,  
-1.3797066485510583,  
0.7614302908946665,  
0.5091243097447496,  
-1.034844537010192,  
1.0872752511102444,  
-0.476692079414531,  
0.49649227376774574,  
-1.1491063122969838,  
0.5155370403129137,  
2.9855835289421178,  
1.332632811562063,  
-0.4511213152168112,  
-0.18076672982111605,  
-0.6499435359167832,  
-0.1697346678000319,  
1.4081723136905224,  
0.442588820936982,  
1.722678503402018],  
[ 0.6039929180328771,  
0.6039929180328772,  
1.1870458270689,  
1.1870458270688995,  
1.412745515623535,  
2.7932578893846336,  
3.721244973412882,  
4.900800320776727,  
6.39210348373028,  
6.39210348373028,  
7.061133772685592,  
7.061133772685592,  
7.061133772685592,  
7.064294030691084,  
7.896781244010901,  
7.896781244010901,  
7.998168023342792,  
8.09271241991372,  
8.09271241991372,  
9.328885229004163,  
9.328906326502109,  
9.56647323827175,  
9.587868480377287,  
9.606795901338938,  
9.632809215929381,  
9.925261433896223,  
10.67745113859835,  
11.226267254217802,  
11.25813692634961,  
11.259219336255413,  
1.5276356326766196,  
-1.2318130242699923,  
0.07924764105056724,  
-3.11015247863868,  
1.71979592089301,  
2.1636204056140302,  
-0.44284897868332995,  
-1.9599373218939633,  
0.06248244737264575,  
1.4749130816585614,  
0.6808242800852113,  
-2.8378068229153226,  
1.7023278591356004,  
1.50553848610602,  
0.9365133390345636,  
-2.1922613442274193,  
2.8432021818280635,  
0.1855585942894919,  
-1.305416067894503,  
0.1905478234118404,  
0.7393995701939485,  
0.19798052248890954,  
-0.8075009715521676,  
0.3948611135767452,

0.2802743807361451,  
-1.4516873620037638,  
1.5556285183865062,  
-1.0754052466574715,  
-0.26931261584286686,  
1.2336702516634759,  
-0.8384600779602994,  
0.1263891070094113,  
1.371252832802525,  
0.215177045818575,  
0.6381629880602765,  
-0.10309421117565558,  
0.4124383487994645,  
-0.655499258712117,  
0.4988310520659948,  
0.9884276098863405,  
1.4367219570983862,  
2.175763151095631,  
0.4657848221151968,  
-0.43932071710829274,  
0.9992343531072873,  
2.543795366459747,  
1.4484903663678823,  
-1.0884458694866728,  
1.5946427529603922,  
1.6036026746991174,  
0.5049418933876622,  
-1.0871394525284908,  
1.0140119509472394,  
0.5109229333717124,  
0.8743589388253838,  
0.09626392588768701,  
-1.263331036369507,  
0.7924497462635596,  
0.7602243892770352,  
-0.02425703489356225,  
-0.9488939939602019,  
2.6693155936644737,  
0.5100002820942202,  
0.595619937330169,  
-0.8296192082845288,  
0.03973961449691636,  
-1.7144893205098422,  
1.1592271204386744,  
0.04896218554826232,  
0.6673584031026698,  
-0.8454442747231521,  
1.0304518931414424,  
0.8556412792926265,  
0.538780781704616,  
-2.308898512383933,  
1.5082121217292006,  
0.9522091008412682,  
-0.6026951427085929,  
-0.561943926102551,  
0.0993983558744849,  
0.4791162049419018,  
0.10320414203165484,  
0.3730055252741846,  
-0.47083232270591907,  
1.8673303303286475,  
0.11712430229385423,  
-0.6044688726688213,  
-0.9010581315425702,  
0.8870944114042272,  
-0.6585959519901412,  
1.4737812112349316,  
-0.08789784470103781,  
2.094313922775301,  
-0.33880630598079,  
2.0864279335765668,  
-0.3541510297313768,  
-0.1447960879675017,  
1.1237218765827641,  
0.7472353955833465,

0.43980261574830926,  
0.6534205210717992,  
1.2606259200129655,  
-0.17935209951086067,  
1.6469967332630842,  
-1.0541245665671384,  
-1.9424469299865808,  
-0.18975499615277758,  
1.967627931161089,  
-0.5610576072704585,  
-1.4036970670846107,  
2.6946925238411343,  
-0.9860662529475024,  
-0.6528571620700129,  
-0.6551571328219318,  
0.9777230807240078,  
0.003267369094500521,  
-1.3217863730621935,  
0.3048209868145306,  
2.1104722024376037,  
-0.13744008360720306],  
[ 0.25527267369507034,  
0.25565792243175783,  
0.2647851751522132,  
0.5363821708593047,  
0.5363873360294482,  
0.7233633669048282,  
1.469495303301716,  
2.6782106232033085,  
3.0738233934797257,  
3.0740346152756928,  
3.0740346154225127,  
3.5401415295205747,  
4.384558950933806,  
4.384564402805264,  
5.187694707345863,  
5.431645815108105,  
5.489249393218873,  
5.489270645046236,  
5.4892706450864015,  
6.745887429448721,  
6.751180124796475,  
6.975059797459636,  
7.4852253234058015,  
7.485225323406553,  
7.485225336458803,  
8.65422617922401,  
9.588402512165866,  
9.885475791973308,  
10.59890299271783,  
10.69671178550786,  
1.7193952291225598,  
-2.699905058742405,  
-1.223597261476082,  
1.010311557825714,  
2.412320728895392,  
0.01205800479020808,  
0.07148434641220561,  
-0.1717056232391439,  
0.7382566227367261,  
1.1624421524382496,  
-0.9704132592114074,  
0.007350927807351759,  
2.3582361698297074,  
1.1487298862005386,  
-0.5298367489795935,  
-0.09976600187590766,  
0.7543852753586129,  
1.401553978295213,  
0.3078871075376248,  
-0.35588965288410024,  
0.15554254602359127,  
0.3425968302644435,  
-1.202384247417669,  
-0.987347192012539,

0.4529373843839761,  
0.4903191821294036,  
-0.3596344497958935,  
-0.17493820576367525,  
1.3619720378391473,  
-0.2517632245160441,  
0.6511229549349082,  
-0.07544040749490964,  
-0.04771613185909407,  
-0.3755018325798389,  
0.9938372515787193,  
-2.617459009880976,  
-1.1600518599196699,  
1.385641845308893,  
1.3078548392623544,  
-1.3438342667259302,  
0.06225569718179881,  
2.197693302377489,  
1.042516443745511,  
0.03537145740203309,  
-0.4361466628046714,  
0.5235506730441506,  
-0.526852610863259,  
0.2683619694707144,  
0.4190531675420984,  
1.1917182306749494,  
-0.22315973823529625,  
0.3724063269005885,  
-0.2016113706580773,  
-0.6608684665627687,  
-0.5566572791655187,  
-0.6080637139710359,  
-1.3764025932169088,  
0.06381643974581075,  
-0.12239416020448966,  
0.8768915165514672,  
0.9734732325585186,  
0.43086234391719236,  
-1.2868778636436715,  
0.2387140460098626,  
0.9650786815364466,  
-0.8088454790489977,  
0.3379873670823351,  
-0.5777804082620341,  
0.5336495835071627,  
2.9920059240641073,  
0.6079052241489462,  
0.5309531439532562,  
-0.3169545414432997,  
-2.3335729587340226,  
1.4959043429555212,  
-0.5568960671660346,  
1.653532167337357,  
0.35120291709985135,  
-1.2609025397237739,  
-0.1931706005433399,  
-0.7761167208985412,  
-0.07661975220377984,  
-0.5351965211836152,  
-0.0031199845298622592,  
-1.0423575145047397,  
0.1404336078605159,  
-0.2659485743030148,  
-1.6615430856264528,  
0.43884229259462737,  
0.6812026744892391,  
0.39460126400851775,  
0.9189185317254136,  
1.0545864345697524,  
1.1559068061784519,  
1.0720705313960006,  
2.514687033544068,  
2.0122769373294087,  
1.2260219872848024,  
-1.3734724775008675,

2.3904026332666466,  
-2.404362121009983,  
-0.8308162974608817,  
-0.49116355387064226,  
1.4544417316540983,  
1.2021789553657038,  
-0.045966888650276455,  
-0.5647889892892385,  
0.6643832758564343,  
1.3569537910410745,  
-0.9183847616510102,  
0.945220285616687,  
-0.2507148012652629,  
0.7511336622169466,  
-0.9416337312429676,  
-1.4793772681330912,  
0.4334847087508488,  
-0.02256141084202589,  
-0.8421263780740565,  
0.7532984525691246,  
-0.4880194119115941],  
[ 0.008743077103622827,  
0.009882832507877682,  
0.7050944318623401,  
0.710375902327237,  
1.3735081730499452,  
1.9102715342756955,  
2.4433320146909057,  
2.4516882946549723,  
2.451688347950266,  
2.451688347950339,  
2.843659132454273,  
2.8437290613274957,  
4.1600447531010465,  
4.306699526502985,  
4.306699526503065,  
5.241123177068926,  
5.241123178389404,  
5.24112317839451,  
5.241123178416889,  
5.24112317841696,  
5.540975568888287,  
5.540975570417886,  
5.941112811664419,  
8.170699047520403,  
8.170699047520507,  
8.170699047530466,  
8.255093472901638,  
10.272293989986627,  
10.424665220800923,  
11.465171522837265,  
3.9395345563718758,  
0.4691052202571919,  
-1.862560190849311,  
-0.5409749194015872,  
0.6809788356765686,  
1.8042992706436805,  
-0.26820425656414737,  
0.1583592390805078,  
2.570139180175488,  
1.9730281302693196,  
-1.463840299189443,  
-0.6685636516618708,  
1.7639202171290544,  
-0.25593154759594605,  
-0.2985776439588054,  
-2.380396900296592,  
0.702730788267215,  
0.1111013414139888,  
0.8409172298864358,  
-1.2895389501906573,  
-0.6495780843509739,  
-0.7851296452736322,  
0.551111177160635,  
-0.7726813911354989,

0.5538939215319534,  
0.03671507307592432,  
0.3611092546557634,  
-1.1244512927039525,  
0.9979933722488747,  
2.1458567471834726,  
0.6045511633065316,  
-2.057454443497708,  
1.252679002491011,  
1.430968651076373,  
0.1975347289978355,  
-1.299395231227167,  
1.3709528213003457,  
0.1431677222477642,  
-0.5468176167431326,  
-1.363138690512715,  
3.0723179570358097,  
0.09197418207209145,  
0.552028513182037,  
-0.14805587495457423,  
0.6542791830341044,  
-0.6463721623376274,  
0.594458988807259,  
0.36313400085196706,  
-0.22487670595801615,  
-0.5600947295073319,  
-0.13194082373612193,  
-0.7877948735702447,  
0.37453010501171596,  
0.4466259555663157,  
1.308811697533367,  
0.18300565834449778,  
0.28722746055568227,  
0.11593248147227052,  
-0.22092771987873516,  
-0.3830228539100271,  
-1.1848305159650747,  
0.5197091232696622,  
-0.20788874837533922,  
-0.6085287569162429,  
0.622048119692812,  
0.36154402486320714,  
-1.283336122338554,  
0.06614563071195226,  
-0.10338801392549199,  
-0.6587068471684263,  
1.34100892693596,  
1.611824691291148,  
0.6916042008757854,  
1.6327439292692163,  
-0.6648342512722216,  
0.37654710496224697,  
-0.24718958516166675,  
-0.7065038375487233,  
0.11746925267221191,  
-0.5800210884330035,  
-0.5819296114685866,  
0.01696046668851879,  
0.08164598903007107,  
0.39930256073308995,  
-0.22041497304878216,  
-0.13569368036844073,  
-0.734071731705797,  
-0.10448732621745443,  
0.4350514428273773,  
-0.4345336137549378,  
0.39154417527507906,  
1.0175423593468684,  
2.0822612023831226,  
2.2518057581506135,  
-0.4050083292569126,  
-1.3225723626396935,  
0.2066177197668252,  
0.3518219705658924,  
0.7692056892056433,

1.1078718838725619,  
0.6955122293015593,  
2.6391129283967607,  
-0.5193467200233968,  
0.16205999751797937,  
1.0319480004914923,  
0.0466744549888964,  
0.8866401912062555,  
0.6199118226017315,  
0.9594432756697039,  
0.30783399339708145,  
2.007890427791846,  
-0.42290702105473665,  
-1.4981000967272742,  
0.1246045734342663,  
1.4175139007816862,  
0.730422807509675,  
-1.0203109099547352,  
1.2475764531977165,  
1.172103834016867,  
2.0417923602468857],  
[ 0.3006295792025693,  
0.5011825648484141,  
1.736075427951676,  
1.7894431127664152,  
2.4859557870150857,  
3.6898895058559917,  
3.73290444462633,  
3.73290444462633,  
3.741728259130309,  
4.1342678631525835,  
4.145528657970977,  
4.615983426127272,  
5.6679892124870985,  
5.692197651053977,  
5.773115344270512,  
6.56178194421021,  
6.56178194421021,  
6.56178194421021,  
6.56178194421021,  
6.56178194421021,  
6.561820835625042,  
6.6476324960056985,  
7.649631249906491,  
8.361638748929934,  
8.576867085540188,  
8.77036061445696,  
9.827286891841206,  
10.5379658375992,  
10.558826131428928,  
11.83004188936984,  
1.5987671786815294,  
-1.5058826811902317,  
2.0440908601375476,  
-1.481172398738803,  
1.4265067306792671,  
1.3375234069756785,  
-1.0089917144708827,  
-1.8440331252413595,  
-0.062239877224771915,  
0.18483713323292328,  
1.8795821846896128,  
-2.058552713287731,  
0.9708425302661001,  
0.8840527876953188,  
0.5964490041287303,  
-1.4043070469033054,  
0.14533141919970372,  
0.022743431858071796,  
-0.3923086391326145,  
0.11023448615420071,  
-0.4204112521530586,  
0.5529792020785508,  
-0.6330031478534407,  
0.23236293228773558,



-0.4459800436834905,  
2.5876988326738504,  
0.6844024813933239,  
0.1732372067049823,  
0.7384853056565549,  
2.8826092918303563,  
-0.11204335589185775,  
-0.2241007440171772,  
-0.4845273525281558,  
0.2744214554588425,  
0.26177442491958286,  
0.4512467910671607,  
-0.6063187184164835,  
-1.2386469417803163,  
-1.1719897599242013,  
1.9705273482015357,  
1.945221133626245,  
0.15309311442469994,  
0.690693149150703,  
0.22188036413222653,  
0.47722534320651633,  
0.12444414704260098,  
-1.0057594761976716,  
-0.3351811680967541,  
1.0750707752291546,  
-0.04597654655420585,  
-1.4770936089010136,  
0.1839119320523196,  
1.0453831678930239,  
1.6851715686961402,  
2.1701829049155683,  
1.692817047863365,  
0.44152889324253053,  
-0.3402272157802259,  
-0.4600811596334244,  
2.365566181908148,  
1.166608300050211,  
-0.12230572309949261,  
-0.07192631995381693,  
-0.48825404466402955,  
1.202761995004197,  
0.503733093641068,  
-0.2613796073125891,  
0.7323467617888468,  
0.30547819787235264,  
0.46207631030173263,  
0.034964002783702264,  
-0.30773087511026637,  
2.2827399003210256,  
0.773042400324002,  
0.07466204753764587,  
-2.812532590652055,  
0.7925074856015164,  
3.3306642432255886,  
-0.8558810509247932,  
-0.9283746444488663,  
0.3079774400122357,  
0.5580467297921388,  
0.5588934104639726,  
0.6444350594161403,  
1.5119717259179621,  
0.14573434197560214,  
0.7631266139944589,  
-0.43452714539522225,  
0.38832086457140946,  
0.36234082213113916,  
-1.3222695581402877,  
-0.6140190631377459,  
2.2873566508452354,  
1.0349767974312705,  
-0.5734592440854204,  
0.5234040439377924,  
-0.8213429806368828,  
-0.8621355796854082,  
-0.5355268774606846,

1.8804920616270637,  
0.022682713405259486,  
1.3625464560687972,  
-0.48449497738356756,  
1.6018376883784673,  
-1.3963097787223904,  
-3.511711037561943,  
1.3223211880663501,  
2.1298031669093946,  
0.24542774430512565,  
0.7034284248706182,  
-0.37346698797179273,  
-0.43051209966139187,  
-0.1034377630705127,  
-0.07417862116176438,  
0.2595758000914042,  
0.9523286668350031,  
0.2556898901330524,  
0.22603519843353895,  
0.9866656966967039,  
2.5031147117731094],  
[ 0.6608465720820748,  
0.9671982645454077,  
1.5458030244804597,  
1.5458030244804597,  
2.2589946156031733,  
2.2589946156031733,  
2.2589946156031733,  
2.6595607382107107,  
3.734699662125929,  
4.07592175958283,  
4.611631942641649,  
4.831287600721991,  
4.831287600721991,  
5.914025831134952,  
5.914025831134952,  
6.072969066301945,  
6.991999801396327,  
6.991999801396326,  
7.161687480905546,  
7.673022292320241,  
7.821921961804373,  
7.912193421610441,  
8.287160283389671,  
8.956173402171897,  
8.956173402171897,  
9.75268721078065,  
9.941478738047602,  
9.941478738047602,  
9.945621910117605,  
10.438880525762482,  
1.4707024445054038,  
1.5353178524994073,  
0.8263465992797864,  
0.5104925709601137,  
0.0752285958369072,  
-0.1142202547489564,  
-1.4526020976761953,  
-1.3531650678039584,  
-0.5250403673431315,  
2.237334263415747,  
0.2921144645165799,  
-1.3764237769851546,  
0.48788675650681135,  
0.8685067508645514,  
0.519063599878773,  
1.1970126362568978,  
0.35376457746361467,  
2.1361591146989944,  
1.704664258187609,  
1.1956277779681033,  
-0.8317273346515459,  
1.1961203419780542,  
0.6738815365004568,  
2.0453196594697167,

-0.3197500197249862,  
0.3940149430820266,  
-0.03491413991246975,  
1.9231424652296574,  
-0.7553371587587144,  
0.5536882090799309,  
-1.1151355813488422,  
0.06532487835880797,  
-0.03610632383025197,  
-0.721099071948806,  
-0.7712693743746337,  
0.2581737620009136,  
0.6969815452179084,  
-0.4519889309472695,  
-0.6781990341468844,  
0.3896669141200773,  
0.746036455743935,  
0.10534513312025831,  
-0.7953867627526213,  
-0.17196672908166516,  
1.1080637640216904,  
-0.36906579226317304,  
0.3903518027422727,  
0.7340380536410088,  
0.16483545086429002,  
0.12911772875241279,  
-0.11978924907966522,  
-0.5410781247103603,  
0.27894738356501725,  
-0.04603280575778243,  
0.3301412555435043,  
0.020942359039511207,  
-0.535470327679227,  
0.26379415288467284,  
0.7549681986050077,  
-0.774180168996079,  
0.3042677541816752,  
0.2314702730743271,  
0.4347582057672544,  
0.5269984906212896,  
-0.5883800499089586,  
0.4216788732962846,  
-0.39154710450095487,  
-0.20962806789618654,  
0.008988716066278926,  
0.42160932452985955,  
-0.4362625059483254,  
0.7149808650234762,  
-0.9606565556866927,  
0.02867923202735973,  
0.6474453926631074,  
0.3125034088891559,  
0.24941070182093517,  
-1.0996459114603814,  
0.42918254303405223,  
1.1958230549534523,  
-0.23035300079654375,  
0.43394127898307777,  
-1.1958360530234091,  
0.2490392548916114,  
0.956337072693143,  
-0.9098880983840639,  
0.24421397010525564,  
0.32228144879356985,  
-0.04019115817841665,  
0.601865593110944,  
-1.0390070893344725,  
-0.3870853595246112,  
1.5254374970388465,  
-0.06482825900051802,  
1.508536156596221,  
-0.4193438972827081,  
-0.2124704995099638,  
0.7982743594716017,  
0.625924999124879,

-1.2144964531756246,  
-0.7306315051046057,  
-1.3775043670320717,  
-0.5254300493631905,  
0.24182169388976885,  
0.05618119509583439,  
-1.1649033986061088,  
0.4414909596355956,  
1.1243259379005652,  
0.9623501696515389,  
-1.0198159738874641,  
0.6746700507964939,  
0.9071271136722682,  
-1.490119256375095,  
-1.8915932031257203,  
1.4861820000050194,  
0.020835967248483293,  
0.2672579153437498,  
1.1487299094399863,  
1.7394956603554965,  
2.161406077992875],  
[ 0.009700543149373924,  
0.009700543149373951,  
0.00970054314937392,  
1.382070146567131,  
1.7587904521787645,  
2.560406827400793,  
3.0924393369175114,  
3.3853584719898073,  
3.3853584719898073,  
3.3855655528609647,  
3.9151369396989866,  
3.9151369396989866,  
5.054043379727587,  
5.058642146366078,  
6.082229999853835,  
6.348636465887238,  
6.754028454322125,  
6.777976106859175,  
7.783524996765277,  
7.783524996765276,  
7.783524996765276,  
7.995280883445485,  
7.995280883445485,  
8.645089634948334,  
8.925040343314908,  
9.356899631457969,  
9.439062141544271,  
9.717990345174004,  
9.717990345174004,  
10.595210012065888,  
0.8074121230882934,  
-0.11817978440691497,  
2.3039735343549332,  
-2.1294851108225332,  
0.6714134591558454,  
0.45516684502263977,  
-0.8318799457604262,  
-1.6937930072137053,  
0.039287662842651484,  
0.5223639661903685,  
-1.2122069881806565,  
0.27186944236208743,  
0.22304871394760792,  
-0.08855679301585977,  
1.1988033553075006,  
-0.9660581453773212,  
1.393585655420428,  
0.524497607950108,  
-0.22549193465024678,  
-0.20940428560116026,  
-0.22546417020605838,  
-0.06641646114084936,  
0.3531991811801793,  
-0.06811222553567531,

1.0762936524340476,  
0.17762298521732672,  
-0.24437612021854904,  
-1.0622868736463833,  
0.41092319903165814,  
-0.5877006275418265,  
1.2299752305066975,  
-1.5519910987794148,  
0.6657478217748831,  
-0.027661876184918333,  
0.011781258679136937,  
0.9082970931589502,  
0.006644189925206108,  
0.3712893817061966,  
-0.04659784477089089,  
0.2991695519878787,  
1.4480032246106211,  
0.3765628272855095,  
0.3810659512210775,  
-0.4053198419433054,  
-0.06957688452126994,  
0.08768201200938007,  
-0.16514507742174195,  
0.05923670456485792,  
-1.0025267882306543,  
-0.041476053822733706,  
0.4728058870419665,  
-0.09799142504381375,  
-0.642516889827151,  
-0.521645479249954,  
0.18062390558973918,  
-0.5137105837376863,  
0.315588961893638,  
1.0102820620809385,  
-1.412161058774387,  
0.5136468128759858,  
-0.5616754178138471,  
0.11099281329082958,  
-0.4065421947836274,  
-0.8520422495977672,  
1.5662481725135406,  
-2.09542418518098,  
1.2116955825236206,  
0.8221816705323761,  
0.041900809919046114,  
-0.09736226691448804,  
-0.6600925025551557,  
-1.1656564284287168,  
0.8214103261157102,  
0.28477271669010623,  
0.5992804506866763,  
-0.21193327493741926,  
0.6490050812244267,  
0.8872065875645788,  
0.2758198961026023,  
-0.3259804283588707,  
0.5954957550354935,  
0.8064107897831347,  
0.15673794452304002,  
-0.5606863141571317,  
1.1354810000650886,  
0.29170605524887394,  
-0.6471431342469229,  
-0.29364595444579666,  
0.05289373230476578,  
0.03489286830366231,  
-0.10405686076243598,  
0.4547289014370767,  
-0.1747513431047453,  
-0.28439942445332933,  
0.010516254927139741,  
0.11813385237732216,  
0.3966163987420368,  
-1.37250350754582,  
0.06601400397758364,

```

-0.3662241908629097,
-0.07601408247331909,
1.737776242565087,
2.1849230369400683,
-0.5785032754175823,
-0.5063968590594791,
-0.23335270192508997,
2.320012252653636,
0.6182382779358941,
0.7875200859675175,
-0.009873677663214134,
0.7482624361366613,
-0.35875384806276184,
-0.5357091554695692,
0.4397736267416906,
0.16706548411788932,
0.9251966251074774,
0.053252937203382235,
-0.23592171730002592,
1.2877035765438765,
2.1426518726936172]],
'run_time_sec': 43067.655497312546}}],
'redundant': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.38848003251483587,
0.3884800325148359,
1.2841735835398218,
1.284173583539822,
1.2841735835398218,
1.818138220668234,
1.818138220668234,
2.7575469841005327,
2.7575469841005327,
2.7575469841005327,
3.0053468968599275,
3.0053468968599275,
3.005346896859927,
4.184079661691832,
4.83635165164968,
4.83635165164968,
5.97926077140412,
6.458805266455043,
6.513102391504654,
6.513102391504654,
7.122105903846713,
7.2188422331450415,
7.988590448127284,
8.268095077127937,
8.268095077127937,
9.164456488648115,
9.164456488648115,
9.782953992889732,
9.782953992889732,
10.467486029517685,
1.5496959718296535,
-1.0300437645832343,
0.425343365508412,
-1.7136674729251273,
0.33645197441382346,

```

0.2288357961575219,  
0.10470230685228102,  
-0.6612661793744108,  
0.11823315872480306,  
0.48571962162230753,  
-1.3748501535311368,  
0.2563120795974374,  
-0.38871520150353267,  
-0.18786175076151226,  
1.0017996241286973,  
0.05598903629217323,  
1.501328526357405,  
-0.32299727271195017,  
0.5715295079657807,  
-0.12201961934486968,  
2.2747823054657927,  
0.16289086097520028,  
0.027619518366160244,  
-0.10165606616500937,  
-0.06321979816820887,  
-0.27543819802246033,  
-0.0048370064103128475,  
0.1330138167350915,  
-0.06428151371988705,  
0.21905201010909556,  
0.25697175483980955,  
-1.462905966720411,  
0.8014511304369155,  
3.456137165485204,  
-0.3560002683832885,  
-0.4886877133354182,  
0.32039145066707037,  
1.6153352350920127,  
0.5940099487759896,  
0.18140087044059483,  
0.27123106498617,  
0.7444341922951362,  
0.170480557625751,  
-0.4688462519246396,  
0.5235839184929864,  
-0.5470964469389679,  
-0.011921500492307424,  
1.4116230981753706,  
0.49972453659747124,  
-0.7800673920851233,  
0.4234227404504273,  
-0.2071635265929523,  
0.14064328933496192,  
-1.2007096247825992,  
0.12047098237640114,  
-0.4125103841815656,  
1.0447620953563077,  
0.0020814149928196773,  
0.4988991062112368,  
-0.34495773827123155,  
-0.12849063482979717,  
0.4280934542561602,  
0.7138444629946918,  
-0.6497712710787925,  
-0.43652659674625793,  
0.917432486791049,  
-0.8523477361785018,  
0.5648987974980545,  
0.3183226113969618,  
0.14295784675778261,  
0.9589824340171335,  
0.9194478619356266,  
1.1001359353915339,  
1.5417377267389083,  
-0.5376003771957187,  
-0.5404528215706331,  
0.21624687748210675,  
0.8814937279455825,  
-0.371639532103812,  
-0.2668100917972658,

```

1.3133163210428074,
0.44574090697479807,
-1.0940261852319737,
-0.313830643067749,
-0.06100275437545863,
-0.049560783686653447,
-0.3025056724120473,
-0.9891529613817422,
-0.35099332176432035,
0.5436069706516342,
-0.722828417704955,
1.6968661444846564,
-2.4402971962208975,
0.7865745542588627,
1.3437881169309889,
0.36108471326554326,
-0.1749159211919777,
-0.014334278530919132,
0.02978377629472008,
1.8533978555002608,
-1.8470426695738211,
0.6272356375919823,
0.44775499409400255,
1.3281153539688288,
0.4583217606753929,
0.6443670392327268,
0.5254233581973354,
2.3087652110195127,
-0.7761319091913014,
-0.7605421959233766,
-0.6461580464596497,
0.7075597766411752,
0.985778508379752,
-1.3130974173457381,
2.8711331564400684,
1.2993543284582694,
1.9493614761217355,
1.1647493000584068,
-0.42731613935458074,
2.7038346000669766]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric2_sample#6'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,

```



```
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X '
'2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X '
'5 + 1 Z 4 + 1 X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Y 0 '
'Y 1 + 0.5 Z 0 Z 1 + '
'0.5 X 1 X 2 + 0.5 Y 1 '
'Y 2 + 0.5 Z 1 Z 2 + '
'0.5 X 2 X 3 + 0.5 Y 2 '
'Y 3 + 0.5 Z 2 Z 3 + '
'0.5 X 3 X 4 + 0.5 Y 3 '
'Y 4 + 0.5 Z 3 Z 4 + '
'0.5 X 4 X 5 + 0.5 Y 4 '
'Y 5 + 0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + 0.5 Y 5 '
'Y 6 + 0.5 Z 5 Z 6']},
output': { 'data_points': [ [4, 2, 0, 0, -6.1446915183056525],
[12, 6, 0, 0, -4.667338994079639]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}],
'run_time_sec': 4.555680751800537}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
-cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
r': 0},
time': {'max': 10.0, 'min': 0.0},
type': 'heisenberg'}}},
init_param': { 'value': [ -1.8784742854218807e-17,
-7.763750530158576e-17,
0.3802827375258553,
0.44096449652630626,
0.8040692975576897,
1.9224694434519336,
1.9224694434519338,
1.9224694434519336,
1.9224694434519336,
1.9224694434519336,
1.9224694434519338,
```

2.730288811725591,  
4.476350841356259,  
4.476350841356259,  
4.476350841356259,  
6.331658137341824,  
6.331658137341824,  
6.7621011201584285,  
6.77851096220289,  
7.490043179529316,  
7.490043179529316,  
7.490043179529316,  
7.490043179529316,  
7.511664240193972,  
8.302259372586072,  
8.36899822047307,  
8.607405767895836,  
9.631163052898822,  
9.874876363637043,  
10.225975825453373,  
2.711573403856553,  
0.20239905137011172,  
-0.4220883549830381,  
-0.8404830976891227,  
1.794332340210785,  
1.5095243517856047,  
0.22326098118939897,  
0.07733371735403745,  
1.280548885023134,  
1.4121496210624682,  
0.9815935680907694,  
-2.975348552150871,  
1.6316643284140941,  
0.8239502945369961,  
0.0314505340316768,  
-1.0892891749800817,  
1.720694113273713,  
0.6634696927679957,  
-0.836512780686814,  
-1.1286873737196692,  
-0.09500137106776224,  
1.0428135848317974,  
-0.4828772957450712,  
-1.129334172148368,  
0.7253737318795237,  
1.4108675361353635,  
0.7588540034470418,  
-0.5039485441412638,  
0.10346857579652805,  
1.2668095290766983,  
0.7994757345637048,  
-0.7393240316081237,  
-0.7818304990031031,  
0.25375980918776664,  
2.228975199542585,  
2.2487625387645873,  
0.6384105819815235,  
0.39434544396871446,  
1.3679129840939837,  
-0.27336699910726836,  
1.3170761670781417,  
1.1159622861844822,  
1.176824183488981,  
0.40583799697229034,  
0.8786168217534174,  
0.2914083315983707,  
-0.8464697846173548,  
-0.032455291822620566,  
-2.0755386823554396,  
-0.11439663923099666,  
0.7312672791487281,  
0.4263196833485598,  
0.11802610051350722,  
1.0445881812565523,  
-1.9566462184988007,  
0.9492303984073598,

```
-1.7129593951518396,  
-0.3230601534209437,  
0.3161713641922788,  
-0.4811213940350071,  
0.08327140785409295,  
0.37526634808329173,  
-1.9990814349080968,  
-0.15397700748904192,  
-0.9549084255901845,  
1.1120455683467105,  
-0.42952128451280097,  
0.17929609797141985,  
1.0446016069356951,  
0.846774755857218,  
-0.2784586201121851,  
0.23000407229986752,  
-0.9198047598183884,  
0.996529675185623,  
0.34608382599103005,  
0.5099375110708237,  
2.1948932092248885,  
1.3625694142279887,  
-0.9306056124011278,  
0.6012804875871011,  
-0.7788968212470156,  
-1.5884735532174328,  
1.0361309111992296,  
0.015937704739038126,  
1.4003797043998856,  
2.429422654005534,  
-0.27504014116509645,  
0.8256449732433587,  
1.2146087003914199,  
-0.6435553984602482,  
0.3046269503778821,  
1.0182549333954134,  
1.4202224852266074,  
1.3511302325707892,  
-0.7261672378416364,  
1.5992752660640235,  
-0.5764295578986515,  
-0.8318409785507642,  
1.1375736468462807,  
0.8529850561064739,  
0.9553972898831558,  
-0.09161160854677679,  
1.617622889574723,  
1.4551513261723394,  
-0.08817813881493969,  
0.8045852859105778,  
1.9892741470924016,  
1.8347816167556374,  
-0.8050652823779443,  
0.008511392950551585,  
2.1460096989270747,  
0.49277581514942953,  
-2.4311684786278165,  
0.5134791015266132,  
0.9751974520662461,  
-0.38582649358518695,  
0.7746227771853464,  
1.7307944301597258,  
2.1320333699599043,  
1.1654652968447545]],  
'noise_profile': { 'noise_on_init_param': { 'status': False,  
                                              'value': 0},  
                  'noise_prob': [0.001, 0.001, 0, 0],  
                  'status': True,  
                  'type': 'depolarizing'},  
'nqubits': 7,  
'observable': { 'coefficients': { 'bn': [ 1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,
```

[illegible]

```
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}},
'init_param': { 'value': [ 0.6189603325174557,
0.7142372255934472,
0.818217611349809,
1.1433975540074377,
1.9121137997887092,
1.912113799788709,
1.9189666863881127,
2.194219841514053,
2.734492156740232,
4.250258815642276,
4.250258815642276,
5.774076859791501,
6.527612880112256,
6.532834731882501,
8.049613322901676,
8.049613322901676,
8.050730377555883,
8.561643142317116,
8.561643142317116,
8.758357012835646,
8.758357012835646,
8.78353884989931,
9.477076383056275,
9.536600626467342,
9.536600626467342,
9.536600626467342,
10.241295505019522,
10.318321333031077,
10.579129354925781,
10.82886994059623,
3.662494394083504,
0.08309129295248968,
1.5295376506525808,
-1.5964000102221196,
1.8988970610647178,
-0.07218621526676876,
0.7238532160702689,
-1.2917423920622229,
1.8532222971765195,
-0.40818119715800666,
0.469598065996274,
-1.2652675561295137,
0.41465882817859046,
0.48683539382624846,
-0.15336518315146752,
-1.6419783820068856,
1.2136622236743368,
0.5933123377118196,
0.9666225223219593,
0.9539776194708611,
-0.3793986531891993,
-0.2570964298405315,
1.5884302353807402,
0.19867970725527498,
1.0036205245072367,
-1.7266220384949087,
0.6519864384701275,
0.173373648086925,
1.8697046853700252,
0.5263944462203128,
2.9785129063723943,
-0.5937256494260224,
```

0.22753174799850245,  
0.24918335157216837,  
1.5438671949833176,  
-0.2981477150404249,  
-0.0503664733834821,  
0.542442835193611,  
1.8096859498837612,  
-2.2260935596321993,  
0.28693396030012636,  
0.9986781622414097,  
-0.01940263773226835,  
-1.8805315707929653,  
-0.1513202473661221,  
0.1836836320118686,  
-0.5655439481125303,  
-0.30323205019871646,  
-0.4186198812206128,  
0.2357002564872809,  
2.8296979465953833,  
-1.0776781071762758,  
-0.08378558447273823,  
1.7446476514004516,  
-0.4606832586075214,  
-1.762173446350097,  
0.10241780783627007,  
1.6018254886002428,  
0.2621004786967086,  
1.349261138919249,  
0.14987623247602613,  
0.5068543254371847,  
-1.3474781551208477,  
1.0890436270679893,  
1.6662048029626129,  
0.3608718991529565,  
-0.11137748070221386,  
0.5641204379289552,  
2.2546014997074266,  
1.8888740160956543,  
-0.23345107582518032,  
-1.5772444286238798,  
2.1408383357361265,  
-0.4968079560788485,  
0.1533667959779154,  
-0.40238715350257875,  
0.25591729793510365,  
2.947382531044255,  
-0.32162602471486745,  
-0.7587223675916386,  
-0.8983111566200868,  
0.006114119281372181,  
2.9372824954589514,  
0.48288231335139287,  
0.7939297064609614,  
1.9454360656955985,  
2.092519500518508,  
0.8995449331251366,  
0.10171517677156572,  
0.45235144869603666,  
1.02501950409702,  
0.24331156538914245,  
0.48973195386607005,  
2.672871435464254,  
1.313352678455905,  
2.010046934709317,  
-0.42153209835304317,  
-0.13436700176919486,  
-0.6950305532982513,  
0.602655355930264,  
1.6681913778840949,  
0.4125109526933123,  
0.514533549588801,  
1.0794873063708696,  
-0.9571806916209341,  
0.27630815458061647,  
0.6001387806934945,

```

0.5059087494947612,
-0.5722342732268321,
0.3986919058890637,
1.0044202485382987,
0.3352295947729849,
1.3777059541173544,
-2.835684252944388,
0.6104690716589696,
1.838086538234438,
-0.3106134411398272,
-2.2167272073692903,
0.10706372359431235,
-0.17469850626418476]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric2_sample#3'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X '
                                '2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X '
                                '5 + 1 Z 4 + 1 X 5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Y 0 '
                                                         'Y 1 + 0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + 0.5 Y 1 '
                                                         'Y 2 + 0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + 0.5 Y 2 '
                                                         'Y 3 + 0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + 0.5 Y 3 '
                                                         'Y 4 + 0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + 0.5 Y 4 '
                                                         'Y 5 + 0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + 0.5 Y 5 '
                                                         'Y 6 + 0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.218690041461777],
                             [12, 6, 0, 0, -4.805156509769757]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': { 'noise_on_init_param': {
'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
```

```

0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}},
'run_time_sec': 4.225522518157959}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}},
'init_param': { 'value': [ 0.4022850038273885,
0.4222288083135141,
0.7644599371513524,
0.7900179023917507,
1.1026508993249646,
1.1630326759467198,
1.1630326759467198,
1.2119340062926192,
1.9859325565890973,
1.985932556589097,
2.096166401632718,
3.378647998605865,
3.378647998605865,
3.378647998605865,
4.354848115861854,
6.006218342726225,
6.006218342726225,
6.009974297352436,
8.225327865566033,
8.242093148909708,
9.222354355246733,
9.369468664000962,
9.432712219232048,
9.692289963799956,
9.692829942577658,
10.391360826688166,
10.391360826688166,
10.529867035412478,
10.529867035412478,
11.06290493838992,
2.9062307172979733,
-1.7788694936155562,
-0.1145266982224492,
-0.9311559923392093,
0.9691998209476543,
1.7463479137973288,
-0.7663862807329105,
-0.9694574896037749,

```



2.8979112386638413,  
1.1400097878698292,  
0.8096361549155084,  
-1.5900494197653285,  
0.09829667109053167,  
0.31839493135320834,  
0.3886777840539921,  
0.12229184789371997,  
1.7250225844898464,  
1.0065795676456808,  
1.4535641205083867,  
-0.3486770669120958,  
0.2556790893233589,  
1.778531141883236,  
0.269972269049403,  
1.0155903957099945,  
0.8041163886037216,  
0.5381821926966456,  
-0.30108604163317454,  
0.6396533041678052,  
2.1819991440037696,  
1.4978086658278347,  
2.5181040929106753,  
0.4624415671193703,  
-0.17701736987873673,  
0.6910098122382194,  
2.947172461882987,  
-1.0727539032453073,  
0.4023854197196741,  
1.650490750838525,  
0.9313998963798695,  
-0.6769162055305248,  
-0.5620785927454173,  
-0.20885673940707247,  
2.5019757090972443,  
-0.37561416876024456,  
-0.9329392032282731,  
0.7818961506889994,  
0.44350434198669075,  
-0.10644929099379355,  
-2.498928032568615,  
-1.2046085786256906,  
-0.06365416567297402,  
0.17257236645054272,  
1.2516209341031546,  
-0.3591527663232026,  
0.46789807326225935,  
0.24374638092155315,  
0.02110383811013195,  
0.12714835746845662,  
-0.5505736947218767,  
-0.03497727012222505,  
-2.2168334497478877,  
-0.21485512988314215,  
1.7552902914988067,  
0.6189795903733311,  
0.3191491062237487,  
0.522632432692797,  
-1.1121089236913335,  
1.1371618962620422,  
-0.2410043783817164,  
0.24168543661014927,  
0.39418565996934685,  
1.2107667809264395,  
2.398781467533486,  
0.6948257569073976,  
0.6170229142231725,  
0.7050419245924102,  
1.768546262611762,  
1.5562956304120967,  
-0.4269237214365518,  
0.6302835616447369,  
1.7710848704009405,  
1.2281100264507194,  
1.5036530549577243,

```

-0.7435268012971183,
0.7613541379199313,
0.8523298100708424,
-0.6655959646469325,
1.1543911681084875,
2.2675628634479494,
1.0299985170060308,
1.400963430022522,
0.27759304330136975,
0.6960561589746208,
-0.4210335016880339,
0.0336463669485127,
-2.099660094290342,
0.6674819238895001,
0.5049668435179431,
0.48001405045948287,
1.3574871122533543,
-2.2986993170736225,
9.601426007351498e-05,
1.3312470798272018,
0.7582238004326416,
-0.35033967277151296,
-0.4108552112493075,
0.1982910129710702,
0.6700017270602091,
0.26559360983179486,
-0.14563210230012705,
-0.39610135234418875,
1.1727729846793147,
0.6713573564879365,
0.8527070052929181,
0.8268283343075853,
2.2918575835381745,
0.5082103460913493,
1.8600493489550152,
0.49576811175353974,
2.232387985311215}},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric2_sample#8'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X '

```

```

'2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X '
'5 + 1 Z 4 + 1 X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Y 0 '
'Y 1 + 0.5 Z 0 Z 1 + '
'0.5 X 1 X 2 + 0.5 Y 1 '
'Y 2 + 0.5 Z 1 Z 2 + '
'0.5 X 2 X 3 + 0.5 Y 2 '
'Y 3 + 0.5 Z 2 Z 3 + '
'0.5 X 3 X 4 + 0.5 Y 3 '
'Y 4 + 0.5 Z 3 Z 4 + '
'0.5 X 4 X 5 + 0.5 Y 4 '
'Y 5 + 0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + 0.5 Y 5 '
'Y 6 + 0.5 Z 5 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -5.743389283741309],
[12, 6, 0, 0, -4.3560016590478785]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}],
'run_time_sec': 4.8073859214782715}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}},
'init_param': { 'value': [ 0.16477895719846114,
0.16477895719846108,
0.7183189156962347,
1.8697093861419474,
2.105082615571597,
3.05308344502201,
4.199393321043376,
4.199393321043376,
4.199393321043375,
6.490210948425593,
6.4902109484255925,
6.490210948425593,
6.4902109484255925,
6.4902109484255925,
6.4902109484255925,

```

6.490210948425593,  
6.882554174728105,  
6.882554174728105,  
6.882554174728105,  
6.882554174728104,  
6.8877583035732775,  
6.8877583035732775,  
6.8877583035732775,  
8.21014824639056,  
8.21014824639056,  
9.071469420716642,  
9.120928605341893,  
9.714944098401723,  
11.474131735950095,  
11.474131735950095,  
11.794551582273902,  
1.341188628911811,  
1.6554894539990426,  
-2.1068974621953425,  
-1.4171475675653578,  
0.33211669069513333,  
0.11331792925356984,  
-1.3610911099963097,  
0.46439741779020816,  
0.9313501387866817,  
1.0938593094543279,  
-0.3591727738608774,  
-0.4732622270970327,  
1.6321598874818157,  
-0.2782091348514778,  
-1.0526781349295347,  
0.0708703831522549,  
2.6982701224663113,  
-0.038867313655444914,  
-0.10508583152652556,  
-0.40759365792756236,  
0.6284849004330764,  
0.5192751929971827,  
-1.6282040637266806,  
0.0014422433007245106,  
-1.8299719264591412,  
2.3182597876656823,  
0.8875167319646391,  
1.5664268415036142,  
1.5052778791259855,  
2.935955436800565,  
1.533101581959507,  
1.8091829332960188,  
0.45080966818917967,  
0.1506883627647002,  
-0.6843548866459184,  
-0.5544883854492364,  
1.2466562002431278,  
-1.1866110136199353,  
1.4521358231995756,  
-1.125608676420736,  
-0.24054383618816966,  
-0.058272145415006006,  
0.410408128597049,  
-1.6441753460137252,  
0.4019816715685168,  
0.4588365987304068,  
1.354346078964423,  
-1.7153251360741875,  
-1.1039978646265602e-06,  
0.7940670488104785,  
0.17979772520560053,  
-0.24385394325110826,  
0.6367160741723578,  
0.8500459957371875,  
0.0559416907316065,  
0.32418668587130467,  
-1.4797636873635434,  
0.11902177942387202,  
0.5185165439317966,

```

-0.08399222686641401,
0.8650918037299421,
1.4911587670088011,
0.12792248933645675,
0.3372262149750348,
-0.6553154954729696,
1.1995792367396254,
0.5132294030998703,
0.44835115860783636,
-0.37116980512777586,
0.7805194563374558,
-0.854334789795377,
0.5008527672922033,
-0.2302685629030402,
0.6145182391921147,
-0.6575500079215796,
0.8657035637529482,
1.1874516653159721,
-0.16284802367068918,
-0.26462171656665856,
-0.9815102056659819,
0.23198397744948207,
-1.087097195512072,
0.6616385654966559,
-0.2929637257774683,
0.03471390505932934,
0.2048751570049573,
0.9170017118070749,
0.39617956766989404,
0.12006199846995962,
0.1922705913940127,
0.8784478594386566,
0.055479957240883566,
-0.6634105431569992,
1.0742951419164057,
-0.37818200958777604,
0.28548758229245597,
-0.6594827056613419,
1.0235832498557866,
-0.19428253177041227,
-0.5531991468121416,
-1.189626464718852,
0.2519110119226656,
-0.6708462316627377,
2.7994352657547057,
-3.8764436680175813,
0.5152327138619494,
-0.3749347648847944,
2.9042167722097862,
1.1265965037549552,
-1.850959186134046,
2.165374611027145,
0.8818414791702859,
1.5039524911129019,
0.06564767423285973,
0.6486215314149069,
-0.08854143781823305,
1.8396223528529987,
-0.00792246728000446,
2.8805879469479487,
3.6337353861266473}},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,

```

[illegible]

```
                                0],
                                'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                'r': 0},
                                'time': {'max': 10.0, 'min': 0.0},
                                'type': 'heisenberg'}},
'init_param': { 'value': [ 0.11853625011402234,
                             0.11853625011402236,
                             1.1173235551611367,
                             1.7342580765110573,
                             1.7342580765110573,
                             2.108144483620023,
                             3.054129947242328,
                             3.054129947242328,
                             3.054129947242328,
                             3.056306360633301,
                             4.638414750363569,
                             5.0621851887275495,
                             5.7503913724004905,
                             5.774998407238176,
                             6.917933224474368,
                             6.917933224474368,
                             8.061549209526286,
                             8.061549209526286,
                             8.061549209526286,
                             8.591251503132888,
                             8.591251503132888,
                             9.051235537435975,
                             9.081856762230144,
                             9.467876152039107,
                             9.545932016874406,
                             9.591419209848118,
                             10.465616352275608,
                             10.465616352275608,
                             10.465735173309618,
                             10.980942228105905,
                             2.0734674059611633,
                             0.32892201175743896,
                             -0.007356440825095051,
                             0.7856576253246221,
                             2.089457548986907,
                             0.7744884921126718,
                             -0.35049309306395837,
                             -0.6556831494452968,
                             2.0369525201874903,
                             0.4739652080570001,
                             -0.8564345639983049,
                             1.25716179603495,
                             1.7181260437331554,
                             2.3978160665502384,
                             1.1152024575020885,
                             -1.3335737674295711,
                             0.016650799076572978,
                             1.6607129762234538,
                             0.648059834763191,
                             0.2438725527060928,
                             -0.27307896000752346,
                             1.4369017198677916,
                             3.5672448343800007,
                             -0.5379702113035718,
                             -0.7420664562717484,
                             -0.529699891930992,
                             0.7301471483152846,
                             0.781913925757813,
                             0.6004078048346045,
                             1.7324865479818374,
                             0.4548236607944829,
                             -1.4419813608219112,
                             -0.684662976785234,
                             0.8455512814500156,
                             1.97751114408285,
```

-0.833202517811791,  
1.110524460863052,  
2.6403320691876733,  
-0.3129427957408566,  
-0.06674204626492235,  
0.5842857778318762,  
-0.21132485649138796,  
-0.011842019288790376,  
-0.25743970610802486,  
0.7486616881233721,  
-0.1302029141156864,  
0.09497091477412227,  
-0.3715265429351211,  
0.39570077921274605,  
0.28643868832003017,  
0.7848413456471106,  
-0.7157146817058562,  
0.09411764456438232,  
-0.10910076647953601,  
1.1262761892344808,  
-0.27334997823872975,  
-0.44027652197942063,  
0.6740415100156434,  
-0.336256645457715,  
0.4268157265313067,  
-0.8611696251566416,  
-0.34560928156726306,  
0.5618074077714486,  
0.5866360379174992,  
1.8662876827821717,  
2.21592310898005,  
1.972223656383108,  
1.6141187926643297,  
0.856255815565121,  
-0.34275929095614754,  
-1.0642528745182613,  
-1.0618686751734654,  
0.2379582550153795,  
-0.6501770361983872,  
-0.19408645485522444,  
1.501330829125914,  
1.5726602727591479,  
0.7066066097903853,  
-1.4580936665368467,  
0.46940440748349077,  
-0.1287015677341077,  
-0.9805925033056946,  
-0.3754741669636888,  
-0.026817919501009202,  
1.1067346586651607,  
0.17547923725022047,  
0.8902143171896091,  
-0.22777698610446503,  
0.8082253583749343,  
-1.0674083601412958,  
-0.022706971436593337,  
0.34227899244110566,  
1.3527736523760083,  
2.0767841716125894,  
0.5778568145668401,  
-0.6555502504392442,  
1.2670274746873995,  
0.507694022232518,  
-0.2629991187543805,  
1.7048253080726326,  
1.4088065522309612,  
2.823918413203317,  
1.2763232744235296,  
-1.4348344213353486,  
-0.605496445996402,  
0.09645158262695042,  
0.024639736182597342,  
0.23997550724405606,  
0.9979895378690888,  
-0.40612123795993227,



```

1.826790650755685,
0.029599395583551916,
-0.4592861834683686,
0.0328358806035505,
1.3612120706287358,
0.8210402794880411,
0.05688164146575431,
0.03152531580318861,
2.0316547976974904,
2.795039607579165]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noisefree_time_evo_ric2_sample#10'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X '
                                '2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X '
                                '5 + 1 Z 4 + 1 X 5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Y 0 '
                                                         'Y 1 + 0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + 0.5 Y 1 '
                                                         'Y 2 + 0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + 0.5 Y 2 '
                                                         'Y 3 + 0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + 0.5 Y 3 '
                                                         'Y 4 + 0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + 0.5 Y 4 '
                                                         'Y 5 + 0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + 0.5 Y 5 '
                                                         'Y 6 + 0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.2813019572269795],
                             [12, 6, 0, 0, -4.778373581659957]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': { 'noise_on_init_param': {
'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,

```

```

'init_param': { 'value': [ 0.12420123662801165,
                           0.138246244841176,
                           0.34185010800102933,
                           0.8771280515547424,
                           0.8771280515547423,
                           1.9326762312100456,
                           1.9326762312100456,
                           2.879806034127527,
                           3.4467495190209787,
                           3.460588109395402,
                           3.4605881093954016,
                           3.4605881093954016,
                           3.911934955717517,
                           3.9564836804547703,
                           4.188240551814426,
                           5.098640553346409,
                           5.098640553346409,
                           5.098640553346408,
                           6.466332587579958,
                           7.457565848827182,
                           7.712724508543908,
                           7.890302861063261,
                           7.898577524812402,
                           8.020037295803547,
                           8.020037295803547,
                           9.289723192898348,
                           9.68251578824504,
                           9.68251578824504,
                           10.66694519433398,
                           11.464898013549973,
                           1.8095532965205083,
                           -1.6633278493215808,
                           -1.2281091611401596,
                           -0.40155726479865544,
                           1.7903243850816337,
                           0.18661159996017582,
                           1.2217850039169107,
                           -0.48128156078104645,
                           1.438546033666569,
                           -0.9466383819139143,
                           -0.2179227006066069,

                           'type': 'depolarizing'},
                           'noise_prob': [ 0.001,
                                           0.001,
                                           0,
                                           0],
                           'status': True,
                           'type': 'depolarizing'},
                           'odd_wires': 4}],
                           'run_time_sec': 4.533947706222534}],
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                            'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                            'r': 0},
                                      'time': {'max': 10.0, 'min': 0.0},
                                      'type': 'heisenberg'}},
                          'init_param': { 'value': [ 0.12420123662801165,
                                                       0.138246244841176,
                                                       0.34185010800102933,
                                                       0.8771280515547424,
                                                       0.8771280515547423,
                                                       1.9326762312100456,
                                                       1.9326762312100456,
                                                       2.879806034127527,
                                                       3.4467495190209787,
                                                       3.460588109395402,
                                                       3.4605881093954016,
                                                       3.4605881093954016,
                                                       3.911934955717517,
                                                       3.9564836804547703,
                                                       4.188240551814426,
                                                       5.098640553346409,
                                                       5.098640553346409,
                                                       5.098640553346408,
                                                       6.466332587579958,
                                                       7.457565848827182,
                                                       7.712724508543908,
                                                       7.890302861063261,
                                                       7.898577524812402,
                                                       8.020037295803547,
                                                       8.020037295803547,
                                                       9.289723192898348,
                                                       9.68251578824504,
                                                       9.68251578824504,
                                                       10.66694519433398,
                                                       11.464898013549973,
                                                       1.8095532965205083,
                                                       -1.6633278493215808,
                                                       -1.2281091611401596,
                                                       -0.40155726479865544,
                                                       1.7903243850816337,
                                                       0.18661159996017582,
                                                       1.2217850039169107,
                                                       -0.48128156078104645,
                                                       1.438546033666569,
                                                       -0.9466383819139143,
                                                       -0.2179227006066069,

                                                       'type': 'depolarizing'},
                                                       'noise_prob': [ 0.001,
                                                                     0.001,
                                                                     0,
                                                                     0],
                                                       'status': True,
                                                       'type': 'depolarizing'},
                                                       'odd_wires': 4}],
                           'run_time_sec': 4.533947706222534}],
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                            'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                            'r': 0},
                                      'time': {'max': 10.0, 'min': 0.0},
                                      'type': 'heisenberg'}},
                          'init_param': { 'value': [ 0.12420123662801165,
                                                       0.138246244841176,
                                                       0.34185010800102933,
                                                       0.8771280515547424,
                                                       0.8771280515547423,
                                                       1.9326762312100456,
                                                       1.9326762312100456,
                                                       2.879806034127527,
                                                       3.4467495190209787,
                                                       3.460588109395402,
                                                       3.4605881093954016,
                                                       3.4605881093954016,
                                                       3.911934955717517,
                                                       3.9564836804547703,
                                                       4.188240551814426,
                                                       5.098640553346409,
                                                       5.098640553346409,
                                                       5.098640553346408,
                                                       6.466332587579958,
                                                       7.457565848827182,
                                                       7.712724508543908,
                                                       7.890302861063261,
                                                       7.898577524812402,
                                                       8.020037295803547,
                                                       8.020037295803547,
                                                       9.289723192898348,
                                                       9.68251578824504,
                                                       9.68251578824504,
                                                       10.66694519433398,
                                                       11.464898013549973,
                                                       1.8095532965205083,
                                                       -1.6633278493215808,
                                                       -1.2281091611401596,
                                                       -0.40155726479865544,
                                                       1.7903243850816337,
                                                       0.18661159996017582,
                                                       1.2217850039169107,
                                                       -0.48128156078104645,
                                                       1.438546033666569,
                                                       -0.9466383819139143,
                                                       -0.2179227006066069,

                                                       'type': 'depolarizing'},
                                                       'noise_prob': [ 0.001,
                                                                     0.001,
                                                                     0,
                                                                     0],
                                                       'status': True,
                                                       'type': 'depolarizing'},
                                                       'odd_wires': 4}],
                           'run_time_sec': 4.533947706222534}],
{ 'status': False,
  'value': 0},

```

-0.07921201994836616,  
0.6692914930417907,  
-0.16791294486623565,  
-0.3278463005181308,  
1.2883193159418245,  
1.9001761172388045,  
0.7646920019853412,  
-0.6325477821570596,  
-0.5987552945744136,  
0.5669730115381587,  
0.5983941343774113,  
-0.06179171362000896,  
-0.6867235859693906,  
0.5211737756628548,  
-0.19354588250953578,  
0.6072816218147872,  
0.3472677197742769,  
-0.08031734075212016,  
1.4024126217748347,  
-0.5867181790012919,  
0.809620813948269,  
0.35997425529443994,  
-0.8722967249300235,  
-0.5874818244923429,  
-0.5567926036837068,  
-0.6652314874983639,  
-0.6042054992483096,  
-0.13918430829641074,  
-0.08277488470584692,  
-0.4972293169762719,  
-0.4421668735352916,  
0.6160601456858428,  
-1.1972657609969646,  
-1.1558488364748807,  
-1.4501782622641872,  
0.03989088007781949,  
-0.8684923327267209,  
-0.5569704341339503,  
0.15823054121075,  
0.6345578215095505,  
0.3601853745371903,  
-0.42594808878819745,  
0.08979804115834313,  
-0.153043281560756,  
-0.603228229875778,  
-1.1264410002736531,  
0.6895580235946861,  
-0.11045941959152497,  
0.5174109375139814,  
1.3269460586908306,  
-0.3852298542423827,  
-2.4120095755015893,  
0.08807412161753436,  
0.1228551365077638,  
-0.6982591234727157,  
-1.1618488040328845,  
2.5586909942385017,  
-0.24921574033555105,  
-1.9870969070050777,  
-1.0279498295884981,  
-0.7796802357622239,  
0.48428681889730063,  
0.7162815161060118,  
-0.15547297036103372,  
1.0522591887013215,  
1.772822944479854,  
-0.2654037211186137,  
-0.2720110866721671,  
-0.03929478442656517,  
0.34606077605631835,  
0.5533331494282367,  
1.0574846609095763,  
-0.5747611578732846,  
0.4916772893793279,  
0.9875709691916216,

```

-0.17857479553023695,
-1.147281220275154,
0.37370382177065037,
2.456815155407461,
0.6567596591037266,
0.9507316292553318,
1.5113928877114242,
1.8380989093110256,
-0.1736919900840187,
-1.2666253947041328,
-0.554819304070435,
1.1931643666366285,
0.4614862178419797,
1.2040726557184918,
0.3083618234293392,
-0.4066692475369416,
0.3740368412278018,
-1.684611974494111,
-0.8650016725760176,
-1.4838330341878547,
-0.14344887350922086,
4.203596189627334,
1.1133202614474196,
1.391124117957397,
1.8627332105499828,
-0.28192336755973296,
-1.5416482647725873,
-1.9612892990030817,
0.8836928087418303,
0.300761821046295,
0.6785848024508535,
-0.5500277556546446,
0.5742776326882599,
-1.181756808209963]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noisefree_time_evo_ric2_sample#5'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X '
                                '2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X '
                                '5 + 1 Z 4 + 1 X 5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Y 0 '

```

```

'Y 1 + 0.5 Z 0 Z 1 + '
'0.5 X 1 X 2 + 0.5 Y 1 '
'Y 2 + 0.5 Z 1 Z 2 + '
'0.5 X 2 X 3 + 0.5 Y 2 '
'Y 3 + 0.5 Z 2 Z 3 + '
'0.5 X 3 X 4 + 0.5 Y 3 '
'Y 4 + 0.5 Z 3 Z 4 + '
'0.5 X 4 X 5 + 0.5 Y 4 '
'Y 5 + 0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + 0.5 Y 5 '
'Y 6 + 0.5 Z 5 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -5.814676484708358],
                             [12, 6, 0, 0, -4.248447309496402]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': { 'noise_on_init_param': {
'noise_prob': [ 0.001,
                 0.001,
                 0,
                 0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'noise_prob': [ 0.001,
                 0.001,
                 0,
                 0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}},
'run_time_sec': 4.216556787490845}},
{ 'config': { 'ansatz': { 'gateset': 1,
                        'layer': 30,
                        'ugate': { 'coefficients': { 'bn': [ 0,
                                                             0,
                                                             0,
                                                             0,
                                                             0,
                                                             0,
                                                             0],
'cn': [ 0.5,
        0.5,
        0.5,
        0.5,
        0.5,
        0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}},
'init_param': { 'value': [ 0.43940602753254654,
                           0.4524980474487914,
                           0.6462847510297367,
                           0.6535145711164267,
                           0.7019965052930044,
                           1.0830061860275473,
                           1.4380021973026182,
                           2.1860837771467474,
                           2.1860837771467474,
                           2.1860837771467474,
                           2.4875804812430995,
                           2.911818356328843,
                           4.9134595358452735,
                           5.043089843653786,
                           5.994354774193697,
                           6.658321281734746,
                           6.666230857319696,

```

8.458454027735183,  
8.458454027735183,  
8.458454027735183,  
8.938931772570164,  
8.938931772570164,  
9.876451730548837,  
9.876451730548837,  
10.140618079102744,  
10.453495471248813,  
10.878653713196195,  
11.282429749250388,  
11.726474998572407,  
11.93229290545428,  
2.9640535214497064,  
-0.6206168106317247,  
-0.4035747848788786,  
-2.067222048924027,  
2.0576259596946604,  
1.364315765000901,  
-0.1480698866383175,  
-1.95043906046908,  
0.7897528850889669,  
1.350582507885341,  
-0.3349044763190947,  
-2.3429833820345465,  
2.04351680973891,  
0.8083219796841106,  
-0.06520770630024467,  
-0.8776318722364843,  
2.4862506381076748,  
0.8345121096737285,  
-0.03071661620417745,  
-0.6225183255138825,  
0.7450777062518694,  
0.12619297185303674,  
0.15620862918286052,  
-0.47540100870445906,  
0.6345315438244892,  
1.451076347224231,  
0.10985833383721234,  
-1.6475696409761669,  
1.1918822544398533,  
1.3235539868194213,  
-0.24222060474147966,  
0.2418944215339802,  
1.0397651583041008,  
1.6773252160624976,  
0.16975786500059598,  
-0.9211027317156172,  
0.7590471244619662,  
1.76540125315151,  
2.43856734239768,  
-0.19488067618654012,  
0.8462629124439717,  
0.9979674075340036,  
2.5775834810620677,  
0.5650956422366618,  
-0.5475934153287456,  
-0.0253449469292375,  
1.2524069066350432,  
-0.605696708865831,  
0.7019502861337156,  
0.2803153244338447,  
-1.0831925759777479,  
1.0082140101851143,  
-0.3762046176346905,  
-0.9535933533256993,  
-1.0422804614435257,  
0.13948594332192887,  
0.5835070530053111,  
0.16086524965091817,  
0.06403444071667018,  
-0.06194188553710435,  
-0.4026223625881385,  
0.2750028468648149,

```

0.6789909068622377,
0.05162849323802493,
-0.7735332926339995,
-0.14862918062202837,
0.7661757453229759,
-0.16119730427373616,
0.6482389226852195,
3.1459456036848104,
-0.4760920139337192,
1.6197254159790668,
-0.5506328506738539,
0.9968299487743895,
-0.3106735286083523,
-1.2388662013594425,
0.8898580979157581,
0.43256773745092003,
-0.7272220041247079,
0.8716071923554094,
1.5193589139179793,
0.9787540447681606,
-1.4044929205930872,
-0.1984876316951887,
-0.46744984056178585,
-0.7765225748074835,
0.04344696088727837,
0.32373965212791267,
0.9049555024172572,
0.7139278873651953,
-0.8122282267372439,
0.5323405298774778,
-0.08437719753251166,
-0.14277007957413837,
0.7912147308716768,
0.26055493673650715,
0.11357082745857092,
0.3153698930365579,
3.1981441448638614,
0.32109035951393206,
-0.23017443442945684,
0.0316864124540797,
0.20875812581978664,
0.5466872162452653,
1.2918521189433907,
-0.7312547980705957,
1.4958457475939604,
-0.053193686203739404,
-0.4437772137226961,
-0.5271126400646005,
2.5136810835026426,
0.6674244883024821,
-1.0140291771816496,
-1.177197116527103,
2.058315434744553,
0.050372102721390984,
-0.09022974351195023,
-2.296438941834702,
0.3261688389091777,
0.3072223897800251]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [ 0.5,
                                         0.5,
                                         0.5,
                                         0.5]

```

```
0.5,  
0.5],  
    'r': 1},  
    'def': 'ising'},  
    'output': { 'draw': { 'fig_dpi': 100,  
        'status': False,  
        'type': 'png'},  
        'file_name_prefix':  
'AUTOMATE_heisenberg_noise_free_time_evo_ric2_sample#1'},  
    'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},  
    'run': 'redundant',  
    'state': 'dmatrix',  
    'vqe': { 'iteration': 1,  
        'optimization': { 'algorithm': 'SLSQP',  
            'constraint': True,  
            'status': False}},  
    'zne': { 'data_points': None,  
        'degree': 0,  
        'method': 'richardson',  
        'sampling': 'default'}},  
    'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X '  
        '2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X '  
        '5 + 1 Z 4 + 1 X 5 X 6 + 1 Z 5 + 1 Z 6',  
        'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Y 0 '  
            'Y 1 + 0.5 Z 0 Z 1 + '  
            '0.5 X 1 X 2 + 0.5 Y 1 '  
            'Y 2 + 0.5 Z 1 Z 2 + '  
            '0.5 X 2 X 3 + 0.5 Y 2 '  
            'Y 3 + 0.5 Z 2 Z 3 + '  
            '0.5 X 3 X 4 + 0.5 Y 3 '  
            'Y 4 + 0.5 Z 3 Z 4 + '  
            '0.5 X 4 X 5 + 0.5 Y 4 '  
            'Y 5 + 0.5 Z 4 Z 5 + '  
            '0.5 X 5 X 6 + 0.5 Y 5 '  
            'Y 6 + 0.5 Z 5 Z 6']},  
    'output': { 'data_points': [ [4, 2, 0, 0, -5.966837375471956],  
        [12, 6, 0, 0, -4.629850195237585]],  
        'noise_details': [ { 'gates_num': [4, 1, 1, 0],  
            'identity_factors': [0, 0, 0, 0],  
            'noise_level': [4, 2, 0, 0],  
            'noise_profile': { 'noise_on_init_param': {  
  
                'noise_prob': [ 0.001,  
                    0.001,  
                    0,  
                    0],  
                'status': True,  
                'type': 'depolarizing'},  
            'odd_wires': 4},  
        { 'gates_num': [12, 3, 1, 0],  
            'identity_factors': [1, 1, 0, 0],  
            'noise_level': [12, 6, 0, 0],  
            'noise_profile': { 'noise_on_init_param': {  
  
                'noise_prob': [ 0.001,  
                    0.001,  
                    0,  
                    0],  
                'status': True,  
                'type': 'depolarizing'},  
            'odd_wires': 4}],  
        'run_time_sec': 4.641341924667358}},  
    { 'config': { 'ansatz': { 'gateset': 1,  
        'layer': 30,  
        'ugate': { 'coefficients': { 'bn': [ 0,  
            0,  
            0,  
            0,  
            0,  
            0],  
            'cn': [ 0.5,  
                0.5,
```



```
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}},
'init_param': { 'value': [ -2.397634216504411e-17,
1.429450133825379e-17,
0.9192297980258759,
0.9192297980258759,
2.8984599305110854,
3.1993874679766523,
3.199387467976652,
3.715279848679994,
3.715919998165357,
5.126008182976459,
5.749875525815113,
5.785995839176617,
5.785995839176617,
5.785995839176617,
5.785995839176617,
6.315437962379428,
6.678845841951143,
7.3578167224936415,
7.415694801781823,
7.531263738212295,
7.949087697575632,
7.949087697575632,
8.111169110068786,
9.407094598577077,
9.495286031274873,
9.495286031274873,
10.993257661103009,
11.063439993331317,
11.639888600691357,
11.75175692668691,
2.1152038588685538,
-0.7839988468841306,
-1.0579861702584952,
-0.5122509123294313,
1.0012369417099964,
0.9275037440003397,
0.5343037326701707,
-0.014459274586663672,
2.31692048955396,
2.1400689678453872,
-0.9468421716760329,
1.3225342455296385,
2.4229762260600483,
1.4561600175543838,
-0.4592924007287594,
0.6389204073366491,
0.5578650700802136,
1.458345504678432,
-0.11931303728638508,
0.04406428844113783,
-0.26144087074192934,
0.6459890964472403,
1.2243061606997268,
0.09770103868863204,
0.23645607828472368,
0.3280111145811677,
0.5390648705936556,
-0.6034481934191781,
-1.1942560416831098,
0.3295059316644399,
-0.0732996553139216,
0.5043071925129845,
0.7399437462813884,
0.3595686242698361,
1.4643835231854074,
-0.1697776944282527,
0.2588380732750666,
0.44311592273109757,
```

-0.6031987466514527,  
-0.06131410155451245,  
-0.3299395710828798,  
-0.45492250592824107,  
0.5555861976799495,  
1.1612177689175078,  
1.833550163228831,  
1.5629483318007886,  
-0.2455585474033218,  
-0.4534768786824923,  
-1.2225865843307935,  
0.20468879325769473,  
1.3398561861341207,  
-0.58709602862573,  
0.07181500566168061,  
0.17010271339345,  
0.36406988692952136,  
-1.689809967880289,  
-1.1677426672173294,  
-0.7977758879892671,  
0.531032719362766,  
-1.7722607960867016,  
0.6332033998224597,  
0.6669814362912183,  
0.218182728116887,  
1.0415656581640258,  
-1.4544893086294475,  
0.5175174925258392,  
-0.9742907090362619,  
-0.30648595673224416,  
1.2400541074634985,  
-0.30003161306087445,  
-0.14406503395842435,  
-0.43061285539013316,  
0.6914697219419143,  
-0.48545379734819916,  
-0.2166375004086177,  
1.2014709434123243,  
1.0734635496959384,  
0.43666289070672293,  
-0.9550440807047608,  
1.2817732673505913,  
0.6254203972471953,  
0.8730111716749767,  
1.1814458389257443,  
-0.5855214911540807,  
0.33647224367417283,  
0.914891547403245,  
-0.10924028322724566,  
0.6731472714644756,  
-0.8672547313943412,  
-1.1628903969680444,  
1.2968110405185924,  
-0.7478342770444015,  
1.0157432273471354,  
0.05866260951598884,  
0.1549884083832883,  
2.402954000164725,  
-0.8510405490988947,  
-0.13394876321797194,  
0.35128800256256376,  
0.03985349181110424,  
1.0891408951797659,  
0.49683980443602116,  
1.3618410332836905,  
0.31089249400158553,  
0.007823999182329802,  
-1.0325531315281817,  
-0.13635517978577905,  
-0.4783006843261583,  
-0.9648987725589863,  
-0.4094326055257113,  
0.0620151507481985,  
-0.3631850012398663,  
-0.9119123598789223,

```

-0.3458539889181142,
0.8501459643039054,
1.6461875633189593,
0.08799287143090098,
-0.82318299513447,
1.17289644669955,
-0.9455811832961388}],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric2_sample#4'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X '
                                '2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X '
                                '5 + 1 Z 4 + 1 X 5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Y 0 '
                                                         'Y 1 + 0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + 0.5 Y 1 '
                                                         'Y 2 + 0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + 0.5 Y 2 '
                                                         'Y 3 + 0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + 0.5 Y 3 '
                                                         'Y 4 + 0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + 0.5 Y 4 '
                                                         'Y 5 + 0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + 0.5 Y 5 '
                                                         'Y 6 + 0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.241465922765087],
                             [12, 6, 0, 0, -4.714681794898787]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': { 'noise_on_init_param': {
'status': False,
'value': 0},
'noise_prob': [ 0.001,
                 0.001,
                 0,
                 0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],

```

```
'status': False,  
'value': 0},
```

```
'identity_factors': [1, 1, 0, 0],  
'noise_level': [12, 6, 0, 0],  
'noise_profile': { 'noise_on_init_param': {  
  
    'noise_prob': [ 0.001,  
                    0.001,  
                    0,  
                    0],  
    'status': True,  
    'type': 'depolarizing'},  
    'odd_wires': 4}],  
    'run_time_sec': 5.401231288909912}},  
{ 'config': { 'ansatz': { 'gateset': 1,  
                           'layer': 30,  
                           'ugate': { 'coefficients': { 'bn': [ 0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0],  
                                                           'cn': [ 0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5],  
                                                           'r': 0},  
                           'time': {'max': 10.0, 'min': 0.0},  
                           'type': 'heisenberg'}},  
    'init_param': { 'value': [ 0.05238332857976487,  
                                0.05238332857976488,  
                                0.05238332857976461,  
                                0.5882470284735626,  
                                1.6186245942059996,  
                                2.2470777294271223,  
                                2.8315596913723913,  
                                2.8315596913723913,  
                                2.8333251330604914,  
                                3.7474015252366555,  
                                3.7474015252366555,  
                                3.7474015252366555,  
                                3.7474015252366555,  
                                4.452994588443841,  
                                4.625910007504636,  
                                4.625910007504636,  
                                5.314362007876739,  
                                7.185299991262795,  
                                7.185299991262795,  
                                8.165312898322489,  
                                8.165312898322489,  
                                8.165312898322489,  
                                8.684979613482101,  
                                9.661121823219345,  
                                9.674169964387936,  
                                10.525655511340814,  
                                10.525655511340814,  
                                10.525655511340814,  
                                11.154963299169733,  
                                11.154963299169733,  
                                2.50282655917642,  
                                0.9490947670548783,  
                                0.70056532212722,  
                                -0.9370006834105179,  
                                2.127395945212884,  
                                1.5529950009292526,  
                                -0.5538339242405286,  
                                -0.45109357069990613,  
                                3.2608593101153462,  
                                2.1691098922881027,  
                                0.924351518772188,  
                                0.7799372105219657,  
                                2.588492585292434,  
                                1.4914484649202893,
```

0.5111989894903198,  
-1.6854828839595362,  
0.709524102178921,  
-0.3201993643863164,  
0.37756499567776974,  
0.11160463007405702,  
1.4506751210554825,  
-0.1158349928449886,  
-0.4172082421780774,  
-0.47420587439641587,  
2.1318004152619214,  
1.5026342770773617,  
0.9629412747697549,  
-1.017935070811068,  
2.2274033566257083,  
0.9541631607884562,  
2.2865374842341715,  
-0.6901760390806929,  
1.4488496207691695,  
-0.15529093800821045,  
1.378510821815928,  
-0.1238908488185843,  
1.0420944500710088,  
1.8938950235205334,  
-0.40270933293735856,  
-0.4838468076888962,  
-0.7769068081513464,  
2.0570355933263196,  
0.33843722154840217,  
-0.21296684820549192,  
-0.3087457919151385,  
1.6713665097762895,  
0.7955513549984788,  
-0.5031484152839188,  
0.2783608989762586,  
1.4322280472670237,  
0.12038812465567636,  
0.8648150791824706,  
0.13552183280667268,  
0.07182610915111512,  
0.3477791234991623,  
-0.1584859230597403,  
0.5851519083687279,  
0.578565105996425,  
-1.7921034519484391,  
0.9189192684840749,  
-0.6139572052593133,  
-0.023527142002935514,  
-0.6495330854871428,  
0.7767670181361933,  
0.13616638059771954,  
-0.22568119775616352,  
0.4192866974084779,  
0.1401009023541104,  
1.419355971488301,  
1.1103093112149183,  
-0.8728413553259085,  
1.014691351510677,  
2.35757700845783,  
1.131891326153365,  
-1.2979835358031357,  
0.42365777146015526,  
1.0982786992551208,  
1.698510255572029,  
1.2090506157632,  
-1.3597097700308411,  
-0.9049577551064396,  
1.0199036275847497,  
2.9541844671388584,  
-0.42829772740772204,  
0.6542829736223691,  
3.7916586259391143,  
-0.1983670801457003,  
0.7855289833525587,  
-0.1534574040841844,

[illegible]

```

'0.5 X 2 X 3 + 0.5 Y 2 '
'Y 3 + 0.5 Z 2 Z 3 + '
'0.5 X 3 X 4 + 0.5 Y 3 '
'Y 4 + 0.5 Z 3 Z 4 + '
'0.5 X 4 X 5 + 0.5 Y 4 '
'Y 5 + 0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + 0.5 Y 5 '
'Y 6 + 0.5 Z 5 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -6.220556999324399],
                             [12, 6, 0, 0, -4.682225394272194]],
  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
    'identity_factors': [0, 0, 0, 0],
    'noise_level': [4, 2, 0, 0],
    'noise_profile': { 'noise_on_init_param': {
      'noise_prob': [ 0.001,
                     0.001,
                     0,
                     0],
      'status': True,
      'type': 'depolarizing'},
    'odd_wires': 4},
    { 'gates_num': [12, 3, 1, 0],
      'identity_factors': [1, 1, 0, 0],
      'noise_level': [12, 6, 0, 0],
      'noise_profile': { 'noise_on_init_param': {
        'noise_prob': [ 0.001,
                       0.001,
                       0,
                       0],
        'status': True,
        'type': 'depolarizing'},
        'odd_wires': 4}],
      'run_time_sec': 4.927646160125732}}],
'vqe': [ { 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
      'cn': [ 0.5,
              0.5,
              0.5,
              0.5,
              0.5,
              0.5],
      'r': 0},
      'time': {'max': 10.0, 'min': 0.0},
      'type': 'heisenberg'}}},
    'init_param': {'value': 'random'},
    'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
      'noise_prob': [0.001, 0.001, 0, 0],
      'status': True,
      'type': 'depolarizing'},
    'nqubits': 7,
    'observable': { 'coefficients': { 'bn': [ 1.0,
        1.0,
        1.0,
        1.0,
        1.0,
        1.0,
        1.0],
      'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
      'r': 1},
      'def': 'ising'},
    'output': { 'draw': {'fig_dpi': 100, 'status': True, 'type': 'png'},
      'file_name_prefix': 'heisenberg_noise_free_time_evo'},
    'redundant': { 'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]],
      'run': 'vqe',
      'state': 'dmatrix',
      'vqe': { 'iteration': 10,
        'optimization': { 'algorithm': 'SLSQP',
          'constraint': True,
          'status': True}},
      'zne': { 'data_points': None,

```

```

'degree': 1,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 '
      '+ 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + '
      '1 X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Y 0 Y 1 + '
      '0.5 Z 0 Z 1 + 0.5 X 1 X 2 + '
      '0.5 Y 1 Y 2 + 0.5 Z 1 Z 2 + '
      '0.5 X 2 X 3 + 0.5 Y 2 Y 3 + '
      '0.5 Z 2 Z 3 + 0.5 X 3 X 4 + '
      '0.5 Y 3 Y 4 + 0.5 Z 3 Z 4 + '
      '0.5 X 4 X 5 + 0.5 Y 4 Y 5 + '
      '0.5 Z 4 Z 5 + 0.5 X 5 X 6 + '
      '0.5 Y 5 Y 6 + 0.5 Z 5 Z 6']},
'output': { 'exact_sol': -8.56677223350563,
'initial_cost_history': [ 5.796866365657828,
      5.94197444368484,
      5.78867192910188,
      5.996879673940564,
      5.865062503342141,
      5.991390959337936,
      5.72582024636959,
      5.872963620288267,
      5.948869313039893,
      5.964755550858089],
'noise_details': { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': { 'noise_on_init_param': { 'status':
      'value':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
'optimized_minimum_cost': [ -5.966837375471974,
      -6.220556999324403,
      -6.218690041461848,
      -6.241465922765082,
      -5.8146764847083485,
      -6.144691518305702,
      -5.966791417158719,
      -5.743389283741366,
      -5.966171999363111,
      -6.281301957226982],
'optimized_parameters': [ [ 0.43940602753254654,
      0.4524980474487914,
      0.6462847510297367,
      0.6535145711164267,
      0.7019965052930044,
      1.0830061860275473,
      1.4380021973026182,
      2.1860837771467474,
      2.1860837771467474,
      2.1860837771467474,
      2.4875804812430995,
      2.911818356328843,
      4.9134595358452735,
      5.043089843653786,
      5.994354774193697,
      6.658321281734746,
      6.666230857319696,
      8.458454027735183,
      8.458454027735183,
      8.458454027735183,
      8.938931772570164,
      8.938931772570164,
      9.876451730548837,
      9.876451730548837,
      10.140618079102744,
      10.453495471248813,
      10.878653713196195,
      11.282429749250388,

```

False,

0},



11.726474998572407,  
11.93229290545428,  
2.9640535214497064,  
-0.6206168106317247,  
-0.4035747848788786,  
-2.067222048924027,  
2.0576259596946604,  
1.364315765000901,  
-0.1480698866383175,  
-1.95043906046908,  
0.7897528850889669,  
1.350582507885341,  
-0.3349044763190947,  
-2.3429833820345465,  
2.04351680973891,  
0.8083219796841106,  
-0.06520770630024467,  
-0.8776318722364843,  
2.4862506381076748,  
0.8345121096737285,  
-0.03071661620417745,  
-0.6225183255138825,  
0.7450777062518694,  
0.12619297185303674,  
0.15620862918286052,  
-0.47540100870445906,  
0.6345315438244892,  
1.451076347224231,  
0.10985833383721234,  
-1.6475696409761669,  
1.1918822544398533,  
1.3235539868194213,  
-0.24222060474147966,  
0.2418944215339802,  
1.0397651583041008,  
1.6773252160624976,  
0.16975786500059598,  
-0.9211027317156172,  
0.7590471244619662,  
1.76540125315151,  
2.43856734239768,  
-0.19488067618654012,  
0.8462629124439717,  
0.9979674075340036,  
2.5775834810620677,  
0.5650956422366618,  
-0.5475934153287456,  
-0.0253449469292375,  
1.2524069066350432,  
-0.605696708865831,  
0.7019502861337156,  
0.2803153244338447,  
-1.0831925759777479,  
1.0082140101851143,  
-0.3762046176346905,  
-0.9535933533256993,  
-1.0422804614435257,  
0.13948594332192887,  
0.5835070530053111,  
0.16086524965091817,  
0.06403444071667018,  
-0.06194188553710435,  
-0.4026223625881385,  
0.2750028468648149,  
0.6789909068622377,  
0.05162849323802493,  
-0.7735332926339995,  
-0.14862918062202837,  
0.7661757453229759,  
-0.16119730427373616,  
0.6482389226852195,  
3.1459456036848104,  
-0.4760920139337192,  
1.6197254159790668,  
-0.5506328506738539,

0.9968299487743895,  
-0.3106735286083523,  
-1.2388662013594425,  
0.8898580979157581,  
0.43256773745092003,  
-0.7272220041247079,  
0.8716071923554094,  
1.5193589139179793,  
0.9787540447681606,  
-1.4044929205930872,  
-0.1984876316951887,  
-0.46744984056178585,  
-0.7765225748074835,  
0.04344696088727837,  
0.32373965212791267,  
0.9049555024172572,  
0.7139278873651953,  
-0.8122282267372439,  
0.5323405298774778,  
-0.08437719753251166,  
-0.14277007957413837,  
0.7912147308716768,  
0.26055493673650715,  
0.11357082745857092,  
0.3153698930365579,  
3.1981441448638614,  
0.32109035951393206,  
-0.23017443442945684,  
0.0316864124540797,  
0.20875812581978664,  
0.5466872162452653,  
1.2918521189433907,  
-0.7312547980705957,  
1.4958457475939604,  
-0.053193686203739404,  
-0.4437772137226961,  
-0.5271126400646005,  
2.5136810835026426,  
0.6674244883024821,  
-1.0140291771816496,  
-1.177197116527103,  
2.058315434744553,  
0.050372102721390984,  
-0.09022974351195023,  
-2.296438941834702,  
0.3261688389091777,  
0.3072223897800251],  
[ 0.05238332857976487,  
0.05238332857976488,  
0.05238332857976461,  
0.5882470284735626,  
1.6186245942059996,  
2.2470777294271223,  
2.8315596913723913,  
2.8315596913723913,  
2.8333251330604914,  
3.7474015252366555,  
3.7474015252366555,  
3.7474015252366555,  
3.7474015252366555,  
4.452994588443841,  
4.625910007504636,  
4.625910007504636,  
5.314362007876739,  
7.185299991262795,  
7.185299991262795,  
8.165312898322489,  
8.165312898322489,  
8.165312898322489,  
8.684979613482101,  
9.661121823219345,  
9.674169964387936,  
10.525655511340814,  
10.525655511340814,  
10.525655511340814,

11.154963299169733,  
11.154963299169733,  
2.50282655917642,  
0.9490947670548783,  
0.70056532212722,  
-0.9370006834105179,  
2.127395945212884,  
1.5529950009292526,  
-0.5538339242405286,  
-0.45109357069990613,  
3.2608593101153462,  
2.1691098922881027,  
0.924351518772188,  
0.7799372105219657,  
2.588492585292434,  
1.4914484649202893,  
0.5111989894903198,  
-1.6854828839595362,  
0.709524102178921,  
-0.3201993643863164,  
0.37756499567776974,  
0.11160463007405702,  
1.4506751210554825,  
-0.1158349928449886,  
-0.4172082421780774,  
-0.47420587439641587,  
2.1318004152619214,  
1.5026342770773617,  
0.9629412747697549,  
-1.017935070811068,  
2.2274033566257083,  
0.9541631607884562,  
2.2865374842341715,  
-0.6901760390806929,  
1.4488496207691695,  
-0.15529093800821045,  
1.378510821815928,  
-0.1238908488185843,  
1.0420944500710088,  
1.8938950235205334,  
-0.40270933293735856,  
-0.4838468076888962,  
-0.7769068081513464,  
2.0570355933263196,  
0.33843722154840217,  
-0.21296684820549192,  
-0.3087457919151385,  
1.6713665097762895,  
0.7955513549984788,  
-0.5031484152839188,  
0.2783608989762586,  
1.4322280472670237,  
0.12038812465567636,  
0.8648150791824706,  
0.13552183280667268,  
0.07182610915111512,  
0.3477791234991623,  
-0.1584859230597403,  
0.5851519083687279,  
0.578565105996425,  
-1.7921034519484391,  
0.9189192684840749,  
-0.6139572052593133,  
-0.023527142002935514,  
-0.6495330854871428,  
0.7767670181361933,  
0.13616638059771954,  
-0.22568119775616352,  
0.4192866974084779,  
0.1401009023541104,  
1.419355971488301,  
1.1103093112149183,  
-0.8728413553259085,  
1.014691351510677,  
2.35757700845783,

1.131891326153365,  
-1.2979835358031357,  
0.42365777146015526,  
1.0982786992551208,  
1.698510255572029,  
1.2090506157632,  
-1.3597097700308411,  
-0.9049577551064396,  
1.0199036275847497,  
2.9541844671388584,  
-0.42829772740772204,  
0.6542829736223691,  
3.7916586259391143,  
-0.1983670801457003,  
0.7855289833525587,  
-0.1534574040841844,  
1.809122493112309,  
0.35293394466185096,  
1.0573849517470935,  
2.461665111905985,  
1.0784030177718114,  
-1.585709677044719,  
0.8985620342798133,  
2.2360691692951646,  
0.24022620726925167,  
2.6922129347449117,  
0.15599094623602128,  
2.799936411115923,  
0.9657316063780467,  
-0.2732772147086647,  
-1.448572189075712,  
-0.7280589250410919,  
0.057973620624421296,  
0.9321748335747359,  
-1.4338621772181848,  
1.3976338029473028,  
-0.25504403617708243,  
3.210257057781798,  
0.03448775329128267,  
0.05070056715723011,  
-1.3727823101385919,  
0.8243579770218447,  
0.13142013414460954,  
-0.4933237632531999,  
1.1105137227416793,  
0.7155364379215329,  
-0.21063252058278284],  
[ 0.6189603325174557,  
0.7142372255934472,  
0.818217611349809,  
1.1433975540074377,  
1.9121137997887092,  
1.912113799788709,  
1.9189666863881127,  
2.194219841514053,  
2.734492156740232,  
4.250258815642276,  
4.250258815642276,  
5.774076859791501,  
6.527612880112256,  
6.532834731882501,  
8.049613322901676,  
8.049613322901676,  
8.050730377555883,  
8.561643142317116,  
8.561643142317116,  
8.758357012835646,  
8.758357012835646,  
8.78353884989931,  
9.477076383056275,  
9.536600626467342,  
9.536600626467342,  
9.536600626467342,  
10.241295505019522,  
10.318321333031077,

10.579129354925781,  
10.82886994059623,  
3.662494394083504,  
0.08309129295248968,  
1.5295376506525808,  
-1.5964000102221196,  
1.8988970610647178,  
-0.07218621526676876,  
0.7238532160702689,  
-1.2917423920622229,  
1.8532222971765195,  
-0.40818119715800666,  
0.469598065996274,  
-1.2652675561295137,  
0.41465882817859046,  
0.48683539382624846,  
-0.15336518315146752,  
-1.6419783820068856,  
1.2136622236743368,  
0.5933123377118196,  
0.9666225223219593,  
0.9539776194708611,  
-0.3793986531891993,  
-0.2570964298405315,  
1.5884302353807402,  
0.19867970725527498,  
1.0036205245072367,  
-1.7266220384949087,  
0.6519864384701275,  
0.173373648086925,  
1.8697046853700252,  
0.5263944462203128,  
2.9785129063723943,  
-0.5937256494260224,  
0.22753174799850245,  
0.24918335157216837,  
1.5438671949833176,  
-0.2981477150404249,  
-0.0503664733834821,  
0.542442835193611,  
1.8096859498837612,  
-2.2260935596321993,  
0.28693396030012636,  
0.9986781622414097,  
-0.01940263773226835,  
-1.8805315707929653,  
-0.1513202473661221,  
0.1836836320118686,  
-0.5655439481125303,  
-0.30323205019871646,  
-0.4186198812206128,  
0.2357002564872809,  
2.8296979465953833,  
-1.0776781071762758,  
-0.08378558447273823,  
1.7446476514004516,  
-0.4606832586075214,  
-1.762173446350097,  
0.10241780783627007,  
1.6018254886002428,  
0.2621004786967086,  
1.349261138919249,  
0.14987623247602613,  
0.5068543254371847,  
-1.3474781551208477,  
1.0890436270679893,  
1.6662048029626129,  
0.3608718991529565,  
-0.11137748070221386,  
0.5641204379289552,  
2.2546014997074266,  
1.8888740160956543,  
-0.23345107582518032,  
-1.5772444286238798,  
2.1408383357361265,

-0.4968079560788485,  
0.1533667959779154,  
-0.40238715350257875,  
0.25591729793510365,  
2.947382531044255,  
-0.32162602471486745,  
-0.7587223675916386,  
-0.8983111566200868,  
0.006114119281372181,  
2.9372824954589514,  
0.48288231335139287,  
0.7939297064609614,  
1.9454360656955985,  
2.092519500518508,  
0.8995449331251366,  
0.10171517677156572,  
0.45235144869603666,  
1.02501950409702,  
0.24331156538914245,  
0.48973195386607005,  
2.672871435464254,  
1.313352678455905,  
2.010046934709317,  
-0.42153209835304317,  
-0.13436700176919486,  
-0.6950305532982513,  
0.6026553555930264,  
1.6681913778840949,  
0.4125109526933123,  
0.514533549588801,  
1.0794873063708696,  
-0.9571806916209341,  
0.27630815458061647,  
0.6001387806934945,  
0.5059087494947612,  
-0.5722342732268321,  
0.3986919058890637,  
1.0044202485382987,  
0.3352295947729849,  
1.3777059541173544,  
-2.835684252944388,  
0.6104690716589696,  
1.838086538234438,  
-0.3106134411398272,  
-2.2167272073692903,  
0.10706372359431235,  
-0.17469850626418476],  
[-2.397634216504411e-17,  
1.429450133825379e-17,  
0.9192297980258759,  
0.9192297980258759,  
2.8984599305110854,  
3.1993874679766523,  
3.199387467976652,  
3.715279848679994,  
3.715919998165357,  
5.126008182976459,  
5.749875525815113,  
5.785995839176617,  
5.785995839176617,  
5.785995839176617,  
5.785995839176617,  
6.315437962379428,  
6.678845841951143,  
7.3578167224936415,  
7.415694801781823,  
7.531263738212295,  
7.949087697575632,  
7.949087697575632,  
8.111169110068786,  
9.407094598577077,  
9.495286031274873,  
9.495286031274873,  
10.993257661103009,  
11.063439993331317,

11.639888600691357,  
11.75175692668691,  
2.1152038588685538,  
-0.7839988468841306,  
-1.0579861702584952,  
-0.5122509123294313,  
1.0012369417099964,  
0.9275037440003397,  
0.5343037326701707,  
-0.014459274586663672,  
2.31692048955396,  
2.1400689678453872,  
-0.9468421716760329,  
1.3225342455296385,  
2.4229762260600483,  
1.4561600175543838,  
-0.4592924007287594,  
0.6389204073366491,  
0.5578650700802136,  
1.458345504678432,  
-0.11931303728638508,  
0.04406428844113783,  
-0.26144087074192934,  
0.6459890964472403,  
1.2243061606997268,  
0.09770103868863204,  
0.23645607828472368,  
0.3280111145811677,  
0.5390648705936556,  
-0.6034481934191781,  
-1.1942560416831098,  
0.3295059316644399,  
-0.0732996553139216,  
0.5043071925129845,  
0.7399437462813884,  
0.3595686242698361,  
1.4643835231854074,  
-0.1697776944282527,  
0.2588380732750666,  
0.44311592273109757,  
-0.6031987466514527,  
-0.06131410155451245,  
-0.3299395710828798,  
-0.45492250592824107,  
0.5555861976799495,  
1.1612177689175078,  
1.833550163228831,  
1.5629483318007886,  
-0.2455585474033218,  
-0.4534768786824923,  
-1.2225865843307935,  
0.20468879325769473,  
1.3398561861341207,  
-0.58709602862573,  
0.07181500566168061,  
0.17010271339345,  
0.36406988692952136,  
-1.689809967880289,  
-1.1677426672173294,  
-0.7977758879892671,  
0.531032719362766,  
-1.7722607960867016,  
0.6332033998224597,  
0.6669814362912183,  
0.218182728116887,  
1.0415656581640258,  
-1.4544893086294475,  
0.5175174925258392,  
-0.9742907090362619,  
-0.30648595673224416,  
1.2400541074634985,  
-0.30003161306087445,  
-0.14406503395842435,  
-0.43061285539013316,  
0.6914697219419143,

-0.48545379734819916,  
-0.2166375004086177,  
1.2014709434123243,  
1.0734635496959384,  
0.43666289070672293,  
-0.9550440807047608,  
1.2817732673505913,  
0.6254203972471953,  
0.8730111716749767,  
1.1814458389257443,  
-0.5855214911540807,  
0.33647224367417283,  
0.914891547403245,  
-0.10924028322724566,  
0.6731472714644756,  
-0.8672547313943412,  
-1.1628903969680444,  
1.2968110405185924,  
-0.7478342770444015,  
1.0157432273471354,  
0.05866260951598884,  
0.1549884083832883,  
2.402954000164725,  
-0.8510405490988947,  
-0.13394876321797194,  
0.35128800256256376,  
0.03985349181110424,  
1.0891408951797659,  
0.49683980443602116,  
1.3618410332836905,  
0.31089249400158553,  
0.007823999182329802,  
-1.0325531315281817,  
-0.13635517978577905,  
-0.4783006843261583,  
-0.9648987725589863,  
-0.4094326055257113,  
0.0620151507481985,  
-0.3631850012398663,  
-0.9119123598789223,  
-0.3458539889181142,  
0.8501459643039054,  
1.6461875633189593,  
0.08799287143090098,  
-0.82318299513447,  
1.17289644669955,  
-0.9455811832961388],  
[ 0.12420123662801165,  
0.138246244841176,  
0.34185010800102933,  
0.8771280515547424,  
0.8771280515547423,  
1.9326762312100456,  
1.9326762312100456,  
2.879806034127527,  
3.4467495190209787,  
3.460588109395402,  
3.4605881093954016,  
3.4605881093954016,  
3.911934955717517,  
3.9564836804547703,  
4.188240551814426,  
5.098640553346409,  
5.098640553346409,  
5.098640553346408,  
6.466332587579958,  
7.457565848827182,  
7.712724508543908,  
7.890302861063261,  
7.898577524812402,  
8.020037295803547,  
8.020037295803547,  
9.289723192898348,  
9.68251578824504,  
9.68251578824504,



10.66694519433398,  
11.464898013549973,  
1.8095532965205083,  
-1.6633278493215808,  
-1.2281091611401596,  
-0.40155726479865544,  
1.7903243850816337,  
0.18661159996017582,  
1.2217850039169107,  
-0.48128156078104645,  
1.438546033666569,  
-0.9466383819139143,  
-0.2179227006066069,  
-0.07921201994836616,  
0.6692914930417907,  
-0.16791294486623565,  
-0.3278463005181308,  
1.2883193159418245,  
1.9001761172388045,  
0.7646920019853412,  
-0.6325477821570596,  
-0.5987552945744136,  
0.5669730115381587,  
0.5983941343774113,  
-0.06179171362000896,  
-0.6867235859693906,  
0.5211737756628548,  
-0.19354588250953578,  
0.6072816218147872,  
0.3472677197742769,  
-0.08031734075212016,  
1.4024126217748347,  
-0.5867181790012919,  
0.809620813948269,  
0.35997425529443994,  
-0.8722967249300235,  
-0.5874818244923429,  
-0.5567926036837068,  
-0.6652314874983639,  
-0.6042054992483096,  
-0.13918430829641074,  
-0.08277488470584692,  
-0.4972293169762719,  
-0.4421668735352916,  
0.6160601456858428,  
-1.1972657609969646,  
-1.1558488364748807,  
-1.4501782622641872,  
0.03989088007781949,  
-0.8684923327267209,  
-0.5569704341339503,  
0.15823054121075,  
0.6345578215095505,  
0.3601853745371903,  
-0.42594808878819745,  
0.08979804115834313,  
-0.153043281560756,  
-0.603228229875778,  
-1.1264410002736531,  
0.6895580235946861,  
-0.11045941959152497,  
0.5174109375139814,  
1.3269460586908306,  
-0.3852298542423827,  
-2.4120095755015893,  
0.08807412161753436,  
0.1228551365077638,  
-0.6982591234727157,  
-1.1618488040328845,  
2.5586909942385017,  
-0.24921574033555105,  
-1.9870969070050777,  
-1.0279498295884981,  
-0.7796802357622239,  
0.48428681889730063,

0.7162815161060118,  
-0.15547297036103372,  
1.0522591887013215,  
1.772822944479854,  
-0.2654037211186137,  
-0.2720110866721671,  
-0.03929478442656517,  
0.34606077605631835,  
0.5533331494282367,  
1.0574846609095763,  
-0.5747611578732846,  
0.4916772893793279,  
0.9875709691916216,  
-0.17857479553023695,  
-1.147281220275154,  
0.37370382177065037,  
2.456815155407461,  
0.6567596591037266,  
0.9507316292553318,  
1.5113928877114242,  
1.8380989093110256,  
-0.1736919900840187,  
-1.2666253947041328,  
-0.554819304070435,  
1.1931643666366285,  
0.4614862178419797,  
1.2040726557184918,  
0.3083618234293392,  
-0.4066692475369416,  
0.3740368412278018,  
-1.684611974494111,  
-0.8650016725760176,  
-1.4838330341878547,  
-0.14344887350922086,  
4.203596189627334,  
1.1133202614474196,  
1.391124117957397,  
1.8627332105499828,  
-0.28192336755973296,  
-1.5416482647725873,  
-1.9612892990030817,  
0.8836928087418303,  
0.300761821046295,  
0.6785848024508535,  
-0.5500277556546446,  
0.5742776326882599,  
-1.181756808209963],  
[ 0.38848003251483587,  
0.3884800325148359,  
1.2841735835398218,  
1.284173583539822,  
1.2841735835398218,  
1.818138220668234,  
1.818138220668234,  
2.7575469841005327,  
2.7575469841005327,  
2.7575469841005327,  
3.0053468968599275,  
3.0053468968599275,  
3.005346896859927,  
4.184079661691832,  
4.83635165164968,  
4.83635165164968,  
5.97926077140412,  
6.458805266455043,  
6.513102391504654,  
6.513102391504654,  
7.122105903846713,  
7.2188422331450415,  
7.988590448127284,  
8.268095077127937,  
8.268095077127937,  
9.164456488648115,  
9.164456488648115,  
9.782953992889732,

9.782953992889732,  
10.467486029517685,  
1.5496959718296535,  
-1.0300437645832343,  
0.425343365508412,  
-1.7136674729251273,  
0.33645197441382346,  
0.2288357961575219,  
0.10470230685228102,  
-0.6612661793744108,  
0.11823315872480306,  
0.48571962162230753,  
-1.3748501535311368,  
0.2563120795974374,  
-0.38871520150353267,  
-0.18786175076151226,  
1.0017996241286973,  
0.05598903629217323,  
1.501328526357405,  
-0.32299727271195017,  
0.5715295079657807,  
-0.12201961934486968,  
2.2747823054657927,  
0.16289086097520028,  
0.027619518366160244,  
-0.10165606616500937,  
-0.06321979816820887,  
-0.27543819802246033,  
-0.0048370064103128475,  
0.1330138167350915,  
-0.06428151371988705,  
0.21905201010909556,  
0.25697175483980955,  
-1.462905966720411,  
0.8014511304369155,  
3.456137165485204,  
-0.3560002683832885,  
-0.4886877133354182,  
0.32039145066707037,  
1.6153352350920127,  
0.5940099487759896,  
0.18140087044059483,  
0.27123106498617,  
0.7444341922951362,  
0.170480557625751,  
-0.4688462519246396,  
0.5235839184929864,  
-0.5470964469389679,  
-0.011921500492307424,  
1.4116230981753706,  
0.49972453659747124,  
-0.7800673920851233,  
0.4234227404504273,  
-0.2071635265929523,  
0.14064328933496192,  
-1.2007096247825992,  
0.12047098237640114,  
-0.4125103841815656,  
1.0447620953563077,  
0.0020814149928196773,  
0.4988991062112368,  
-0.34495773827123155,  
-0.12849063482979717,  
0.4280934542561602,  
0.7138444629946918,  
-0.6497712710787925,  
-0.43652659674625793,  
0.917432486791049,  
-0.8523477361785018,  
0.5648987974980545,  
0.3183226113969618,  
0.14295784675778261,  
0.9589824340171335,  
0.9194478619356266,  
1.1001359353915339,

1.5417377267389083,  
-0.5376003771957187,  
-0.5404528215706331,  
0.21624687748210675,  
0.8814937279455825,  
-0.371639532103812,  
-0.2668100917972658,  
1.3133163210428074,  
0.44574090697479807,  
-1.0940261852319737,  
-0.313830643067749,  
-0.06100275437545863,  
-0.049560783686653447,  
-0.3025056724120473,  
-0.9891529613817422,  
-0.35099332176432035,  
0.5436069706516342,  
-0.722828417704955,  
1.6968661444846564,  
-2.4402971962208975,  
0.7865745542588627,  
1.3437881169309889,  
0.36108471326554326,  
-0.1749159211919777,  
-0.014334278530919132,  
0.02978377629472008,  
1.8533978555002608,  
-1.8470426695738211,  
0.6272356375919823,  
0.44775499409400255,  
1.3281153539688288,  
0.4583217606753929,  
0.6443670392327268,  
0.5254233581973354,  
2.3087652110195127,  
-0.7761319091913014,  
-0.7605421959233766,  
-0.6461580464596497,  
0.7075597766411752,  
0.985778508379752,  
-1.3130974173457381,  
2.8711331564400684,  
1.2993543284582694,  
1.9493614761217355,  
1.1647493000584068,  
-0.42731613935458074,  
2.7038346000669766],  
[ -1.8784742854218807e-17,  
-7.763750530158576e-17,  
0.3802827375258553,  
0.44096449652630626,  
0.8040692975576897,  
1.9224694434519336,  
1.9224694434519338,  
1.9224694434519336,  
1.9224694434519336,  
1.9224694434519336,  
1.9224694434519338,  
2.730288811725591,  
4.476350841356259,  
4.476350841356259,  
4.476350841356259,  
6.331658137341824,  
6.331658137341824,  
6.7621011201584285,  
6.77851096220289,  
7.490043179529316,  
7.490043179529316,  
7.490043179529316,  
7.490043179529316,  
7.511664240193972,  
8.302259372586072,  
8.36899822047307,  
8.607405767895836,  
9.631163052898822,

9.874876363637043,  
10.225975825453373,  
2.711573403856553,  
0.20239905137011172,  
-0.4220883549830381,  
-0.8404830976891227,  
1.794332340210785,  
1.5095243517856047,  
0.22326098118939897,  
0.07733371735403745,  
1.280548885023134,  
1.4121496210624682,  
0.9815935680907694,  
-2.975348552150871,  
1.6316643284140941,  
0.8239502945369961,  
0.0314505340316768,  
-1.0892891749800817,  
1.720694113273713,  
0.6634696927679957,  
-0.836512780686814,  
-1.1286873737196692,  
-0.09500137106776224,  
1.0428135848317974,  
-0.4828772957450712,  
-1.129334172148368,  
0.7253737318795237,  
1.4108675361353635,  
0.7588540034470418,  
-0.5039485441412638,  
0.10346857579652805,  
1.2668095290766983,  
0.7994757345637048,  
-0.7393240316081237,  
-0.7818304990031031,  
0.25375980918776664,  
2.228975199542585,  
2.2487625387645873,  
0.6384105819815235,  
0.39434544396871446,  
1.3679129840939837,  
-0.27336699910726836,  
1.3170761670781417,  
1.1159622861844822,  
1.176824183488981,  
0.40583799697229034,  
0.8786168217534174,  
0.2914083315983707,  
-0.8464697846173548,  
-0.032455291822620566,  
-2.0755386823554396,  
-0.11439663923099666,  
0.7312672791487281,  
0.4263196833485598,  
0.11802610051350722,  
1.0445881812565523,  
-1.9566462184988007,  
0.9492303984073598,  
-1.7129593951518396,  
-0.3230601534209437,  
0.3161713641922788,  
-0.4811213940350071,  
0.08327140785409295,  
0.37526634808329173,  
-1.9990814349080968,  
-0.15397700748904192,  
-0.9549084255901845,  
1.1120455683467105,  
-0.42952128451280097,  
0.17929609797141985,  
1.0446016069356951,  
0.846774755857218,  
-0.2784586201121851,  
0.23000407229986752,  
-0.9198047598183884,

0.996529675185623,  
0.34608382599103005,  
0.5099375110708237,  
2.1948932092248885,  
1.3625694142279887,  
-0.9306056124011278,  
0.6012804875871011,  
-0.7788968212470156,  
-1.5884735532174328,  
1.0361309111992296,  
0.015937704739038126,  
1.4003797043998856,  
2.429422654005534,  
-0.27504014116509645,  
0.8256449732433587,  
1.2146087003914199,  
-0.6435553984602482,  
0.3046269503778821,  
1.0182549333954134,  
1.4202224852266074,  
1.3511302325707892,  
-0.7261672378416364,  
1.5992752660640235,  
-0.5764295578986515,  
-0.8318409785507642,  
1.1375736468462807,  
0.8529850561064739,  
0.9553972898831558,  
-0.09161160854677679,  
1.617622889574723,  
1.4551513261723394,  
-0.08817813881493969,  
0.8045852859105778,  
1.9892741470924016,  
1.8347816167556374,  
-0.8050652823779443,  
0.008511392950551585,  
2.1460096989270747,  
0.49277581514942953,  
-2.4311684786278165,  
0.5134791015266132,  
0.9751974520662461,  
-0.38582649358518695,  
0.7746227771853464,  
1.7307944301597258,  
2.1320333699599043,  
1.1654652968447545],  
[ 0.4022850038273885,  
0.4222288083135141,  
0.7644599371513524,  
0.7900179023917507,  
1.1026508993249646,  
1.1630326759467198,  
1.1630326759467198,  
1.2119340062926192,  
1.9859325565890973,  
1.985932556589097,  
2.096166401632718,  
3.378647998605865,  
3.378647998605865,  
3.378647998605865,  
4.354848115861854,  
6.006218342726225,  
6.006218342726225,  
6.009974297352436,  
8.225327865566033,  
8.242093148909708,  
9.222354355246733,  
9.369468664000962,  
9.432712219232048,  
9.692289963799956,  
9.692829942577658,  
10.391360826688166,  
10.391360826688166,  
10.529867035412478,

10.529867035412478,  
11.06290493838992,  
2.9062307172979733,  
-1.7788694936155562,  
-0.1145266982224492,  
-0.9311559923392093,  
0.9691998209476543,  
1.7463479137973288,  
-0.7663862807329105,  
-0.9694574896037749,  
2.8979112386638413,  
1.1400097878698292,  
0.8096361549155084,  
-1.5900494197653285,  
0.09829667109053167,  
0.31839493135320834,  
0.3886777840539921,  
0.12229184789371997,  
1.7250225844898464,  
1.0065795676456808,  
1.4535641205083867,  
-0.3486770669120958,  
0.2556790893233589,  
1.778531141883236,  
0.269972269049403,  
1.0155903957099945,  
0.8041163886037216,  
0.5381821926966456,  
-0.30108604163317454,  
0.6396533041678052,  
2.1819991440037696,  
1.4978086658278347,  
2.5181040929106753,  
0.4624415671193703,  
-0.17701736987873673,  
0.6910098122382194,  
2.947172461882987,  
-1.0727539032453073,  
0.4023854197196741,  
1.650490750838525,  
0.9313998963798695,  
-0.6769162055305248,  
-0.5620785927454173,  
-0.20885673940707247,  
2.5019757090972443,  
-0.37561416876024456,  
-0.9329392032282731,  
0.7818961506889994,  
0.44350434198669075,  
-0.10644929099379355,  
-2.498928032568615,  
-1.2046085786256906,  
-0.06365416567297402,  
0.17257236645054272,  
1.2516209341031546,  
-0.3591527663232026,  
0.46789807326225935,  
0.24374638092155315,  
0.02110383811013195,  
0.12714835746845662,  
-0.5505736947218767,  
-0.03497727012222505,  
-2.2168334497478877,  
-0.21485512988314215,  
1.7552902914988067,  
0.6189795903733311,  
0.3191491062237487,  
0.522632432692797,  
-1.1121089236913335,  
1.1371618962620422,  
-0.2410043783817164,  
0.24168543661014927,  
0.39418565996934685,  
1.2107667809264395,  
2.398781467533486,

0.6948257569073976,  
0.6170229142231725,  
0.7050419245924102,  
1.768546262611762,  
1.5562956304120967,  
-0.4269237214365518,  
0.6302835616447369,  
1.7710848704009405,  
1.2281100264507194,  
1.5036530549577243,  
-0.7435268012971183,  
0.7613541379199313,  
0.8523298100708424,  
-0.6655959646469325,  
1.1543911681084875,  
2.2675628634479494,  
1.0299985170060308,  
1.400963430022522,  
0.27759304330136975,  
0.6960561589746208,  
-0.4210335016880339,  
0.0336463669485127,  
-2.099660094290342,  
0.6674819238895001,  
0.5049668435179431,  
0.48001405045948287,  
1.3574871122533543,  
-2.2986993170736225,  
9.601426007351498e-05,  
1.3312470798272018,  
0.7582238004326416,  
-0.35033967277151296,  
-0.4108552112493075,  
0.1982910129710702,  
0.6700017270602091,  
0.26559360983179486,  
-0.14563210230012705,  
-0.39610135234418875,  
1.1727729846793147,  
0.6713573564879365,  
0.8527070052929181,  
0.8268283343075853,  
2.2918575835381745,  
0.5082103460913493,  
1.8600493489550152,  
0.49576811175353974,  
2.232387985311215],  
[ 0.16477895719846114,  
0.16477895719846108,  
0.7183189156962347,  
1.8697093861419474,  
2.105082615571597,  
3.05308344502201,  
4.199393321043376,  
4.199393321043376,  
4.199393321043375,  
6.490210948425593,  
6.4902109484255925,  
6.490210948425593,  
6.4902109484255925,  
6.4902109484255925,  
6.490210948425593,  
6.882554174728105,  
6.882554174728105,  
6.882554174728105,  
6.882554174728104,  
6.8877583035732775,  
6.8877583035732775,  
6.8877583035732775,  
8.21014824639056,  
8.21014824639056,  
9.071469420716642,  
9.120928605341893,  
9.714944098401723,  
11.474131735950095,



11.474131735950095,  
11.794551582273902,  
1.341188628911811,  
1.6554894539990426,  
-2.1068974621953425,  
-1.4171475675653578,  
0.33211669069513333,  
0.11331792925356984,  
-1.3610911099963097,  
0.46439741779020816,  
0.9313501387866817,  
1.0938593094543279,  
-0.3591727738608774,  
-0.4732622270970327,  
1.6321598874818157,  
-0.2782091348514778,  
-1.0526781349295347,  
0.0708703831522549,  
2.6982701224663113,  
-0.038867313655444914,  
-0.10508583152652556,  
-0.40759365792756236,  
0.6284849004330764,  
0.5192751929971827,  
-1.6282040637266806,  
0.0014422433007245106,  
-1.8299719264591412,  
2.3182597876656823,  
0.8875167319646391,  
1.5664268415036142,  
1.5052778791259855,  
2.935955436800565,  
1.533101581959507,  
1.8091829332960188,  
0.45080966818917967,  
0.1506883627647002,  
-0.6843548866459184,  
-0.5544883854492364,  
1.2466562002431278,  
-1.1866110136199353,  
1.4521358231995756,  
-1.125608676420736,  
-0.24054383618816966,  
-0.058272145415006006,  
0.410408128597049,  
-1.6441753460137252,  
0.4019816715685168,  
0.4588365987304068,  
1.354346078964423,  
-1.7153251360741875,  
-1.1039978646265602e-06,  
0.7940670488104785,  
0.17979772520560053,  
-0.24385394325110826,  
0.6367160741723578,  
0.8500459957371875,  
0.0559416907316065,  
0.32418668587130467,  
-1.4797636873635434,  
0.11902177942387202,  
0.5185165439317966,  
-0.08399222686641401,  
0.8650918037299421,  
1.4911587670088011,  
0.12792248933645675,  
0.3372262149750348,  
-0.6553154954729696,  
1.1995792367396254,  
0.5132294030998703,  
0.44835115860783636,  
-0.37116980512777586,  
0.7805194563374558,  
-0.854334789795377,  
0.5008527672922033,  
-0.2302685629030402,

0.6145182391921147,  
-0.6575500079215796,  
0.8657035637529482,  
1.1874516653159721,  
-0.16284802367068918,  
-0.26462171656665856,  
-0.9815102056659819,  
0.23198397744948207,  
-1.087097195512072,  
0.6616385654966559,  
-0.2929637257774683,  
0.03471390505932934,  
0.2048751570049573,  
0.9170017118070749,  
0.39617956766989404,  
0.12006199846995962,  
0.1922705913940127,  
0.8784478594386566,  
0.055479957240883566,  
-0.6634105431569992,  
1.0742951419164057,  
-0.37818200958777604,  
0.28548758229245597,  
-0.6594827056613419,  
1.0235832498557866,  
-0.19428253177041227,  
-0.5531991468121416,  
-1.189626464718852,  
0.2519110119226656,  
-0.6708462316627377,  
2.7994352657547057,  
-3.8764436680175813,  
0.5152327138619494,  
-0.3749347648847944,  
2.9042167722097862,  
1.1265965037549552,  
-1.850959186134046,  
2.165374611027145,  
0.8818414791702859,  
1.5039524911129019,  
0.06564767423285973,  
0.6486215314149069,  
-0.08854143781823305,  
1.8396223528529987,  
-0.00792246728000446,  
2.8805879469479487,  
3.6337353861266473],  
[ 0.11853625011402234,  
0.11853625011402236,  
1.1173235551611367,  
1.7342580765110573,  
1.7342580765110573,  
2.108144483620023,  
3.054129947242328,  
3.054129947242328,  
3.054129947242328,  
3.056306360633301,  
4.638414750363569,  
5.0621851887275495,  
5.7503913724004905,  
5.774998407238176,  
6.917933224474368,  
6.917933224474368,  
8.061549209526286,  
8.061549209526286,  
8.061549209526286,  
8.591251503132888,  
8.591251503132888,  
9.051235537435975,  
9.081856762230144,  
9.467876152039107,  
9.545932016874406,  
9.591419209848118,  
10.465616352275608,  
10.465616352275608,

10.465735173309618,  
10.980942228105905,  
2.0734674059611633,  
0.32892201175743896,  
-0.007356440825095051,  
0.7856576253246221,  
2.089457548986907,  
0.7744884921126718,  
-0.35049309306395837,  
-0.6556831494452968,  
2.0369525201874903,  
0.4739652080570001,  
-0.8564345639983049,  
1.25716179603495,  
1.7181260437331554,  
2.3978160665502384,  
1.1152024575020885,  
-1.3335737674295711,  
0.016650799076572978,  
1.6607129762234538,  
0.648059834763191,  
0.2438725527060928,  
-0.27307896000752346,  
1.4369017198677916,  
3.5672448343800007,  
-0.5379702113035718,  
-0.7420664562717484,  
-0.529699891930992,  
0.7301471483152846,  
0.781913925757813,  
0.6004078048346045,  
1.7324865479818374,  
0.4548236607944829,  
-1.4419813608219112,  
-0.684662976785234,  
0.8455512814500156,  
1.97751114408285,  
-0.833202517811791,  
1.110524460863052,  
2.6403320691876733,  
-0.3129427957408566,  
-0.06674204626492235,  
0.5842857778318762,  
-0.21132485649138796,  
-0.011842019288790376,  
-0.25743970610802486,  
0.7486616881233721,  
-0.1302029141156864,  
0.09497091477412227,  
-0.3715265429351211,  
0.39570077921274605,  
0.28643868832003017,  
0.7848413456471106,  
-0.7157146817058562,  
0.09411764456438232,  
-0.10910076647953601,  
1.1262761892344808,  
-0.27334997823872975,  
-0.44027652197942063,  
0.6740415100156434,  
-0.336256645457715,  
0.4268157265313067,  
-0.8611696251566416,  
-0.34560928156726306,  
0.5618074077714486,  
0.5866360379174992,  
1.8662876827821717,  
2.21592310898005,  
1.972223656383108,  
1.6141187926643297,  
0.856255815565121,  
-0.34275929095614754,  
-1.0642528745182613,  
-1.0618686751734654,  
0.2379582550153795,

```

-0.6501770361983872,
-0.19408645485522444,
1.501330829125914,
1.5726602727591479,
0.7066066097903853,
-1.4580936665368467,
0.46940440748349077,
-0.1287015677341077,
-0.9805925033056946,
-0.3754741669636888,
-0.026817919501009202,
1.1067346586651607,
0.17547923725022047,
0.8902143171896091,
-0.22777698610446503,
0.8082253583749343,
-1.0674083601412958,
-0.022706971436593337,
0.34227899244110566,
1.3527736523760083,
2.0767841716125894,
0.5778568145668401,
-0.6555502504392442,
1.2670274746873995,
0.507694022232518,
-0.2629991187543805,
1.7048253080726326,
1.4088065522309612,
2.823918413203317,
1.2763232744235296,
-1.4348344213353486,
-0.605496445996402,
0.09645158262695042,
0.024639736182597342,
0.23997550724405606,
0.9979895378690888,
-0.40612123795993227,
1.826790650755685,
0.029599395583551916,
-0.4592861834683686,
0.0328358806035505,
1.3612120706287358,
0.8210402794880411,
0.05688164146575431,
0.03152531580318861,
2.0316547976974904,
2.795039607579165]],
    'run_time_sec': 69142.54766130447}}],
'zne': [ { 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 0},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.16477895719846114,
0.16477895719846108,
0.7183189156962347,
1.8697093861419474,
2.105082615571597,
3.05308344502201,
4.199393321043376,
4.199393321043376,
4.199393321043375,
6.490210948425593,
6.4902109484255925,
6.490210948425593,
6.4902109484255925,
6.4902109484255925,
6.490210948425593,

```

6.882554174728105,  
6.882554174728105,  
6.882554174728105,  
6.882554174728104,  
6.8877583035732775,  
6.8877583035732775,  
6.8877583035732775,  
8.21014824639056,  
8.21014824639056,  
9.071469420716642,  
9.120928605341893,  
9.714944098401723,  
11.474131735950095,  
11.474131735950095,  
11.794551582273902,  
1.341188628911811,  
1.6554894539990426,  
-2.1068974621953425,  
-1.4171475675653578,  
0.33211669069513333,  
0.11331792925356984,  
-1.3610911099963097,  
0.46439741779020816,  
0.9313501387866817,  
1.0938593094543279,  
-0.3591727738608774,  
-0.4732622270970327,  
1.6321598874818157,  
-0.2782091348514778,  
-1.0526781349295347,  
0.0708703831522549,  
2.6982701224663113,  
-0.038867313655444914,  
-0.10508583152652556,  
-0.40759365792756236,  
0.6284849004330764,  
0.5192751929971827,  
-1.6282040637266806,  
0.0014422433007245106,  
-1.8299719264591412,  
2.3182597876656823,  
0.8875167319646391,  
1.5664268415036142,  
1.5052778791259855,  
2.935955436800565,  
1.533101581959507,  
1.8091829332960188,  
0.45080966818917967,  
0.1506883627647002,  
-0.6843548866459184,  
-0.5544883854492364,  
1.2466562002431278,  
-1.1866110136199353,  
1.4521358231995756,  
-1.125608676420736,  
-0.24054383618816966,  
-0.058272145415006006,  
0.410408128597049,  
-1.6441753460137252,  
0.4019816715685168,  
0.4588365987304068,  
1.354346078964423,  
-1.7153251360741875,  
-1.1039978646265602e-06,  
0.7940670488104785,  
0.17979772520560053,  
-0.24385394325110826,  
0.6367160741723578,  
0.8500459957371875,  
0.0559416907316065,  
0.32418668587130467,  
-1.4797636873635434,  
0.11902177942387202,  
0.5185165439317966,  
-0.08399222686641401,

```
0.8650918037299421,  
1.4911587670088011,  
0.12792248933645675,  
0.3372262149750348,  
-0.6553154954729696,  
1.1995792367396254,  
0.5132294030998703,  
0.44835115860783636,  
-0.37116980512777586,  
0.7805194563374558,  
-0.854334789795377,  
0.5008527672922033,  
-0.2302685629030402,  
0.6145182391921147,  
-0.6575500079215796,  
0.8657035637529482,  
1.1874516653159721,  
-0.16284802367068918,  
-0.26462171656665856,  
-0.9815102056659819,  
0.23198397744948207,  
-1.087097195512072,  
0.6616385654966559,  
-0.2929637257774683,  
0.03471390505932934,  
0.2048751570049573,  
0.9170017118070749,  
0.39617956766989404,  
0.12006199846995962,  
0.1922705913940127,  
0.8784478594386566,  
0.055479957240883566,  
-0.6634105431569992,  
1.0742951419164057,  
-0.37818200958777604,  
0.28548758229245597,  
-0.6594827056613419,  
1.0235832498557866,  
-0.19428253177041227,  
-0.5531991468121416,  
-1.189626464718852,  
0.2519110119226656,  
-0.6708462316627377,  
2.7994352657547057,  
-3.8764436680175813,  
0.5152327138619494,  
-0.3749347648847944,  
2.9042167722097862,  
1.1265965037549552,  
-1.850959186134046,  
2.165374611027145,  
0.8818414791702859,  
1.5039524911129019,  
0.06564767423285973,  
0.6486215314149069,  
-0.08854143781823305,  
1.8396223528529987,  
-0.00792246728000446,  
2.8805879469479487,  
3.6337353861266473]],  
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},  
                    'noise_prob': [0.001, 0.001, 0, 0],  
                    'status': True,  
                    'type': 'depolarizing'},  
'nqubits': 7,  
'observable': { 'coefficients': { 'bn': [ 1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0],  
                                'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],  
                                'r': 1},  
                  'def': 'ising'},
```

```

'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric2_sample#9'},
            'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                    'optimization': { 'algorithm': 'SLSQP',
                                      'constraint': True,
                                      'status': False}},
            'zne': { 'data_points': [ [4, 2, 0, 0, -5.966171999362981],
                                      [12, 6, 0, 0, -4.491721403204036]],
                    'degree': 0,
                    'method': 'richardson',
                    'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.9591064453125e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -6.703397297442454,
                            'others': { 'beta_coefficients': [1.5, -0.5],
                                         'cost_richardson_zne': 2.5,
                                         'sorted_expectation_vals': [
-5.966171999362981,
-4.491721403204036],
                                         'sorted_noise': [6, 18]],
                                         'sampled data': [ [4, 2, 0, 0, -5.966171999362981],
                                                           [12, 6, 0, 0, -4.491721403204036]],
                                         'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                         'r': 0},
                                      'time': {'max': 10.0, 'min': 0.0},
                                      'type': 'heisenberg'}}},
  'init_param': { 'value': [ 0.38848003251483587,
                              0.3884800325148359,
                              1.2841735835398218,
                              1.284173583539822,
                              1.2841735835398218,
                              1.818138220668234,
                              1.818138220668234,
                              2.7575469841005327,
                              2.7575469841005327,
                              2.7575469841005327,
                              3.0053468968599275,
                              3.0053468968599275,
                              3.005346896859927,
                              4.184079661691832,
                              4.83635165164968,
                              4.83635165164968,
                              5.97926077140412,
                              6.458805266455043,
                              6.513102391504654,
                              6.513102391504654,
                              7.122105903846713,
                              7.2188422331450415,
                              7.988590448127284,
                              8.268095077127937,
                              8.268095077127937,
                              9.164456488648115,
                              9.164456488648115,
                              9.782953992889732,
                              9.782953992889732,
                              10.467486029517685,
                              1.5496959718296535,
                              -1.0300437645832343,
                              0.425343365508412,
                              -1.7136674729251273,
                              0.33645197441382346,

```

0.2288357961575219,  
0.10470230685228102,  
-0.6612661793744108,  
0.11823315872480306,  
0.48571962162230753,  
-1.3748501535311368,  
0.2563120795974374,  
-0.38871520150353267,  
-0.18786175076151226,  
1.0017996241286973,  
0.05598903629217323,  
1.501328526357405,  
-0.32299727271195017,  
0.5715295079657807,  
-0.12201961934486968,  
2.2747823054657927,  
0.16289086097520028,  
0.027619518366160244,  
-0.10165606616500937,  
-0.06321979816820887,  
-0.27543819802246033,  
-0.0048370064103128475,  
0.1330138167350915,  
-0.06428151371988705,  
0.21905201010909556,  
0.25697175483980955,  
-1.462905966720411,  
0.8014511304369155,  
3.456137165485204,  
-0.3560002683832885,  
-0.4886877133354182,  
0.32039145066707037,  
1.6153352350920127,  
0.5940099487759896,  
0.18140087044059483,  
0.27123106498617,  
0.7444341922951362,  
0.170480557625751,  
-0.4688462519246396,  
0.5235839184929864,  
-0.5470964469389679,  
-0.011921500492307424,  
1.4116230981753706,  
0.49972453659747124,  
-0.7800673920851233,  
0.4234227404504273,  
-0.2071635265929523,  
0.14064328933496192,  
-1.2007096247825992,  
0.12047098237640114,  
-0.4125103841815656,  
1.0447620953563077,  
0.0020814149928196773,  
0.4988991062112368,  
-0.34495773827123155,  
-0.12849063482979717,  
0.4280934542561602,  
0.7138444629946918,  
-0.6497712710787925,  
-0.43652659674625793,  
0.917432486791049,  
-0.8523477361785018,  
0.5648987974980545,  
0.3183226113969618,  
0.14295784675778261,  
0.9589824340171335,  
0.9194478619356266,  
1.1001359353915339,  
1.5417377267389083,  
-0.5376003771957187,  
-0.5404528215706331,  
0.21624687748210675,  
0.8814937279455825,  
-0.371639532103812,  
-0.2668100917972658,



```

1.3133163210428074,
0.44574090697479807,
-1.0940261852319737,
-0.313830643067749,
-0.06100275437545863,
-0.049560783686653447,
-0.3025056724120473,
-0.9891529613817422,
-0.35099332176432035,
0.5436069706516342,
-0.722828417704955,
1.6968661444846564,
-2.4402971962208975,
0.7865745542588627,
1.3437881169309889,
0.36108471326554326,
-0.1749159211919777,
-0.014334278530919132,
0.02978377629472008,
1.8533978555002608,
-1.8470426695738211,
0.6272356375919823,
0.44775499409400255,
1.3281153539688288,
0.4583217606753929,
0.6443670392327268,
0.5254233581973354,
2.3087652110195127,
-0.7761319091913014,
-0.7605421959233766,
-0.6461580464596497,
0.7075597766411752,
0.985778508379752,
-1.3130974173457381,
2.8711331564400684,
1.2993543284582694,
1.9493614761217355,
1.1647493000584068,
-0.42731613935458074,
2.7038346000669766]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric2_sample#6'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.1446915183056525],
                           [12, 6, 0, 0, -4.667338994079639]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 5.4836273193359375e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -6.883367780418659,
                            'others': { 'beta_coefficients': [1.5, -0.5],

```

-6.1446915183056525,  
-4.667338994079639],

```
'cost_richardson_zne': 2.5,  
'sorted_expectation_vals': [  
  
    'sorted_noise': [6, 18]],  
    'sampled data': [ [4, 2, 0, 0, -6.1446915183056525],  
                      [12, 6, 0, 0, -4.667338994079639]],  
    'sampling': 'default']},  
{ 'config': { 'ansatz': { 'gateset': 1,  
                          'layer': 30,  
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],  
                                                         'cn': [ 0.5,  
                                                             0.5,  
                                                             0.5,  
                                                             0.5,  
                                                             0.5,  
                                                             0.5],  
                                                         'r': 0},  
                          'time': {'max': 10.0, 'min': 0.0},  
                          'type': 'heisenberg'}}},  
  'init_param': { 'value': [ 0.4022850038273885,  
                             0.4222288083135141,  
                             0.7644599371513524,  
                             0.7900179023917507,  
                             1.1026508993249646,  
                             1.1630326759467198,  
                             1.1630326759467198,  
                             1.2119340062926192,  
                             1.9859325565890973,  
                             1.985932556589097,  
                             2.096166401632718,  
                             3.378647998605865,  
                             3.378647998605865,  
                             3.378647998605865,  
                             4.354848115861854,  
                             6.006218342726225,  
                             6.006218342726225,  
                             6.009974297352436,  
                             8.225327865566033,  
                             8.242093148909708,  
                             9.222354355246733,  
                             9.369468664000962,  
                             9.432712219232048,  
                             9.692289963799956,  
                             9.692829942577658,  
                             10.391360826688166,  
                             10.391360826688166,  
                             10.529867035412478,  
                             10.529867035412478,  
                             11.06290493838992,  
                             2.9062307172979733,  
                             -1.7788694936155562,  
                             -0.1145266982224492,  
                             -0.9311559923392093,  
                             0.9691998209476543,  
                             1.7463479137973288,  
                             -0.7663862807329105,  
                             -0.9694574896037749,  
                             2.8979112386638413,  
                             1.1400097878698292,  
                             0.8096361549155084,  
                             -1.5900494197653285,  
                             0.09829667109053167,  
                             0.31839493135320834,  
                             0.3886777840539921,  
                             0.12229184789371997,  
                             1.7250225844898464,  
                             1.0065795676456808,  
                             1.4535641205083867,  
                             -0.3486770669120958,  
                             0.2556790893233589,  
                             1.778531141883236,  
                             0.269972269049403,  
                             1.0155903957099945,  
                             0.8041163886037216,
```

0.5381821926966456,  
-0.30108604163317454,  
0.6396533041678052,  
2.1819991440037696,  
1.4978086658278347,  
2.5181040929106753,  
0.4624415671193703,  
-0.17701736987873673,  
0.6910098122382194,  
2.947172461882987,  
-1.0727539032453073,  
0.4023854197196741,  
1.650490750838525,  
0.9313998963798695,  
-0.6769162055305248,  
-0.5620785927454173,  
-0.20885673940707247,  
2.5019757090972443,  
-0.37561416876024456,  
-0.9329392032282731,  
0.7818961506889994,  
0.44350434198669075,  
-0.10644929099379355,  
-2.498928032568615,  
-1.2046085786256906,  
-0.06365416567297402,  
0.17257236645054272,  
1.2516209341031546,  
-0.3591527663232026,  
0.46789807326225935,  
0.24374638092155315,  
0.02110383811013195,  
0.12714835746845662,  
-0.5505736947218767,  
-0.03497727012222505,  
-2.2168334497478877,  
-0.21485512988314215,  
1.7552902914988067,  
0.6189795903733311,  
0.3191491062237487,  
0.522632432692797,  
-1.1121089236913335,  
1.1371618962620422,  
-0.2410043783817164,  
0.24168543661014927,  
0.39418565996934685,  
1.2107667809264395,  
2.398781467533486,  
0.6948257569073976,  
0.6170229142231725,  
0.7050419245924102,  
1.768546262611762,  
1.5562956304120967,  
-0.4269237214365518,  
0.6302835616447369,  
1.7710848704009405,  
1.2281100264507194,  
1.5036530549577243,  
-0.7435268012971183,  
0.7613541379199313,  
0.8523298100708424,  
-0.6655959646469325,  
1.1543911681084875,  
2.2675628634479494,  
1.0299985170060308,  
1.400963430022522,  
0.27759304330136975,  
0.6960561589746208,  
-0.4210335016880339,  
0.0336463669485127,  
-2.099660094290342,  
0.6674819238895001,  
0.5049668435179431,  
0.48001405045948287,  
1.3574871122533543,

```

-2.2986993170736225,
9.601426007351498e-05,
1.3312470798272018,
0.7582238004326416,
-0.35033967277151296,
-0.4108552112493075,
0.1982910129710702,
0.6700017270602091,
0.26559360983179486,
-0.14563210230012705,
-0.39610135234418875,
1.1727729846793147,
0.6713573564879365,
0.8527070052929181,
0.8268283343075853,
2.2918575835381745,
0.5082103460913493,
1.8600493489550152,
0.49576811175353974,
2.232387985311215]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noisefree_time_evo_ric2_sample#8'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -5.743389283741309],
[12, 6, 0, 0, -4.3560016590478785]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.266334533691406e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -6.437083096088025,
'others': { 'beta_coeffiecients': [1.5, -0.5],
'cost_richardson_zne': 2.5,
'sorted_expectation_vals': [
-5.743389283741309,
-4.3560016590478785],
'sorted_noise': [6, 18]},
'sampled data': [ [4, 2, 0, 0, -5.743389283741309],
[12, 6, 0, 0, -4.3560016590478785]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}}},

```

```
'init_param': { 'value': [ 0.6189603325174557,  
0.7142372255934472,  
0.818217611349809,  
1.1433975540074377,  
1.9121137997887092,  
1.912113799788709,  
1.9189666863881127,  
2.194219841514053,  
2.734492156740232,  
4.250258815642276,  
4.250258815642276,  
5.774076859791501,  
6.527612880112256,  
6.532834731882501,  
8.049613322901676,  
8.049613322901676,  
8.050730377555883,  
8.561643142317116,  
8.561643142317116,  
8.758357012835646,  
8.758357012835646,  
8.78353884989931,  
9.477076383056275,  
9.536600626467342,  
9.536600626467342,  
9.536600626467342,  
10.241295505019522,  
10.318321333031077,  
10.579129354925781,  
10.82886994059623,  
3.662494394083504,  
0.08309129295248968,  
1.5295376506525808,  
-1.5964000102221196,  
1.8988970610647178,  
-0.07218621526676876,  
0.7238532160702689,  
-1.2917423920622229,  
1.8532222971765195,  
-0.40818119715800666,  
0.469598065996274,  
-1.2652675561295137,  
0.41465882817859046,  
0.48683539382624846,  
-0.15336518315146752,  
-1.6419783820068856,  
1.2136622236743368,  
0.5933123377118196,  
0.9666225223219593,  
0.9539776194708611,  
-0.3793986531891993,  
-0.2570964298405315,  
1.5884302353807402,  
0.19867970725527498,  
1.0036205245072367,  
-1.7266220384949087,  
0.6519864384701275,  
0.173373648086925,  
1.8697046853700252,  
0.5263944462203128,  
2.9785129063723943,  
-0.5937256494260224,  
0.22753174799850245,  
0.24918335157216837,  
1.5438671949833176,  
-0.2981477150404249,  
-0.0503664733834821,  
0.542442835193611,  
1.8096859498837612,  
-2.2260935596321993,  
0.28693396030012636,  
0.9986781622414097,  
-0.01940263773226835,  
-1.8805315707929653,  
-0.1513202473661221,
```

0.1836836320118686,  
-0.5655439481125303,  
-0.30323205019871646,  
-0.4186198812206128,  
0.2357002564872809,  
2.8296979465953833,  
-1.0776781071762758,  
-0.08378558447273823,  
1.7446476514004516,  
-0.4606832586075214,  
-1.762173446350097,  
0.10241780783627007,  
1.6018254886002428,  
0.2621004786967086,  
1.349261138919249,  
0.14987623247602613,  
0.5068543254371847,  
-1.3474781551208477,  
1.0890436270679893,  
1.6662048029626129,  
0.3608718991529565,  
-0.11137748070221386,  
0.5641204379289552,  
2.2546014997074266,  
1.8888740160956543,  
-0.23345107582518032,  
-1.5772444286238798,  
2.1408383357361265,  
-0.4968079560788485,  
0.1533667959779154,  
-0.40238715350257875,  
0.25591729793510365,  
2.947382531044255,  
-0.32162602471486745,  
-0.7587223675916386,  
-0.8983111566200868,  
0.006114119281372181,  
2.9372824954589514,  
0.48288231335139287,  
0.7939297064609614,  
1.9454360656955985,  
2.092519500518508,  
0.8995449331251366,  
0.10171517677156572,  
0.45235144869603666,  
1.02501950409702,  
0.24331156538914245,  
0.48973195386607005,  
2.672871435464254,  
1.313352678455905,  
2.010046934709317,  
-0.42153209835304317,  
-0.13436700176919486,  
-0.6950305532982513,  
0.6026553555930264,  
1.6681913778840949,  
0.4125109526933123,  
0.514533549588801,  
1.0794873063708696,  
-0.9571806916209341,  
0.27630815458061647,  
0.6001387806934945,  
0.5059087494947612,  
-0.5722342732268321,  
0.3986919058890637,  
1.0044202485382987,  
0.3352295947729849,  
1.3777059541173544,  
-2.835684252944388,  
0.6104690716589696,  
1.838086538234438,  
-0.3106134411398272,  
-2.2167272073692903,  
0.10706372359431235,  
-0.174698506264184761}],

```

'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noisefree_time_evo_ric2_sample#3'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.218690041461777],
                           [12, 6, 0, 0, -4.805156509769757]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.7670135498046875e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -6.9254568073077865,
                            'others': { 'beta_coeffieicients': [1.5, -0.5],
                                         'cost_richardson_zne': 2.5,
                                         'sorted_expectation_vals': [
-6.218690041461777,
-4.805156509769757],
                                         'sorted_noise': [6, 18]},
                            'sampled data': [ [4, 2, 0, 0, -6.218690041461777],
                                                [12, 6, 0, 0, -4.805156509769757]],
                            'sampling': 'default'}}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [ 0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5],
                                                         'r': 0},
                                      'time': {'max': 10.0, 'min': 0.0},
                                      'type': 'heisenberg'}}},
  'init_param': { 'value': [ 0.05238332857976487,
                              0.05238332857976488,
                              0.05238332857976461,
                              0.5882470284735626,
                              1.6186245942059996,
                              2.2470777294271223,
                              2.8315596913723913,
                              2.8315596913723913,
                              2.8333251330604914,
                              3.7474015252366555,
                              3.7474015252366555,
                              3.7474015252366555,
                              3.7474015252366555,
                              4.452994588443841,
                              4.625910007504636,
                              4.625910007504636,
                              5.314362007876739,
                              7.185299991262795,
                              7.185299991262795,
                              8.165312898322489,

```

8.165312898322489,  
8.165312898322489,  
8.684979613482101,  
9.661121823219345,  
9.674169964387936,  
10.525655511340814,  
10.525655511340814,  
10.525655511340814,  
11.154963299169733,  
11.154963299169733,  
2.50282655917642,  
0.9490947670548783,  
0.70056532212722,  
-0.9370006834105179,  
2.127395945212884,  
1.5529950009292526,  
-0.5538339242405286,  
-0.45109357069990613,  
3.2608593101153462,  
2.1691098922881027,  
0.924351518772188,  
0.7799372105219657,  
2.588492585292434,  
1.4914484649202893,  
0.5111989894903198,  
-1.6854828839595362,  
0.709524102178921,  
-0.3201993643863164,  
0.37756499567776974,  
0.11160463007405702,  
1.4506751210554825,  
-0.1158349928449886,  
-0.4172082421780774,  
-0.47420587439641587,  
2.1318004152619214,  
1.5026342770773617,  
0.9629412747697549,  
-1.017935070811068,  
2.2274033566257083,  
0.9541631607884562,  
2.2865374842341715,  
-0.6901760390806929,  
1.4488496207691695,  
-0.15529093800821045,  
1.378510821815928,  
-0.1238908488185843,  
1.0420944500710088,  
1.8938950235205334,  
-0.40270933293735856,  
-0.4838468076888962,  
-0.7769068081513464,  
2.0570355933263196,  
0.33843722154840217,  
-0.21296684820549192,  
-0.3087457919151385,  
1.6713665097762895,  
0.7955513549984788,  
-0.5031484152839188,  
0.2783608989762586,  
1.4322280472670237,  
0.12038812465567636,  
0.8648150791824706,  
0.13552183280667268,  
0.07182610915111512,  
0.3477791234991623,  
-0.1584859230597403,  
0.5851519083687279,  
0.578565105996425,  
-1.7921034519484391,  
0.9189192684840749,  
-0.6139572052593133,  
-0.023527142002935514,  
-0.6495330854871428,  
0.7767670181361933,  
0.13616638059771954,



```

-0.22568119775616352,
0.4192866974084779,
0.1401009023541104,
1.419355971488301,
1.1103093112149183,
-0.8728413553259085,
1.014691351510677,
2.35757700845783,
1.131891326153365,
-1.2979835358031357,
0.42365777146015526,
1.0982786992551208,
1.698510255572029,
1.2090506157632,
-1.3597097700308411,
-0.9049577551064396,
1.0199036275847497,
2.9541844671388584,
-0.42829772740772204,
0.6542829736223691,
3.7916586259391143,
-0.1983670801457003,
0.7855289833525587,
-0.1534574040841844,
1.809122493112309,
0.35293394466185096,
1.0573849517470935,
2.461665111905985,
1.0784030177718114,
-1.585709677044719,
0.8985620342798133,
2.2360691692951646,
0.24022620726925167,
2.6922129347449117,
0.15599094623602128,
2.799936411115923,
0.9657316063780467,
-0.2732772147086647,
-1.448572189075712,
-0.7280589250410919,
0.057973620624421296,
0.9321748335747359,
-1.4338621772181848,
1.3976338029473028,
-0.25504403617708243,
3.210257057781798,
0.03448775329128267,
0.05070056715723011,
-1.3727823101385919,
0.8243579770218447,
0.13142013414460954,
-0.4933237632531999,
1.1105137227416793,
0.7155364379215329,
-0.21063252058278284]},
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noisefree_time_evo_ric2_sample#2'},
'redundant': { 'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]],
'run': 'zne',

```

```

'state': 'dmatrix',
'vqe': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.220556999324399],
                           [12, 6, 0, 0, -4.682225394272194]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.528594970703125e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -6.989722801850501,
                            'others': { 'beta_coefficients': [1.5, -0.5],
                                         'cost_richardson_zne': 2.5,
                                         'sorted_expectation_vals': [
-6.220556999324399,
-4.682225394272194],

                                         'sorted_noise': [6, 18]],
                                         'sampled data': [ [4, 2, 0, 0, -6.220556999324399],
                                                           [12, 6, 0, 0, -4.682225394272194]],
                                         'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                         'r': 0},
                                      'time': {'max': 10.0, 'min': 0.0},
                                      'type': 'heisenberg'}}},
  'init_param': { 'value': [ -1.8784742854218807e-17,
                              -7.763750530158576e-17,
                              0.3802827375258553,
                              0.44096449652630626,
                              0.8040692975576897,
                              1.9224694434519336,
                              1.9224694434519338,
                              1.9224694434519336,
                              1.9224694434519336,
                              1.9224694434519336,
                              1.9224694434519338,
                              2.730288811725591,
                              4.476350841356259,
                              4.476350841356259,
                              4.476350841356259,
                              6.331658137341824,
                              6.331658137341824,
                              6.7621011201584285,
                              6.77851096220289,
                              7.490043179529316,
                              7.490043179529316,
                              7.490043179529316,
                              7.490043179529316,
                              7.511664240193972,
                              8.302259372586072,
                              8.36899822047307,
                              8.607405767895836,
                              9.631163052898822,
                              9.874876363637043,
                              10.225975825453373,
                              2.711573403856553,
                              0.20239905137011172,
                              -0.4220883549830381,
                              -0.8404830976891227,
                              1.794332340210785,
                              1.5095243517856047,
                              0.22326098118939897,
                              0.07733371735403745,
                              1.280548885023134,
                              1.4121496210624682,

```

0.9815935680907694,  
-2.975348552150871,  
1.6316643284140941,  
0.8239502945369961,  
0.0314505340316768,  
-1.0892891749800817,  
1.720694113273713,  
0.6634696927679957,  
-0.836512780686814,  
-1.1286873737196692,  
-0.09500137106776224,  
1.0428135848317974,  
-0.4828772957450712,  
-1.129334172148368,  
0.7253737318795237,  
1.4108675361353635,  
0.7588540034470418,  
-0.5039485441412638,  
0.10346857579652805,  
1.2668095290766983,  
0.7994757345637048,  
-0.7393240316081237,  
-0.7818304990031031,  
0.25375980918776664,  
2.228975199542585,  
2.2487625387645873,  
0.6384105819815235,  
0.39434544396871446,  
1.3679129840939837,  
-0.27336699910726836,  
1.3170761670781417,  
1.1159622861844822,  
1.176824183488981,  
0.40583799697229034,  
0.8786168217534174,  
0.2914083315983707,  
-0.8464697846173548,  
-0.032455291822620566,  
-2.0755386823554396,  
-0.11439663923099666,  
0.7312672791487281,  
0.4263196833485598,  
0.11802610051350722,  
1.0445881812565523,  
-1.9566462184988007,  
0.9492303984073598,  
-1.7129593951518396,  
-0.3230601534209437,  
0.3161713641922788,  
-0.4811213940350071,  
0.08327140785409295,  
0.37526634808329173,  
-1.9990814349080968,  
-0.15397700748904192,  
-0.9549084255901845,  
1.1120455683467105,  
-0.42952128451280097,  
0.17929609797141985,  
1.0446016069356951,  
0.846774755857218,  
-0.2784586201121851,  
0.23000407229986752,  
-0.9198047598183884,  
0.996529675185623,  
0.34608382599103005,  
0.5099375110708237,  
2.1948932092248885,  
1.3625694142279887,  
-0.9306056124011278,  
0.6012804875871011,  
-0.7788968212470156,  
-1.5884735532174328,  
1.0361309111992296,  
0.015937704739038126,  
1.4003797043998856,

```

2.429422654005534,
-0.27504014116509645,
0.8256449732433587,
1.2146087003914199,
-0.6435553984602482,
0.3046269503778821,
1.0182549333954134,
1.4202224852266074,
1.3511302325707892,
-0.7261672378416364,
1.5992752660640235,
-0.5764295578986515,
-0.8318409785507642,
1.1375736468462807,
0.8529850561064739,
0.9553972898831558,
-0.09161160854677679,
1.617622889574723,
1.4551513261723394,
-0.08817813881493969,
0.8045852859105778,
1.9892741470924016,
1.8347816167556374,
-0.8050652823779443,
0.008511392950551585,
2.1460096989270747,
0.49277581514942953,
-2.4311684786278165,
0.5134791015266132,
0.9751974520662461,
-0.38582649358518695,
0.7746227771853464,
1.7307944301597258,
2.1320333699599043,
1.1654652968447545]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noisefree_time_evo_ric2_sample#7'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -5.9667914171586585],
                          [12, 6, 0, 0, -4.541488857163632]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.76837158203125e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -6.679442697156171,
                           'others': { 'beta_coeffiecients': [1.5, -0.5],
                                         'cost_richardson_zne': 2.5,
                                         'sorted_expectation_vals': [
-5.9667914171586585,
-4.541488857163632],
'sorted_noise': [6, 18]},

```

```

'sampled data': [ [4, 2, 0, 0, -5.9667914171586585],
                  [12, 6, 0, 0, -4.541488857163632]],
'sampling': 'default'}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                         'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'heisenberg'}},
  'init_param': { 'value': [ 0.43940602753254654,
                             0.4524980474487914,
                             0.6462847510297367,
                             0.6535145711164267,
                             0.7019965052930044,
                             1.0830061860275473,
                             1.4380021973026182,
                             2.1860837771467474,
                             2.1860837771467474,
                             2.1860837771467474,
                             2.4875804812430995,
                             2.911818356328843,
                             4.9134595358452735,
                             5.043089843653786,
                             5.994354774193697,
                             6.658321281734746,
                             6.666230857319696,
                             8.458454027735183,
                             8.458454027735183,
                             8.458454027735183,
                             8.938931772570164,
                             8.938931772570164,
                             9.876451730548837,
                             9.876451730548837,
                             10.140618079102744,
                             10.453495471248813,
                             10.878653713196195,
                             11.282429749250388,
                             11.726474998572407,
                             11.93229290545428,
                             2.9640535214497064,
                             -0.6206168106317247,
                             -0.4035747848788786,
                             -2.067222048924027,
                             2.0576259596946604,
                             1.364315765000901,
                             -0.1480698866383175,
                             -1.95043906046908,
                             0.7897528850889669,
                             1.350582507885341,
                             -0.3349044763190947,
                             -2.3429833820345465,
                             2.04351680973891,
                             0.8083219796841106,
                             -0.06520770630024467,
                             -0.8776318722364843,
                             2.4862506381076748,
                             0.8345121096737285,
                             -0.03071661620417745,
                             -0.6225183255138825,
                             0.7450777062518694,
                             0.12619297185303674,
                             0.15620862918286052,
                             -0.47540100870445906,
                             0.6345315438244892,
                             1.451076347224231,
                             0.10985833383721234,
                             -1.6475696409761669,
                             1.1918822544398533,
                             1.3235539868194213,

```

-0.24222060474147966,  
0.2418944215339802,  
1.0397651583041008,  
1.6773252160624976,  
0.16975786500059598,  
-0.9211027317156172,  
0.7590471244619662,  
1.76540125315151,  
2.43856734239768,  
-0.19488067618654012,  
0.8462629124439717,  
0.9979674075340036,  
2.5775834810620677,  
0.5650956422366618,  
-0.5475934153287456,  
-0.0253449469292375,  
1.2524069066350432,  
-0.605696708865831,  
0.7019502861337156,  
0.2803153244338447,  
-1.0831925759777479,  
1.0082140101851143,  
-0.3762046176346905,  
-0.9535933533256993,  
-1.0422804614435257,  
0.13948594332192887,  
0.5835070530053111,  
0.16086524965091817,  
0.06403444071667018,  
-0.06194188553710435,  
-0.4026223625881385,  
0.2750028468648149,  
0.6789909068622377,  
0.05162849323802493,  
-0.7735332926339995,  
-0.14862918062202837,  
0.7661757453229759,  
-0.16119730427373616,  
0.6482389226852195,  
3.1459456036848104,  
-0.4760920139337192,  
1.6197254159790668,  
-0.5506328506738539,  
0.9968299487743895,  
-0.3106735286083523,  
-1.2388662013594425,  
0.8898580979157581,  
0.43256773745092003,  
-0.7272220041247079,  
0.8716071923554094,  
1.5193589139179793,  
0.9787540447681606,  
-1.4044929205930872,  
-0.1984876316951887,  
-0.46744984056178585,  
-0.7765225748074835,  
0.04344696088727837,  
0.32373965212791267,  
0.9049555024172572,  
0.7139278873651953,  
-0.8122282267372439,  
0.5323405298774778,  
-0.08437719753251166,  
-0.14277007957413837,  
0.7912147308716768,  
0.26055493673650715,  
0.11357082745857092,  
0.3153698930365579,  
3.1981441448638614,  
0.32109035951393206,  
-0.23017443442945684,  
0.0316864124540797,  
0.20875812581978664,  
0.5466872162452653,  
1.2918521189433907,

```

-0.7312547980705957,
1.4958457475939604,
-0.053193686203739404,
-0.4437772137226961,
-0.5271126400646005,
2.5136810835026426,
0.6674244883024821,
-1.0140291771816496,
-1.177197116527103,
2.058315434744553,
0.050372102721390984,
-0.09022974351195023,
-2.296438941834702,
0.3261688389091777,
0.3072223897800251]],
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric2_sample#1'},
'redundant': { 'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -5.966837375471956],
[12, 6, 0, 0, -4.6298501952375855]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.266334533691406e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -6.635330965589142,
'others': { 'beta_coefficients': [1.5, -0.5],
'cost_richardson_zne': 2.5,
'sorted_expectation_vals': [
-5.966837375471956,
-4.6298501952375855],
'sorted_noise': [6, 18]],
'sampled data': [ [4, 2, 0, 0, -5.966837375471956],
[12, 6, 0, 0, -4.6298501952375855]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': { 'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}},
'init_param': { 'value': [ -2.397634216504411e-17,
1.429450133825379e-17,
0.9192297980258759,
0.9192297980258759,
2.8984599305110854,

```

3.1993874679766523,  
3.199387467976652,  
3.715279848679994,  
3.715919998165357,  
5.126008182976459,  
5.749875525815113,  
5.785995839176617,  
5.785995839176617,  
5.785995839176617,  
5.785995839176617,  
6.315437962379428,  
6.678845841951143,  
7.3578167224936415,  
7.415694801781823,  
7.531263738212295,  
7.949087697575632,  
7.949087697575632,  
8.111169110068786,  
9.407094598577077,  
9.495286031274873,  
9.495286031274873,  
10.993257661103009,  
11.063439993331317,  
11.639888600691357,  
11.75175692668691,  
2.1152038588685538,  
-0.7839988468841306,  
-1.0579861702584952,  
-0.5122509123294313,  
1.0012369417099964,  
0.9275037440003397,  
0.5343037326701707,  
-0.014459274586663672,  
2.31692048955396,  
2.1400689678453872,  
-0.9468421716760329,  
1.3225342455296385,  
2.4229762260600483,  
1.4561600175543838,  
-0.4592924007287594,  
0.6389204073366491,  
0.5578650700802136,  
1.458345504678432,  
-0.11931303728638508,  
0.04406428844113783,  
-0.26144087074192934,  
0.6459890964472403,  
1.2243061606997268,  
0.09770103868863204,  
0.23645607828472368,  
0.3280111145811677,  
0.5390648705936556,  
-0.6034481934191781,  
-1.1942560416831098,  
0.3295059316644399,  
-0.0732996553139216,  
0.5043071925129845,  
0.7399437462813884,  
0.3595686242698361,  
1.4643835231854074,  
-0.1697776944282527,  
0.2588380732750666,  
0.44311592273109757,  
-0.6031987466514527,  
-0.06131410155451245,  
-0.3299395710828798,  
-0.45492250592824107,  
0.5555861976799495,  
1.1612177689175078,  
1.833550163228831,  
1.5629483318007886,  
-0.2455585474033218,  
-0.4534768786824923,  
-1.2225865843307935,  
0.20468879325769473,



```

1.3398561861341207,
-0.58709602862573,
0.07181500566168061,
0.17010271339345,
0.36406988692952136,
-1.689809967880289,
-1.1677426672173294,
-0.7977758879892671,
0.531032719362766,
-1.7722607960867016,
0.6332033998224597,
0.6669814362912183,
0.218182728116887,
1.0415656581640258,
-1.4544893086294475,
0.5175174925258392,
-0.9742907090362619,
-0.30648595673224416,
1.2400541074634985,
-0.30003161306087445,
-0.14406503395842435,
-0.43061285539013316,
0.6914697219419143,
-0.48545379734819916,
-0.2166375004086177,
1.2014709434123243,
1.0734635496959384,
0.43666289070672293,
-0.9550440807047608,
1.2817732673505913,
0.6254203972471953,
0.8730111716749767,
1.1814458389257443,
-0.5855214911540807,
0.33647224367417283,
0.914891547403245,
-0.10924028322724566,
0.6731472714644756,
-0.8672547313943412,
-1.1628903969680444,
1.2968110405185924,
-0.7478342770444015,
1.0157432273471354,
0.05866260951598884,
0.1549884083832883,
2.402954000164725,
-0.8510405490988947,
-0.13394876321797194,
0.35128800256256376,
0.03985349181110424,
1.0891408951797659,
0.49683980443602116,
1.3618410332836905,
0.31089249400158553,
0.007823999182329802,
-1.0325531315281817,
-0.13635517978577905,
-0.4783006843261583,
-0.9648987725589863,
-0.4094326055257113,
0.0620151507481985,
-0.3631850012398663,
-0.9119123598789223,
-0.3458539889181142,
0.8501459643039054,
1.6461875633189593,
0.08799287143090098,
-0.82318299513447,
1.17289644669955,
-0.9455811832961388]],
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0 },
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing' },
'nqubits': 7,

```

```
'observable': { 'coefficients': { 'bn': [ 1.0,  
                                         1.0,  
                                         1.0,  
                                         1.0,  
                                         1.0,  
                                         1.0],  
                                     'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],  
                                     'r': 1},  
               'def': 'ising'},  
  'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},  
              'file_name_prefix':  
'AUTOMATE_heisenberg_noisefree_time_evo_ric2_sample#4'},  
  'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},  
  'run': 'zne',  
  'state': 'dmatrix',  
  'vqe': { 'iteration': 1,  
            'optimization': { 'algorithm': 'SLSQP',  
                              'constraint': True,  
                              'status': False}},  
  'zne': { 'data_points': [ [4, 2, 0, 0, -6.241465922765087],  
                             [12, 6, 0, 0, -4.714681794898787]],  
           'degree': 0,  
           'method': 'richardson',  
           'sampling': 'default'}},  
  'output': { 'exact_sol': -8.566772233505624,  
              'run_time_sec': 4.267692565917969e-05,  
              'zne_values': { 'degree': 0,  
                              'extrapolated_value': -7.004857986698237,  
                              'others': { 'beta_coeffiecients': [1.5, -0.5],  
                                           'cost_richardson_zne': 2.5,  
                                           'sorted_expectation_vals': [  
  
-6.241465922765087,  
-4.714681794898787],  
  
                               'sorted_noise': [6, 18]},  
                              'sampled data': [ [4, 2, 0, 0, -6.241465922765087],  
                                                  [12, 6, 0, 0, -4.714681794898787]],  
                              'sampling': 'default'}}},  
  { 'config': { 'ansatz': { 'gateset': 1,  
                            'layer': 30,  
                            'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],  
                                                           'cn': [ 0.5,  
                                                             0.5,  
                                                             0.5,  
                                                             0.5,  
                                                             0.5],  
                                                           'r': 0},  
                                      'time': {'max': 10.0, 'min': 0.0},  
                                      'type': 'heisenberg'}}},  
    'init_param': { 'value': [ 0.11853625011402234,  
                                0.11853625011402236,  
                                1.1173235551611367,  
                                1.7342580765110573,  
                                1.7342580765110573,  
                                2.108144483620023,  
                                3.054129947242328,  
                                3.054129947242328,  
                                3.054129947242328,  
                                3.056306360633301,  
                                4.638414750363569,  
                                5.0621851887275495,  
                                5.7503913724004905,  
                                5.774998407238176,  
                                6.917933224474368,  
                                6.917933224474368,  
                                8.061549209526286,  
                                8.061549209526286,  
                                8.061549209526286,  
                                8.591251503132888,  
                                8.591251503132888,  
                                9.051235537435975,  
                                9.081856762230144,  
                                9.467876152039107,  
                                9.545932016874406,
```

9.591419209848118,  
10.465616352275608,  
10.465616352275608,  
10.465735173309618,  
10.980942228105905,  
2.0734674059611633,  
0.32892201175743896,  
-0.007356440825095051,  
0.7856576253246221,  
2.089457548986907,  
0.7744884921126718,  
-0.35049309306395837,  
-0.6556831494452968,  
2.0369525201874903,  
0.4739652080570001,  
-0.8564345639983049,  
1.25716179603495,  
1.7181260437331554,  
2.3978160665502384,  
1.1152024575020885,  
-1.3335737674295711,  
0.016650799076572978,  
1.6607129762234538,  
0.648059834763191,  
0.2438725527060928,  
-0.27307896000752346,  
1.4369017198677916,  
3.5672448343800007,  
-0.5379702113035718,  
-0.7420664562717484,  
-0.529699891930992,  
0.7301471483152846,  
0.781913925757813,  
0.6004078048346045,  
1.7324865479818374,  
0.4548236607944829,  
-1.4419813608219112,  
-0.684662976785234,  
0.8455512814500156,  
1.97751114408285,  
-0.833202517811791,  
1.110524460863052,  
2.6403320691876733,  
-0.3129427957408566,  
-0.06674204626492235,  
0.5842857778318762,  
-0.21132485649138796,  
-0.011842019288790376,  
-0.25743970610802486,  
0.7486616881233721,  
-0.1302029141156864,  
0.09497091477412227,  
-0.3715265429351211,  
0.39570077921274605,  
0.28643868832003017,  
0.7848413456471106,  
-0.7157146817058562,  
0.09411764456438232,  
-0.10910076647953601,  
1.1262761892344808,  
-0.27334997823872975,  
-0.44027652197942063,  
0.6740415100156434,  
-0.336256645457715,  
0.4268157265313067,  
-0.8611696251566416,  
-0.34560928156726306,  
0.5618074077714486,  
0.5866360379174992,  
1.8662876827821717,  
2.21592310898005,  
1.972223656383108,  
1.6141187926643297,  
0.856255815565121,  
-0.34275929095614754,

```

-1.0642528745182613,
-1.0618686751734654,
0.2379582550153795,
-0.6501770361983872,
-0.19408645485522444,
1.501330829125914,
1.5726602727591479,
0.7066066097903853,
-1.4580936665368467,
0.46940440748349077,
-0.1287015677341077,
-0.9805925033056946,
-0.3754741669636888,
-0.026817919501009202,
1.1067346586651607,
0.17547923725022047,
0.8902143171896091,
-0.22777698610446503,
0.8082253583749343,
-1.0674083601412958,
-0.022706971436593337,
0.34227899244110566,
1.3527736523760083,
2.0767841716125894,
0.5778568145668401,
-0.6555502504392442,
1.2670274746873995,
0.507694022232518,
-0.2629991187543805,
1.7048253080726326,
1.4088065522309612,
2.823918413203317,
1.2763232744235296,
-1.4348344213353486,
-0.605496445996402,
0.09645158262695042,
0.024639736182597342,
0.23997550724405606,
0.9979895378690888,
-0.40612123795993227,
1.826790650755685,
0.029599395583551916,
-0.4592861834683686,
0.0328358806035505,
1.3612120706287358,
0.8210402794880411,
0.05688164146575431,
0.03152531580318861,
2.0316547976974904,
2.795039607579165]],
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric2_sample#10'},
'redundant': { 'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},

```

```

'zne': { 'data_points': [ [4, 2, 0, 0, -6.2813019572269795],
                           [12, 6, 0, 0, -4.778373581659957]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default' }},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.2901763916015625e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -7.032766145010491,
                            'others': { 'beta_coeffieicients': [1.5, -0.5],
                                          'cost_richardson_zne': 2.5,
                                          'sorted_expectation_vals': [
-6.2813019572269795,
-4.778373581659957],
                                          'sorted_noise': [6, 18]],
                            'sampled data': [ [4, 2, 0, 0, -6.2813019572269795],
                                                [12, 6, 0, 0, -4.778373581659957]],
                            'sampling': 'default' } }},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                         'r': 0 },
                          'time': { 'max': 10.0, 'min': 0.0 },
                          'type': 'heisenberg' } }},
  'init_param': { 'value': [ 0.12420123662801165,
                             0.138246244841176,
                             0.34185010800102933,
                             0.8771280515547424,
                             0.8771280515547423,
                             1.9326762312100456,
                             1.9326762312100456,
                             2.879806034127527,
                             3.4467495190209787,
                             3.460588109395402,
                             3.4605881093954016,
                             3.4605881093954016,
                             3.911934955717517,
                             3.9564836804547703,
                             4.188240551814426,
                             5.098640553346409,
                             5.098640553346409,
                             5.098640553346408,
                             6.466332587579958,
                             7.457565848827182,
                             7.712724508543908,
                             7.890302861063261,
                             7.898577524812402,
                             8.020037295803547,
                             8.020037295803547,
                             9.289723192898348,
                             9.68251578824504,
                             9.68251578824504,
                             10.66694519433398,
                             11.464898013549973,
                             1.8095532965205083,
                             -1.6633278493215808,
                             -1.2281091611401596,
                             -0.40155726479865544,
                             1.7903243850816337,
                             0.18661159996017582,
                             1.2217850039169107,
                             -0.48128156078104645,
                             1.438546033666569,
                             -0.9466383819139143,
                             -0.2179227006066069,
                             -0.07921201994836616,
                             0.6692914930417907,
                             -0.16791294486623565,
                             -0.3278463005181308,

```

1.2883193159418245,  
1.9001761172388045,  
0.7646920019853412,  
-0.6325477821570596,  
-0.5987552945744136,  
0.5669730115381587,  
0.5983941343774113,  
-0.06179171362000896,  
-0.6867235859693906,  
0.5211737756628548,  
-0.19354588250953578,  
0.6072816218147872,  
0.3472677197742769,  
-0.08031734075212016,  
1.4024126217748347,  
-0.5867181790012919,  
0.809620813948269,  
0.35997425529443994,  
-0.8722967249300235,  
-0.5874818244923429,  
-0.5567926036837068,  
-0.6652314874983639,  
-0.6042054992483096,  
-0.13918430829641074,  
-0.08277488470584692,  
-0.4972293169762719,  
-0.4421668735352916,  
0.6160601456858428,  
-1.1972657609969646,  
-1.1558488364748807,  
-1.4501782622641872,  
0.03989088007781949,  
-0.8684923327267209,  
-0.5569704341339503,  
0.15823054121075,  
0.6345578215095505,  
0.3601853745371903,  
-0.42594808878819745,  
0.08979804115834313,  
-0.153043281560756,  
-0.603228229875778,  
-1.1264410002736531,  
0.6895580235946861,  
-0.11045941959152497,  
0.5174109375139814,  
1.3269460586908306,  
-0.3852298542423827,  
-2.4120095755015893,  
0.08807412161753436,  
0.1228551365077638,  
-0.6982591234727157,  
-1.1618488040328845,  
2.5586909942385017,  
-0.24921574033555105,  
-1.9870969070050777,  
-1.0279498295884981,  
-0.7796802357622239,  
0.48428681889730063,  
0.7162815161060118,  
-0.15547297036103372,  
1.0522591887013215,  
1.772822944479854,  
-0.2654037211186137,  
-0.2720110866721671,  
-0.03929478442656517,  
0.34606077605631835,  
0.5533331494282367,  
1.0574846609095763,  
-0.5747611578732846,  
0.4916772893793279,  
0.9875709691916216,  
-0.17857479553023695,  
-1.147281220275154,  
0.37370382177065037,  
2.456815155407461,

```

0.6567596591037266,
0.9507316292553318,
1.5113928877114242,
1.8380989093110256,
-0.1736919900840187,
-1.2666253947041328,
-0.554819304070435,
1.1931643666366285,
0.4614862178419797,
1.2040726557184918,
0.3083618234293392,
-0.4066692475369416,
0.3740368412278018,
-1.684611974494111,
-0.8650016725760176,
-1.4838330341878547,
-0.14344887350922086,
4.203596189627334,
1.1133202614474196,
1.391124117957397,
1.8627332105499828,
-0.28192336755973296,
-1.5416482647725873,
-1.9612892990030817,
0.8836928087418303,
0.300761821046295,
0.6785848024508535,
-0.5500277556546446,
0.5742776326882599,
-1.181756808209963]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noisefree_time_evo_ric2_sample#5'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -5.814676484708358],
[12, 6, 0, 0, -4.248447309496402]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 4.0531158447265625e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -6.597791072314337,
'others': { 'beta_coefficients': [1.5, -0.5],
'cost_richardson_zne': 2.5,
'sorted_expectation_vals': [
-5.814676484708358,
-4.248447309496402],
'sorted_noise': [6, 18]},
'sampled data': [ [4, 2, 0, 0, -5.814676484708358],
[12, 6, 0, 0, -4.248447309496402]],
'sampling': 'default'}}}},
'heisenberg-ric3-uniform-scaling': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,

```

$0\}$ 

```

'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': { 'max': 10.0,
'min': 0.0},
'type': 'heisenberg'}},
'init_param': {'value': 'random'},
'noise_profile': { 'noise_on_init_param': { 'status':
'value':
'noise_prob': [ 0.001,
0.001,
0.001,
0.001],
'status': False,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': True,
'type': 'png'},
'file_name_prefix':
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0]]},
'run': 'vqe',
'state': 'dmatrix',
'vqe': { 'iteration': 10,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': True}},
'zne': { 'data_points': None,
'degree': 1,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 +
'1 Z 1 + 1 X 2 X 3 + 1 Z 2 +
'1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 +
'1 Z 4 + 1 X 5 X 6 + 1 Z 5 +
'1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X '
'0 X 1 '
'+ 0.5 '
'Y 0 Y '
'1 + '
'0.5 Z '
'0 Z 1 '
'+ 0.5 '
'X 1 X '

```



```

'2 + '
'0.5 Y '
'1 Y 2 '
'+ 0.5 '
'Z 1 Z '
'2 + '
'0.5 X '
'2 X 3 '
'+ 0.5 '
'Y 2 Y '
'3 + '
'0.5 Z '
'2 Z 3 '
'+ 0.5 '
'X 3 X '
'4 + '
'0.5 Y '
'3 Y 4 '
'+ 0.5 '
'Z 3 Z '
'4 + '
'0.5 X '
'4 X 5 '
'+ 0.5 '
'Y 4 Y '
'5 + '
'0.5 Z '
'4 Z 5 '
'+ 0.5 '
'X 5 X '
'6 + '
'0.5 Y '
'5 Y 6 '
'+ 0.5 '
'Z 5 Z '
'6']],

'output': { 'exact_sol': -8.56677223350563,
            'initial_cost_history': [ 6.121384846939922,
                                      6.150953723335025,
                                      6.28813394059272,
                                      6.195576097324661,
                                      5.996275986067059,
                                      6.155907118612996,
                                      6.197882180139617,
                                      6.276491195599097,
                                      6.126423666072617,
                                      6.100624170709524],
            'noise_details': { 'gates_num': [4, 1, 1, 0],
                               'identity_factors': [0, 0, 0, 0],
                               'noise_level': [0, 0, 0, 0],
                               'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [

0.001,
0.001,
0.001,
0.001],

'status':

False,

'type':

'depolarizing'},

'odd_wires': 4},
'optimized_minimum_cost': [ -7.113819716474412,
                             -6.821323437950204,
                             -7.2322812477454015,
                             -7.168061781988564,
                             -7.037022966690968,
                             -6.764659140688094,
                             -6.70772123506257,
                             -6.951929490175616,
                             -6.765271591343842,
                             -6.643370531408768],
'optimized_parameters': [ [ 0.010202312572582629,
                             0.01020231257258252,
```

0.010202312572582303,  
1.3908062838956354,  
1.3908062838956354,  
2.0164416760130464,  
2.592046705326477,  
2.592046705326477,  
2.592046705326477,  
3.724080378311745,  
3.724080378311745,  
4.739480012897176,  
4.739480012897176,  
5.945308900554525,  
5.945308900554525,  
5.945308900554525,  
5.945308900554525,  
6.51261715666153,  
6.516103684733277,  
7.99085874039394,  
7.99085874039394,  
8.16277333661163,  
8.99858956109671,  
9.406132081871055,  
9.406132081871055,  
9.406132081871055,  
10.1331640829029,  
10.184186623923145,  
11.15918741223016,  
11.16716557378114,  
2.8450840989270483,  
-0.611567672261254,  
-0.551095997013421,  
-1.0131107784954883,  
0.6825070788337171,  
-0.6162852792596847,  
0.053241771237976535,  
-0.12516614014524466,  
1.004304378969064,  
1.0874046621334863,  
-0.263039228744755,  
-0.10249623387196242,  
1.6330709573383448,  
0.7555807809408442,  
-1.304918472993802,  
-1.1870918453507433,  
-0.1330475605934714,  
-0.5047081392764299,  
0.7756728723196425,  
-0.49278801094288127,  
0.42847067786702214,  
0.5383171641852699,  
-0.1052976007723638,  
-1.2720333725347934,  
0.1951924272458347,  
-0.04277330847061178,  
0.9574239041786494,  
-0.23071352324401823,  
0.594076188896681,  
0.34935689199185954,  
1.343124516909016,  
0.09733282827416712,  
0.30944030008743273,  
0.4457207862171129,  
-0.9683728985035202,  
-1.120837258235465,  
0.5707161794308084,  
1.2158524027070072,  
0.7958721804993727,  
-0.9645697723054423,  
-0.8960337800506504,  
0.19569442936859724,  
0.40224575611741115,  
0.043062302517518566,  
-1.1857970207577537,  
0.1737802328972237,  
-0.6433879386848066,

-0.09230835161436789,  
-0.5865305292280132,  
-0.4370825940325887,  
-0.2558137517355887,  
0.0011609522641742864,  
0.6539099100207111,  
0.5336009667754404,  
-0.066252982145182,  
-0.5359243057678726,  
-1.3834098071980059,  
1.0212180272076503,  
0.5141425620577187,  
-0.3002279094652444,  
1.9431365651467594,  
1.0552610834283143,  
0.03764625526605462,  
1.0189467943495765,  
-1.1805772107399133,  
0.2812463759993353,  
1.4321423259624626,  
0.004331180480864721,  
-0.009722915333733264,  
0.6451162813005181,  
-1.3276490840851547,  
-0.022791981388308465,  
0.6904663535208042,  
-0.08291995023229079,  
-0.4292297662993819,  
0.08451212085763125,  
1.730745239172763,  
-0.4572165915626394,  
-0.5304437424739927,  
0.6917595603044201,  
-0.0834050618602206,  
-0.18753214427540912,  
0.03305271309241428,  
-2.06126875311761,  
1.5412249435528216,  
0.6658854058101124,  
-0.36436553183642006,  
-0.9193216873412987,  
-0.12900157901067746,  
0.00542745656150127,  
-2.171309732970475,  
0.7554637248132821,  
1.249093251376782,  
-0.6445658098419218,  
0.14255909437901,  
1.9827929295292588,  
1.7044112257377888,  
1.3052476731654217,  
-1.2421280078558083,  
0.9803773552514545,  
0.624656679395339,  
1.5450717726138348,  
1.3377635200462674,  
1.6713162630334013,  
1.1434539739578018,  
0.7924845860796002,  
0.7488178629415702,  
-0.22907755928161938,  
0.02068614393688229,  
0.7608745118642098,  
-0.9304086893990576,  
0.32284859123973336,  
1.1891889033470526,  
-2.2276657670493667,  
-0.3847051133881006,  
0.34685342333136693,  
0.549782335235608,  
-0.741267714199706,  
0.26835698412135817,  
-0.3932040836252281],  
[ 0.1668593898896292,  
0.17040712573292452,

0.1805381301837931,  
0.5412292500635668,  
0.5489811947718172,  
1.6527475146851556,  
2.55163116002801,  
2.5519072608250526,  
3.5532683674980303,  
3.6288880821260254,  
3.628888082126026,  
4.805536133422,  
4.805536133422,  
5.495812833389341,  
7.061809444427505,  
7.061809444427505,  
7.091809082073759,  
7.091809082073759,  
7.177303629807857,  
7.177303629807857,  
8.014949756247965,  
8.530162577551986,  
8.530162577551986,  
8.546061750342906,  
9.04867098177819,  
9.074898072060186,  
9.632422305371618,  
9.634373167303918,  
10.38794675566215,  
10.6266488059183,  
1.098346025464491,  
1.5064109656875124,  
-1.345000798816457,  
-1.0112785952191263,  
1.6300712383138607,  
0.8148371701480261,  
-0.28350002839102345,  
-0.33372360425933684,  
1.6208682076493302,  
0.8121027533840469,  
1.424723017228629,  
-2.424990019545176,  
0.082574342220046,  
1.5280227698708746,  
-1.15137171364767,  
0.8821561188139568,  
-1.0160789387304932,  
1.6746733218779515,  
2.4704340348759835,  
0.8258460042877822,  
0.21603078517896931,  
-0.05951632881852065,  
-0.38389794767629976,  
1.262782578763767,  
0.2784323534326924,  
-1.1033559163681899,  
-0.6528860571486432,  
0.2962709573582783,  
0.7373896958863383,  
-0.19469473272588958,  
-0.5648694322067066,  
-0.2865513283590244,  
-0.1568370013695695,  
0.5493402156787225,  
-0.06660698090283595,  
-0.03359282593361995,  
2.386303225482439,  
2.5818639178838447,  
-0.2777126348162844,  
0.9824372498806634,  
-0.39422047955069633,  
-0.2578521646674435,  
-2.3189661125012333,  
3.704222502127313,  
0.0786550943979888,  
-0.4292299615806753,  
1.9657979836656132,

-2.0589782426096743,  
0.5074656887310783,  
0.529845836294102,  
0.3333899546946687,  
-2.293287544626138,  
0.38495704078578347,  
0.11228231507748758,  
-0.5441382535456334,  
-0.10489456654410802,  
0.20011773016694326,  
0.2071371298105447,  
-2.3651747840346373,  
-4.642753244408169,  
0.31152670002610416,  
0.5022276983536407,  
0.868938175568576,  
0.20348366213849262,  
1.6475591691674232,  
0.3723999247005541,  
-0.6589367341470095,  
-1.1662574597011768,  
-0.6243580701563078,  
0.7131540586709431,  
0.1202680893039496,  
-0.035429417928639004,  
-0.764191314011073,  
1.2086109032075552,  
-1.051983148544319,  
0.9246153479653275,  
-1.1427863274072698,  
1.332115914696049,  
-0.27763903875773216,  
-0.8366665559266224,  
1.231317184155771,  
1.0584874216549616,  
-1.2625782973678872,  
-0.13344263101573678,  
-0.5438546353631553,  
0.32212207070493337,  
-1.303226737690094,  
-0.01337174800709397,  
1.5589050571537895,  
0.3479397882311206,  
-1.87970134892204,  
2.977494205144941,  
2.126179176803338,  
0.873413305092612,  
0.8500950046844986,  
0.23032349681334924,  
0.3909007718762141,  
1.27926383991169,  
0.4053229000380187,  
0.18190897779649284,  
0.3777935390994293,  
0.16772342823060155,  
0.7412973026981022,  
0.639129360404442,  
0.018341913161260836,  
-1.4541884523192488,  
0.28134413046256895,  
2.4001077951469534,  
1.6611157476326641,  
0.7905510314185135,  
0.3404203970178551,  
2.183912805046456,  
-0.3997518053650227,  
0.053570896670028414,  
-0.357205442227867,  
2.465639862334342,  
0.5537972989863772,  
-0.39728466664110995,  
-0.027817223268321305,  
1.9807706991981826],  
[ 0.5951590437264768,  
0.5951597797898418,

0.596302078053195,  
1.4089369768482796,  
1.4331037442558932,  
1.9334285070314567,  
3.062681311500457,  
3.0626813115004623,  
3.701592986553387,  
3.7015929865611663,  
4.692693983743045,  
4.692707272250184,  
4.692707272250258,  
4.692707272250313,  
5.273956511551061,  
5.2739565115534885,  
5.274711944180805,  
5.292162333185471,  
6.388031186249758,  
6.706092770308958,  
6.706092773942781,  
7.548703938317144,  
7.681022457823495,  
8.397974590110634,  
8.397974590138377,  
8.714530791128386,  
8.714530791128386,  
10.075092988071805,  
10.075092988073155,  
11.341131260513714,  
1.2164966908304873,  
0.5225196146354087,  
-0.34542368185043265,  
-1.252295733833459,  
1.5735101799719247,  
1.0464982053397573,  
1.2394468649734893,  
0.21595542567535536,  
0.6527940529325085,  
1.4145936861598034,  
-0.5380512317672027,  
-1.9014686324238337,  
1.451754133219536,  
2.1987565378949516,  
0.938092448651857,  
-1.6378088277288243,  
0.38538945046186207,  
1.1341127264381634,  
0.4639756379522118,  
0.6078279078278344,  
0.6166736770850927,  
-0.2105783577152824,  
-0.35613934438782024,  
0.019700965332415492,  
-0.1607988588148763,  
2.193665487035956,  
-0.06423342915568941,  
-1.9546338684001463,  
-0.18633224680849803,  
0.7857721800679403,  
-0.6042593641712383,  
0.7490426193215785,  
-1.6440993970557098,  
0.1929003499686422,  
-0.13169470171686798,  
0.1181804780373785,  
0.15693401681144475,  
-0.28658811756127545,  
-0.20708135879200276,  
0.09230795188954338,  
-0.4114468277172402,  
-0.8587939345722652,  
-0.29108154529906144,  
0.5427012646910324,  
-0.25834402839896575,  
0.08607676608574079,  
-1.2954984273935897,

0.1813204379953717,  
-0.34769281236878496,  
-0.09683800499273743,  
-0.9220596744797915,  
-0.67003274699539,  
0.4888752813745547,  
1.2659094572448748,  
0.11946751252820795,  
-0.2586531113468492,  
0.8859866115247531,  
1.5010226653220677,  
1.2253090413370418,  
-1.41480051306012,  
0.4438287250399343,  
1.1348546909542183,  
-0.26356600881424186,  
-2.0062796648632446,  
-1.5997185613370128,  
0.19365670408843416,  
1.9542746653083636,  
-1.16753432767107,  
-0.8341998310634118,  
-0.8078884986396416,  
1.057969787908329,  
0.11874076530060441,  
-0.37823536664235385,  
-0.26520820180860055,  
-0.05623142087332937,  
-0.6351447036627758,  
1.2477313546900863,  
0.09475828495367859,  
1.1570291529547316,  
-0.3159140153065273,  
-0.5798756886838644,  
0.5049917679316769,  
0.17933499272174766,  
-0.6452919120449363,  
0.3093583753904067,  
0.6269418409971109,  
0.536228963471926,  
-0.39297460666924544,  
-0.8585561386083093,  
0.42310038622809626,  
0.4625446959490829,  
0.46551290354297115,  
-0.006225430338097464,  
-0.9498487290783498,  
0.9283489563799108,  
0.5288015885952413,  
-0.6423745714782674,  
0.055608107183735184,  
-0.19141640271906557,  
1.6106743132208,  
-0.930502866063725,  
0.13606233511650948,  
0.7450273046384331,  
-1.862998799714745,  
0.8639045442938115,  
2.2050766695222275,  
2.1209593580448147,  
1.5928713117159927,  
-0.646261951983125,  
0.18338232206466956,  
1.9195145046471642,  
0.9340015251080405,  
0.22314701152636945,  
0.22339358941062268,  
-0.49545999196264406,  
1.6497345768092624,  
-0.37841357670502584,  
0.19313501042389203,  
0.07433308037827455,  
1.831606295240235],  
[ 0.013945989287166007,  
0.014482887559355881,

0.7020792700957467,  
1.2708090216179468,  
1.8771473361142745,  
1.898764043280349,  
2.8886374873795146,  
2.8887394286496386,  
2.889554540070078,  
2.8895545400700837,  
2.889778536891296,  
2.890175029071649,  
2.8901764691110965,  
3.881547037638128,  
4.589967577258263,  
4.916994542918821,  
5.4213951120408375,  
5.421396236977594,  
5.937049320865825,  
6.879796302074518,  
6.931299553407329,  
7.597215453538154,  
7.941093252873733,  
7.941093304737446,  
9.23283235128487,  
9.232832768748333,  
9.232832769084892,  
11.10587443204972,  
11.182791630116155,  
11.297769627933807,  
0.7007490003921656,  
0.8357798277265018,  
-0.006144500286149594,  
-2.002647677865005,  
0.3078229546122665,  
0.6497081019565148,  
-0.5263987300225429,  
-1.3591736982237872,  
0.4978537208919288,  
-1.0703987652029276,  
1.4894572070841317,  
0.10507602812754031,  
1.2060409491957005,  
0.37232709611155723,  
-0.9426439100006672,  
-0.36387040355717715,  
0.9248005896093184,  
1.0383864274136485,  
-0.2845687665108692,  
-1.3700022658840743,  
0.197561542582957,  
-0.32357133547759104,  
-0.5540850172472152,  
0.5749264875292693,  
-0.8790799137852104,  
1.0945413836746756,  
0.3793043522465329,  
-0.4056052817915047,  
-0.03473792548266608,  
0.06466238365347084,  
0.06911551547308,  
0.1689218888799635,  
-0.24055379179177064,  
1.0229644579244672,  
-0.3032356624759471,  
0.7939776889924924,  
0.9000504980210274,  
1.1922086788205504,  
-0.09256238768786877,  
0.5764640092401906,  
0.20671868793560919,  
1.5137094250639866,  
-0.17335127063306519,  
0.8566284172009878,  
-0.14321647694006984,  
1.3125145841881363,  
1.3592268317355658,



0.1512217749645529,  
0.40406540571588334,  
0.048383985681794354,  
0.19259007229061106,  
0.09976438753283409,  
-0.8546571821237718,  
0.6621369033183476,  
-0.1702351863826035,  
0.36026352288591695,  
-0.8538518608539489,  
0.5392868667124087,  
1.1279014251126462,  
-0.36128436957709814,  
0.388999106940785,  
0.6046833425816769,  
0.22322275018396126,  
0.19171695999278726,  
-0.909915166057891,  
0.21776193961543494,  
0.28996753900858246,  
-0.5842323028487328,  
-0.23864599488371552,  
0.5243326463982184,  
0.32056321937714066,  
0.5356836550343521,  
-0.3036011562711703,  
0.28802877152454115,  
-0.33781577627567244,  
0.7960023934710929,  
-0.34238272839391165,  
-0.755152052016237,  
-0.44352996180502197,  
0.07213680417312635,  
-0.10190373256064952,  
0.6647215855084265,  
-0.9303498099091333,  
0.9785859773141862,  
2.090431130104361,  
-0.3615944398761197,  
-0.05657593308707301,  
-0.4893006812698228,  
2.169089562284795,  
-0.2512716878005756,  
0.5324061192252376,  
-0.35101147654456727,  
0.809248070031391,  
1.4509839161975397,  
-0.14911304722907706,  
0.009330045236156378,  
0.16685413556340573,  
-1.0472061077948698,  
1.6539137014575498,  
1.3611819463379937,  
-0.1612641139265809,  
-1.2962247052632323,  
-1.3797066485510583,  
0.7614302908946665,  
0.5091243097447496,  
-1.034844537010192,  
1.0872752511102444,  
-0.476692079414531,  
0.49649227376774574,  
-1.1491063122969838,  
0.5155370403129137,  
2.9855835289421178,  
1.332632811562063,  
-0.4511213152168112,  
-0.18076672982111605,  
-0.6499435359167832,  
-0.1697346678000319,  
1.4081723136905224,  
0.442588820936982,  
1.722678503402018],  
[ 0.6039929180328771,  
0.6039929180328772,

1.1870458270689,  
1.1870458270688995,  
1.412745515623535,  
2.7932578893846336,  
3.721244973412882,  
4.900800320776727,  
6.39210348373028,  
6.39210348373028,  
7.061133772685592,  
7.061133772685592,  
7.061133772685592,  
7.064294030691084,  
7.896781244010901,  
7.896781244010901,  
7.998168023342792,  
8.09271241991372,  
8.09271241991372,  
9.328885229004163,  
9.328906326502109,  
9.56647323827175,  
9.587868480377287,  
9.606795901338938,  
9.632809215929381,  
9.925261433896223,  
10.67745113859835,  
11.226267254217802,  
11.25813692634961,  
11.259219336255413,  
1.5276356326766196,  
-1.2318130242699923,  
0.07924764105056724,  
-3.11015247863868,  
1.71979592089301,  
2.1636204056140302,  
-0.44284897868332995,  
-1.9599373218939633,  
0.06248244737264575,  
1.4749130816585614,  
0.6808242800852113,  
-2.8378068229153226,  
1.7023278591356004,  
1.50553848610602,  
0.9365133390345636,  
-2.1922613442274193,  
2.8432021818280635,  
0.1855585942894919,  
-1.305416067894503,  
0.1905478234118404,  
0.7393995701939485,  
0.19798052248890954,  
-0.8075009715521676,  
0.3948611135767452,  
0.2802743807361451,  
-1.4516873620037638,  
1.5556285183865062,  
-1.0754052466574715,  
-0.26931261584286686,  
1.2336702516634759,  
-0.8384600779602994,  
0.1263891070094113,  
1.371252832802525,  
0.215177045818575,  
0.6381629880602765,  
-0.10309421117565558,  
0.4124383487994645,  
-0.655499258712117,  
0.4988310520659948,  
0.9884276098863405,  
1.4367219570983862,  
2.175763151095631,  
0.4657848221151968,  
-0.43932071710829274,  
0.9992343531072873,  
2.543795366459747,  
1.4484903663678823,

-1.0884458694866728,  
1.5946427529603922,  
1.6036026746991174,  
0.5049418933876622,  
-1.0871394525284908,  
1.0140119509472394,  
0.5109229333717124,  
0.8743589388253838,  
0.09626392588768701,  
-1.263331036369507,  
0.7924497462635596,  
0.7602243892770352,  
-0.02425703489356225,  
-0.9488939939602019,  
2.6693155936644737,  
0.5100002820942202,  
0.595619937330169,  
-0.8296192082845288,  
0.03973961449691636,  
-1.7144893205098422,  
1.1592271204386744,  
0.04896218554826232,  
0.6673584031026698,  
-0.8454442747231521,  
1.0304518931414424,  
0.8556412792926265,  
0.538780781704616,  
-2.308898512383933,  
1.5082121217292006,  
0.9522091008412682,  
-0.6026951427085929,  
-0.561943926102551,  
0.0993983558744849,  
0.4791162049419018,  
0.10320414203165484,  
0.3730055252741846,  
-0.47083232270591907,  
1.8673303303286475,  
0.11712430229385423,  
-0.6044688726688213,  
-0.9010581315425702,  
0.8870944114042272,  
-0.6585959519901412,  
1.4737812112349316,  
-0.08789784470103781,  
2.094313922775301,  
-0.33880630598079,  
2.0864279335765668,  
-0.3541510297313768,  
-0.1447960879675017,  
1.1237218765827641,  
0.7472353955833465,  
0.43980261574830926,  
0.6534205210717992,  
1.2606259200129655,  
-0.17935209951086067,  
1.6469967332630842,  
-1.0541245665671384,  
-1.9424469299865808,  
-0.18975499615277758,  
1.967627931161089,  
-0.5610576072704585,  
-1.4036970670846107,  
2.6946925238411343,  
-0.9860662529475024,  
-0.6528571620700129,  
-0.6551571328219318,  
0.9777230807240078,  
0.003267369094500521,  
-1.3217863730621935,  
0.3048209868145306,  
2.1104722024376037,  
-0.13744008360720306],  
[ 0.25527267369507034,  
0.25565792243175783,

0.2647851751522132,  
0.5363821708593047,  
0.5363873360294482,  
0.7233633669048282,  
1.469495303301716,  
2.6782106232033085,  
3.0738233934797257,  
3.0740346152756928,  
3.0740346154225127,  
3.5401415295205747,  
4.384558950933806,  
4.384564402805264,  
5.187694707345863,  
5.431645815108105,  
5.489249393218873,  
5.489270645046236,  
5.4892706450864015,  
6.745887429448721,  
6.751180124796475,  
6.975059797459636,  
7.4852253234058015,  
7.485225323406553,  
7.485225336458803,  
8.65422617922401,  
9.588402512165866,  
9.885475791973308,  
10.59890299271783,  
10.69671178550786,  
1.7193952291225598,  
-2.699905058742405,  
-1.223597261476082,  
1.010311557825714,  
2.412320728895392,  
0.01205800479020808,  
0.07148434641220561,  
-0.1717056232391439,  
0.7382566227367261,  
1.1624421524382496,  
-0.9704132592114074,  
0.007350927807351759,  
2.3582361698297074,  
1.1487298862005386,  
-0.5298367489795935,  
-0.09976600187590766,  
0.7543852753586129,  
1.401553978295213,  
0.3078871075376248,  
-0.35588965288410024,  
0.15554254602359127,  
0.3425968302644435,  
-1.202384247417669,  
-0.987347192012539,  
0.4529373843839761,  
0.4903191821294036,  
-0.3596344497958935,  
-0.17493820576367525,  
1.3619720378391473,  
-0.2517632245160441,  
0.6511229549349082,  
-0.07544040749490964,  
-0.04771613185909407,  
-0.3755018325798389,  
0.9938372515787193,  
-2.617459009880976,  
-1.1600518599196699,  
1.385641845308893,  
1.3078548392623544,  
-1.3438342667259302,  
0.06225569718179881,  
2.197693302377489,  
1.042516443745511,  
0.03537145740203309,  
-0.4361466628046714,  
0.5235506730441506,  
-0.526852610863259,

0.2683619694707144,  
0.4190531675420984,  
1.1917182306749494,  
-0.22315973823529625,  
0.3724063269005885,  
-0.2016113706580773,  
-0.6608684665627687,  
-0.5566572791655187,  
-0.6080637139710359,  
-1.3764025932169088,  
0.06381643974581075,  
-0.12239416020448966,  
0.8768915165514672,  
0.9734732325585186,  
0.43086234391719236,  
-1.2868778636436715,  
0.2387140460098626,  
0.9650786815364466,  
-0.8088454790489977,  
0.3379873670823351,  
-0.5777804082620341,  
0.5336495835071627,  
2.9920059240641073,  
0.6079052241489462,  
0.5309531439532562,  
-0.3169545414432997,  
-2.3335729587340226,  
1.4959043429555212,  
-0.5568960671660346,  
1.653532167337357,  
0.35120291709985135,  
-1.2609025397237739,  
-0.1931706005433399,  
-0.7761167208985412,  
-0.07661975220377984,  
-0.5351965211836152,  
-0.0031199845298622592,  
-1.0423575145047397,  
0.1404336078605159,  
-0.2659485743030148,  
-1.6615430856264528,  
0.43884229259462737,  
0.6812026744892391,  
0.39460126400851775,  
0.9189185317254136,  
1.0545864345697524,  
1.1559068061784519,  
1.0720705313960006,  
2.514687033544068,  
2.0122769373294087,  
1.2260219872848024,  
-1.3734724775008675,  
2.3904026332666466,  
-2.404362121009983,  
-0.8308162974608817,  
-0.49116355387064226,  
1.4544417316540983,  
1.2021789553657038,  
-0.045966888650276455,  
-0.5647889892892385,  
0.6643832758564343,  
1.3569537910410745,  
-0.9183847616510102,  
0.945220285616687,  
-0.2507148012652629,  
0.7511336622169466,  
-0.9416337312429676,  
-1.4793772681330912,  
0.4334847087508488,  
-0.02256141084202589,  
-0.8421263780740565,  
0.7532984525691246,  
-0.4880194119115941],  
[ 0.008743077103622827,  
0.009882832507877682,

0.7050944318623401,  
0.710375902327237,  
1.3735081730499452,  
1.9102715342756955,  
2.4433320146909057,  
2.4516882946549723,  
2.451688347950266,  
2.451688347950339,  
2.843659132454273,  
2.8437290613274957,  
4.1600447531010465,  
4.306699526502985,  
4.306699526503065,  
5.241123177068926,  
5.241123178389404,  
5.24112317839451,  
5.241123178416889,  
5.24112317841696,  
5.540975568888287,  
5.540975570417886,  
5.941112811664419,  
8.170699047520403,  
8.170699047520507,  
8.170699047530466,  
8.255093472901638,  
10.272293989986627,  
10.424665220800923,  
11.465171522837265,  
3.9395345563718758,  
0.4691052202571919,  
-1.862560190849311,  
-0.5409749194015872,  
0.6809788356765686,  
1.8042992706436805,  
-0.26820425656414737,  
0.1583592390805078,  
2.570139180175488,  
1.9730281302693196,  
-1.463840299189443,  
-0.6685636516618708,  
1.7639202171290544,  
-0.25593154759594605,  
-0.2985776439588054,  
-2.380396900296592,  
0.702730788267215,  
0.1111013414139888,  
0.8409172298864358,  
-1.2895389501906573,  
-0.6495780843509739,  
-0.7851296452736322,  
0.551111177160635,  
-0.7726813911354989,  
0.5538939215319534,  
0.03671507307592432,  
0.3611092546557634,  
-1.1244512927039525,  
0.9979933722488747,  
2.1458567471834726,  
0.6045511633065316,  
-2.057454443497708,  
1.252679002491011,  
1.430968651076373,  
0.1975347289978355,  
-1.299395231227167,  
1.3709528213003457,  
0.1431677222477642,  
-0.5468176167431326,  
-1.363138690512715,  
3.0723179570358097,  
0.09197418207209145,  
0.552028513182037,  
-0.14805587495457423,  
0.6542791830341044,  
-0.6463721623376274,  
0.594458988807259,

0.36313400085196706,  
-0.22487670595801615,  
-0.5600947295073319,  
-0.13194082373612193,  
-0.7877948735702447,  
0.37453010501171596,  
0.4466259555663157,  
1.308811697533367,  
0.18300565834449778,  
0.28722746055568227,  
0.11593248147227052,  
-0.22092771987873516,  
-0.3830228539100271,  
-1.1848305159650747,  
0.5197091232696622,  
-0.20788874837533922,  
-0.6085287569162429,  
0.622048119692812,  
0.36154402486320714,  
-1.283336122338554,  
0.06614563071195226,  
-0.10338801392549199,  
-0.6587068471684263,  
1.34100892693596,  
1.611824691291148,  
0.6916042008757854,  
1.6327439292692163,  
-0.6648342512722216,  
0.37654710496224697,  
-0.24718958516166675,  
-0.7065038375487233,  
0.11746925267221191,  
-0.5800210884330035,  
-0.5819296114685866,  
0.01696046668851879,  
0.08164598903007107,  
0.39930256073308995,  
-0.22041497304878216,  
-0.13569368036844073,  
-0.734071731705797,  
-0.10448732621745443,  
0.4350514428273773,  
-0.4345336137549378,  
0.39154417527507906,  
1.0175423593468684,  
2.0822612023831226,  
2.2518057581506135,  
-0.4050083292569126,  
-1.3225723626396935,  
0.2066177197668252,  
0.3518219705658924,  
0.7692056892056433,  
1.1078718838725619,  
0.6955122293015593,  
2.6391129283967607,  
-0.5193467200233968,  
0.16205999751797937,  
1.0319480004914923,  
0.0466744549888964,  
0.8866401912062555,  
0.6199118226017315,  
0.9594432756697039,  
0.30783399339708145,  
2.007890427791846,  
-0.42290702105473665,  
-1.4981000967272742,  
0.1246045734342663,  
1.4175139007816862,  
0.730422807509675,  
-1.0203109099547352,  
1.2475764531977165,  
1.172103834016867,  
2.0417923602468857],  
[ 0.3006295792025693,  
0.5011825648484141,

1.736075427951676,  
1.7894431127664152,  
2.4859557870150857,  
3.6898895058559917,  
3.73290444462633,  
3.73290444462633,  
3.741728259130309,  
4.1342678631525835,  
4.145528657970977,  
4.615983426127272,  
5.6679892124870985,  
5.692197651053977,  
5.773115344270512,  
6.56178194421021,  
6.56178194421021,  
6.56178194421021,  
6.56178194421021,  
6.56178194421021,  
6.561820835625042,  
6.6476324960056985,  
7.649631249906491,  
8.361638748929934,  
8.576867085540188,  
8.77036061445696,  
9.827286891841206,  
10.5379658375992,  
10.558826131428928,  
11.83004188936984,  
1.5987671786815294,  
-1.5058826811902317,  
2.0440908601375476,  
-1.481172398738803,  
1.4265067306792671,  
1.3375234069756785,  
-1.0089917144708827,  
-1.8440331252413595,  
-0.062239877224771915,  
0.18483713323292328,  
1.8795821846896128,  
-2.058552713287731,  
0.9708425302661001,  
0.8840527876953188,  
0.5964490041287303,  
-1.4043070469033054,  
0.14533141919970372,  
0.022743431858071796,  
-0.3923086391326145,  
0.11023448615420071,  
-0.4204112521530586,  
0.5529792020785508,  
-0.6330031478534407,  
0.23236293228773558,  
-0.4459800436834905,  
2.5876988326738504,  
0.6844024813933239,  
0.1732372067049823,  
0.7384853056565549,  
2.8826092918303563,  
-0.11204335589185775,  
-0.2241007440171772,  
-0.4845273525281558,  
0.2744214554588425,  
0.26177442491958286,  
0.4512467910671607,  
-0.6063187184164835,  
-1.2386469417803163,  
-1.1719897599242013,  
1.9705273482015357,  
1.945221133626245,  
0.15309311442469994,  
0.690693149150703,  
0.22188036413222653,  
0.47722534320651633,  
0.12444414704260098,  
-1.0057594761976716,



-0.3351811680967541,  
1.0750707752291546,  
-0.04597654655420585,  
-1.4770936089010136,  
0.1839119320523196,  
1.0453831678930239,  
1.6851715686961402,  
2.1701829049155683,  
1.692817047863365,  
0.44152889324253053,  
-0.3402272157802259,  
-0.4600811596334244,  
2.365566181908148,  
1.166608300050211,  
-0.12230572309949261,  
-0.07192631995381693,  
-0.48825404466402955,  
1.202761995004197,  
0.503733093641068,  
-0.2613796073125891,  
0.7323467617888468,  
0.30547819787235264,  
0.46207631030173263,  
0.034964002783702264,  
-0.30773087511026637,  
2.2827399003210256,  
0.773042400324002,  
0.07466204753764587,  
-2.812532590652055,  
0.7925074856015164,  
3.3306642432255886,  
-0.8558810509247932,  
-0.9283746444488663,  
0.3079774400122357,  
0.5580467297921388,  
0.5588934104639726,  
0.6444350594161403,  
1.5119717259179621,  
0.14573434197560214,  
0.7631266139944589,  
-0.43452714539522225,  
0.38832086457140946,  
0.36234082213113916,  
-1.3222695581402877,  
-0.6140190631377459,  
2.2873566508452354,  
1.0349767974312705,  
-0.5734592440854204,  
0.5234040439377924,  
-0.8213429806368828,  
-0.8621355796854082,  
-0.5355268774606846,  
1.8804920616270637,  
0.022682713405259486,  
1.3625464560687972,  
-0.48449497738356756,  
1.6018376883784673,  
-1.3963097787223904,  
-3.511711037561943,  
1.3223211880663501,  
2.1298031669093946,  
0.24542774430512565,  
0.7034284248706182,  
-0.37346698797179273,  
-0.43051209966139187,  
-0.1034377630705127,  
-0.07417862116176438,  
0.2595758000914042,  
0.9523286668350031,  
0.2556898901330524,  
0.22603519843353895,  
0.9866656966967039,  
2.5031147117731094],  
[ 0.6608465720820748,  
0.9671982645454077,

1.5458030244804597,  
1.5458030244804597,  
2.2589946156031733,  
2.2589946156031733,  
2.2589946156031733,  
2.2589946156031733,  
2.6595607382107107,  
3.734699662125929,  
4.07592175958283,  
4.611631942641649,  
4.831287600721991,  
4.831287600721991,  
5.914025831134952,  
5.914025831134952,  
6.072969066301945,  
6.991999801396327,  
6.991999801396326,  
7.161687480905546,  
7.673022292320241,  
7.821921961804373,  
7.912193421610441,  
8.287160283389671,  
8.956173402171897,  
8.956173402171897,  
9.75268721078065,  
9.941478738047602,  
9.941478738047602,  
9.945621910117605,  
10.438880525762482,  
1.4707024445054038,  
1.5353178524994073,  
0.8263465992797864,  
0.5104925709601137,  
0.0752285958369072,  
-0.1142202547489564,  
-1.4526020976761953,  
-1.3531650678039584,  
-0.5250403673431315,  
2.237334263415747,  
0.2921144645165799,  
-1.3764237769851546,  
0.48788675650681135,  
0.8685067508645514,  
0.519063599878773,  
1.1970126362568978,  
0.35376457746361467,  
2.1361591146989944,  
1.704664258187609,  
1.1956277779681033,  
-0.8317273346515459,  
1.1961203419780542,  
0.6738815365004568,  
2.0453196594697167,  
-0.3197500197249862,  
0.3940149430820266,  
-0.03491413991246975,  
1.9231424652296574,  
-0.7553371587587144,  
0.5536882090799309,  
-1.1151355813488422,  
0.06532487835880797,  
-0.03610632383025197,  
-0.721099071948806,  
-0.7712693743746337,  
0.2581737620009136,  
0.6969815452179084,  
-0.4519889309472695,  
-0.6781990341468844,  
0.3896669141200773,  
0.746036455743935,  
0.10534513312025831,  
-0.7953867627526213,  
-0.17196672908166516,  
1.1080637640216904,  
-0.36906579226317304,  
0.3903518027422727,

0.7340380536410088,  
0.16483545086429002,  
0.12911772875241279,  
-0.11978924907966522,  
-0.5410781247103603,  
0.27894738356501725,  
-0.04603280575778243,  
0.3301412555435043,  
0.020942359039511207,  
-0.535470327679227,  
0.26379415288467284,  
0.7549681986050077,  
-0.774180168996079,  
0.3042677541816752,  
0.2314702730743271,  
0.4347582057672544,  
0.5269984906212896,  
-0.5883800499089586,  
0.4216788732962846,  
-0.39154710450095487,  
-0.20962806789618654,  
0.008988716066278926,  
0.42160932452985955,  
-0.4362625059483254,  
0.7149808650234762,  
-0.9606565556866927,  
0.02867923202735973,  
0.6474453926631074,  
0.3125034088891559,  
0.24941070182093517,  
-1.0996459114603814,  
0.42918254303405223,  
1.1958230549534523,  
-0.23035300079654375,  
0.43394127898307777,  
-1.1958360530234091,  
0.2490392548916114,  
0.956337072693143,  
-0.9098880983840639,  
0.24421397010525564,  
0.32228144879356985,  
-0.04019115817841665,  
0.601865593110944,  
-1.0390070893344725,  
-0.3870853595246112,  
1.5254374970388465,  
-0.06482825900051802,  
1.508536156596221,  
-0.4193438972827081,  
-0.2124704995099638,  
0.7982743594716017,  
0.625924999124879,  
-1.2144964531756246,  
-0.7306315051046057,  
-1.3775043670320717,  
-0.5254300493631905,  
0.24182169388976885,  
0.05618119509583439,  
-1.1649033986061088,  
0.4414909596355956,  
1.1243259379005652,  
0.9623501696515389,  
-1.0198159738874641,  
0.6746700507964939,  
0.9071271136722682,  
-1.490119256375095,  
-1.8915932031257203,  
1.4861820000050194,  
0.020835967248483293,  
0.2672579153437498,  
1.1487299094399863,  
1.7394956603554965,  
2.161406077992875],  
[ 0.009700543149373924,  
0.009700543149373951,

0.00970054314937392,  
1.382070146567131,  
1.7587904521787645,  
2.560406827400793,  
3.0924393369175114,  
3.3853584719898073,  
3.3853584719898073,  
3.3855655528609647,  
3.9151369396989866,  
3.9151369396989866,  
5.054043379727587,  
5.058642146366078,  
6.082229999853835,  
6.348636465887238,  
6.754028454322125,  
6.777976106859175,  
7.783524996765277,  
7.783524996765276,  
7.783524996765276,  
7.995280883445485,  
7.995280883445485,  
8.645089634948334,  
8.925040343314908,  
9.356899631457969,  
9.439062141544271,  
9.717990345174004,  
9.717990345174004,  
10.595210012065888,  
0.8074121230882934,  
-0.11817978440691497,  
2.3039735343549332,  
-2.1294851108225332,  
0.6714134591558454,  
0.45516684502263977,  
-0.8318799457604262,  
-1.6937930072137053,  
0.039287662842651484,  
0.5223639661903685,  
-1.2122069881806565,  
0.27186944236208743,  
0.22304871394760792,  
-0.08855679301585977,  
1.1988033553075006,  
-0.9660581453773212,  
1.393585655420428,  
0.524497607950108,  
-0.22549193465024678,  
-0.20940428560116026,  
-0.22546417020605838,  
-0.06641646114084936,  
0.3531991811801793,  
-0.06811222553567531,  
1.0762936524340476,  
0.17762298521732672,  
-0.24437612021854904,  
-1.0622868736463833,  
0.41092319903165814,  
-0.5877006275418265,  
1.2299752305066975,  
-1.5519910987794148,  
0.6657478217748831,  
-0.027661876184918333,  
0.011781258679136937,  
0.9082970931589502,  
0.006644189925206108,  
0.3712893817061966,  
-0.04659784477089089,  
0.2991695519878787,  
1.4480032246106211,  
0.3765628272855095,  
0.3810659512210775,  
-0.4053198419433054,  
-0.06957688452126994,  
0.08768201200938007,  
-0.16514507742174195,

0.05923670456485792,  
-1.0025267882306543,  
-0.041476053822733706,  
0.4728058870419665,  
-0.09799142504381375,  
-0.642516889827151,  
-0.521645479249954,  
0.18062390558973918,  
-0.5137105837376863,  
0.315588961893638,  
1.0102820620809385,  
-1.412161058774387,  
0.5136468128759858,  
-0.5616754178138471,  
0.11099281329082958,  
-0.4065421947836274,  
-0.8520422495977672,  
1.5662481725135406,  
-2.09542418518098,  
1.2116955825236206,  
0.8221816705323761,  
0.041900809919046114,  
-0.09736226691448804,  
-0.6600925025551557,  
-1.1656564284287168,  
0.8214103261157102,  
0.28477271669010623,  
0.5992804506866763,  
-0.21193327493741926,  
0.6490050812244267,  
0.8872065875645788,  
0.2758198961026023,  
-0.3259804283588707,  
0.5954957550354935,  
0.8064107897831347,  
0.15673794452304002,  
-0.5606863141571317,  
1.1354810000650886,  
0.29170605524887394,  
-0.6471431342469229,  
-0.29364595444579666,  
0.05289373230476578,  
0.03489286830366231,  
-0.10405686076243598,  
0.4547289014370767,  
-0.1747513431047453,  
-0.28439942445332933,  
0.010516254927139741,  
0.11813385237732216,  
0.3966163987420368,  
-1.37250350754582,  
0.06601400397758364,  
-0.3662241908629097,  
-0.07601408247331909,  
1.737776242565087,  
2.1849230369400683,  
-0.5785032754175823,  
-0.5063968590594791,  
-0.23335270192508997,  
2.320012252653636,  
0.6182382779358941,  
0.7875200859675175,  
-0.009873677663214134,  
0.7482624361366613,  
-0.35875384806276184,  
-0.5357091554695692,  
0.4397736267416906,  
0.16706548411788932,  
0.9251966251074774,  
0.053252937203382235,  
-0.23592171730002592,  
1.2877035765438765,  
2.1426518726936172]],

'run\_time\_sec': 43067.655497312546}}],  
'redundant': [ { 'config': { 'ansatz': { 'gateset': 1,

0.5,  
0.5,  
0.5,  
0.5,  
0.5,  
0.5],

```
'layer': 30,  
'ugate': { 'coefficients': { 'bn': [ 0,  
0,  
0,  
0,  
0,  
0,  
0],  
'cn': [  
  
'r': 0},  
'time': { 'max': 10.0,  
'min': 0.0},  
'type': 'heisenberg'}}},  
'init_param': { 'value': [ 0.11853625011402234,  
0.11853625011402236,  
1.1173235551611367,  
1.7342580765110573,  
1.7342580765110573,  
2.108144483620023,  
3.054129947242328,  
3.054129947242328,  
3.054129947242328,  
3.056306360633301,  
4.638414750363569,  
5.0621851887275495,  
5.7503913724004905,  
5.774998407238176,  
6.917933224474368,  
6.917933224474368,  
8.061549209526286,  
8.061549209526286,  
8.061549209526286,  
8.591251503132888,  
8.591251503132888,  
9.051235537435975,  
9.081856762230144,  
9.467876152039107,  
9.545932016874406,  
9.591419209848118,  
10.465616352275608,  
10.465616352275608,  
10.465735173309618,  
10.980942228105905,  
2.0734674059611633,  
0.32892201175743896,  
-0.007356440825095051,  
0.7856576253246221,  
2.089457548986907,  
0.7744884921126718,  
-0.35049309306395837,  
-0.6556831494452968,  
2.0369525201874903,  
0.4739652080570001,  
-0.8564345639983049,  
1.25716179603495,  
1.7181260437331554,  
2.3978160665502384,  
1.1152024575020885,  
-1.3335737674295711,  
0.016650799076572978,  
1.6607129762234538,  
0.648059834763191,  
0.2438725527060928,  
-0.27307896000752346,  
1.4369017198677916,  
3.5672448343800007,  
-0.5379702113035718,  
-0.7420664562717484,  
-0.529699891930992,
```

0.7301471483152846,  
0.781913925757813,  
0.6004078048346045,  
1.7324865479818374,  
0.4548236607944829,  
-1.4419813608219112,  
-0.684662976785234,  
0.8455512814500156,  
1.97751114408285,  
-0.833202517811791,  
1.110524460863052,  
2.6403320691876733,  
-0.3129427957408566,  
-0.06674204626492235,  
0.5842857778318762,  
-0.21132485649138796,  
-0.011842019288790376,  
-0.25743970610802486,  
0.7486616881233721,  
-0.1302029141156864,  
0.09497091477412227,  
-0.3715265429351211,  
0.39570077921274605,  
0.28643868832003017,  
0.7848413456471106,  
-0.7157146817058562,  
0.09411764456438232,  
-0.10910076647953601,  
1.1262761892344808,  
-0.27334997823872975,  
-0.44027652197942063,  
0.6740415100156434,  
-0.336256645457715,  
0.4268157265313067,  
-0.8611696251566416,  
-0.34560928156726306,  
0.5618074077714486,  
0.5866360379174992,  
1.8662876827821717,  
2.21592310898005,  
1.972223656383108,  
1.6141187926643297,  
0.856255815565121,  
-0.34275929095614754,  
-1.0642528745182613,  
-1.0618686751734654,  
0.2379582550153795,  
-0.6501770361983872,  
-0.19408645485522444,  
1.501330829125914,  
1.5726602727591479,  
0.7066066097903853,  
-1.4580936665368467,  
0.46940440748349077,  
-0.1287015677341077,  
-0.9805925033056946,  
-0.3754741669636888,  
-0.026817919501009202,  
1.1067346586651607,  
0.17547923725022047,  
0.8902143171896091,  
-0.22777698610446503,  
0.8082253583749343,  
-1.0674083601412958,  
-0.022706971436593337,  
0.34227899244110566,  
1.3527736523760083,  
2.0767841716125894,  
0.5778568145668401,  
-0.6555502504392442,  
1.2670274746873995,  
0.507694022232518,  
-0.2629991187543805,  
1.7048253080726326,  
1.4088065522309612,

```

2.823918413203317,
1.2763232744235296,
-1.4348344213353486,
-0.605496445996402,
0.09645158262695042,
0.024639736182597342,
0.23997550724405606,
0.9979895378690888,
-0.40612123795993227,
1.826790650755685,
0.029599395583551916,
-0.4592861834683686,
0.0328358806035505,
1.3612120706287358,
0.8210402794880411,
0.05688164146575431,
0.03152531580318861,
2.0316547976974904,
2.795039607579165]],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1}},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric3_unifrom_scaling_sample#10'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
'2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
'2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
'4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
'1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X '
'0 X 1 '
'+ 0.5 '
'Y 0 Y '
'1 + '
'0.5 Z '
'0 Z 1 '

```



```

'+ 0.5 '
'X 1 X '
'2 + '
'0.5 Y '
'1 Y 2 '
'+ 0.5 '
'Z 1 Z '
'2 + '
'0.5 X '
'2 X 3 '
'+ 0.5 '
'Y 2 Y '
'3 + '
'0.5 Z '
'2 Z 3 '
'+ 0.5 '
'X 3 X '
'4 + '
'0.5 Y '
'3 Y 4 '
'+ 0.5 '
'Z 3 Z '
'4 + '
'0.5 X '
'4 X 5 '
'+ 0.5 '
'Y 4 Y '
'5 + '
'0.5 Z '
'4 Z 5 '
'+ 0.5 '
'X 5 X '
'6 + '
'0.5 Y '
'5 Y 6 '
'+ 0.5 '
'Z 5 Z '
'6']],
'output': { 'data_points': [ [4, 2, 0, 0, -6.28130195722698],
                              [12, 6, 0, 0, -4.778373581659957],
                              [ 20,
                                10,
                                0,
                                0,
                                -3.6190179833186162]],
  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
    'identity_factors': [ 0,
                          0,
                          0,
                          0],
    'noise_level': [4, 2, 0, 0],
    'noise_profile': {
'noise_on_init_param': { 'status': False,
  'value': 0},
'noise_prob': [ 0.001,
  0.001,
  0,
  0],

'status':

True,

'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [ 1,
                        1,
                        0,
                        0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
  'value': 0},
'noise_prob': [ 0.001,
  0.001,
  0,

```

```

0],

True,

'depolarizing'},

'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

True,

'depolarizing'},

'odd_wires': 4}],
{ 'config': { 'run_time_sec': 8.150402307510376}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': { 'max': 10.0,
          'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ -2.397634216504411e-17,
1.429450133825379e-17,
0.9192297980258759,
0.9192297980258759,
2.8984599305110854,
3.1993874679766523,
3.199387467976652,
3.715279848679994,
3.715919998165357,
5.126008182976459,
5.749875525815113,
5.785995839176617,
5.785995839176617,
5.785995839176617,
5.785995839176617,
6.315437962379428,
6.678845841951143,
7.3578167224936415,
7.415694801781823,
7.531263738212295,
7.949087697575632,
7.949087697575632,
8.111169110068786,
9.407094598577077,
9.495286031274873,
9.495286031274873,
10.993257661103009,
11.063439993331317,
11.639888600691357,
11.75175692668691,

```

2.1152038588685538,  
-0.7839988468841306,  
-1.0579861702584952,  
-0.5122509123294313,  
1.0012369417099964,  
0.9275037440003397,  
0.5343037326701707,  
-0.014459274586663672,  
2.31692048955396,  
2.1400689678453872,  
-0.9468421716760329,  
1.3225342455296385,  
2.4229762260600483,  
1.4561600175543838,  
-0.4592924007287594,  
0.6389204073366491,  
0.5578650700802136,  
1.458345504678432,  
-0.11931303728638508,  
0.04406428844113783,  
-0.26144087074192934,  
0.6459890964472403,  
1.2243061606997268,  
0.09770103868863204,  
0.23645607828472368,  
0.3280111145811677,  
0.5390648705936556,  
-0.6034481934191781,  
-1.1942560416831098,  
0.3295059316644399,  
-0.0732996553139216,  
0.5043071925129845,  
0.7399437462813884,  
0.3595686242698361,  
1.4643835231854074,  
-0.1697776944282527,  
0.2588380732750666,  
0.44311592273109757,  
-0.6031987466514527,  
-0.06131410155451245,  
-0.3299395710828798,  
-0.45492250592824107,  
0.5555861976799495,  
1.1612177689175078,  
1.833550163228831,  
1.5629483318007886,  
-0.2455585474033218,  
-0.4534768786824923,  
-1.2225865843307935,  
0.20468879325769473,  
1.3398561861341207,  
-0.58709602862573,  
0.07181500566168061,  
0.17010271339345,  
0.36406988692952136,  
-1.689809967880289,  
-1.1677426672173294,  
-0.7977758879892671,  
0.531032719362766,  
-1.7722607960867016,  
0.6332033998224597,  
0.6669814362912183,  
0.218182728116887,  
1.0415656581640258,  
-1.4544893086294475,  
0.5175174925258392,  
-0.9742907090362619,  
-0.30648595673224416,  
1.2400541074634985,  
-0.30003161306087445,  
-0.14406503395842435,  
-0.43061285539013316,  
0.6914697219419143,  
-0.48545379734819916,  
-0.2166375004086177,

```

1.2014709434123243,
1.0734635496959384,
0.43666289070672293,
-0.9550440807047608,
1.2817732673505913,
0.6254203972471953,
0.8730111716749767,
1.1814458389257443,
-0.5855214911540807,
0.33647224367417283,
0.914891547403245,
-0.10924028322724566,
0.6731472714644756,
-0.8672547313943412,
-1.1628903969680444,
1.2968110405185924,
-0.7478342770444015,
1.0157432273471354,
0.05866260951598884,
0.1549884083832883,
2.402954000164725,
-0.8510405490988947,
-0.13394876321797194,
0.35128800256256376,
0.03985349181110424,
1.0891408951797659,
0.49683980443602116,
1.3618410332836905,
0.31089249400158553,
0.007823999182329802,
-1.0325531315281817,
-0.13635517978577905,
-0.4783006843261583,
-0.9648987725589863,
-0.4094326055257113,
0.0620151507481985,
-0.3631850012398663,
-0.9119123598789223,
-0.3458539889181142,
0.8501459643039054,
1.6461875633189593,
0.08799287143090098,
-0.82318299513447,
1.17289644669955,
-0.9455811832961388]],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':

```

```

'AUTOMATE_heisenberg_noise_free_time_evo_ric3_unifrom_scaling_sample#4'},
    'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                           [1, 1, 0, 0],
                                           [2, 2, 0, 0]]},

    'run': 'redundant',
    'state': 'dmatrix',
    'vqe': { 'iteration': 1,
              'optimization': { 'algorithm': 'SLSQP',
                                'constraint': True,
                                'status': False}},

    'zne': { 'data_points': None,
              'degree': 0,
              'method': 'richardson',
              'sampling': 'default'}},
  'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
                                     '2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
                                     '2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
                                     '4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
                                     '1 Z 5 + 1 Z 6',
              'time_evolution_gate_hamiltonian_string': [ '0.5 X '
                                                           '0 X 1 '
                                                           '+ 0.5 '
                                                           'Y 0 Y '
                                                           '1 + '
                                                           '0.5 Z '
                                                           '0 Z 1 '
                                                           '+ 0.5 '
                                                           'X 1 X '
                                                           '2 + '
                                                           '0.5 Y '
                                                           '1 Y 2 '
                                                           '+ 0.5 '
                                                           'Z 1 Z '
                                                           '2 + '
                                                           '0.5 X '
                                                           '2 X 3 '
                                                           '+ 0.5 '
                                                           'Y 2 Y '
                                                           '3 + '
                                                           '0.5 Z '
                                                           '2 Z 3 '
                                                           '+ 0.5 '
                                                           'X 3 X '
                                                           '4 + '
                                                           '0.5 Y '
                                                           '3 Y 4 '
                                                           '+ 0.5 '
                                                           'Z 3 Z '
                                                           '4 + '
                                                           '0.5 X '
                                                           '4 X 5 '
                                                           '+ 0.5 '
                                                           'Y 4 Y '
                                                           '5 + '
                                                           '0.5 Z '
                                                           '4 Z 5 '
                                                           '+ 0.5 '
                                                           'X 5 X '
                                                           '6 + '
                                                           '0.5 Y '
                                                           '5 Y 6 '
                                                           '+ 0.5 '
                                                           'Z 5 Z '
                                                           '6']},

  'output': { 'data_points': [ [4, 2, 0, 0, -6.241465922765086],
                                [12, 6, 0, 0, -4.714681794898787],
                                [ 20,
                                  10,
                                  0,
                                  0,
                                  -3.5395259571477817]]},

  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                       'identity_factors': [ 0,
                                              0,
                                              0,

```

```

0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
    'status':
    'type':
    'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [ 1,
                        1,
                        0,
                        0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
    'status':
    'type':
    'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [ 2,
                        2,
                        0,
                        0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
    'status':
    'type':
    'odd_wires': 4}},
{ 'run_time_sec': 7.639997243881226}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [
0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
                                                                'r': 0},
                          'time': { 'max': 10.0,
                                    'min': 0.0},
                          'type': 'heisenberg'}}},
  'init_param': { 'value': [ 0.12420123662801165,
                              0.138246244841176,
                              0.34185010800102933,
                              0.8771280515547424,

```

0.8771280515547423,  
1.9326762312100456,  
1.9326762312100456,  
2.879806034127527,  
3.4467495190209787,  
3.460588109395402,  
3.4605881093954016,  
3.4605881093954016,  
3.911934955717517,  
3.9564836804547703,  
4.188240551814426,  
5.098640553346409,  
5.098640553346409,  
5.098640553346408,  
6.466332587579958,  
7.457565848827182,  
7.712724508543908,  
7.890302861063261,  
7.898577524812402,  
8.020037295803547,  
8.020037295803547,  
9.289723192898348,  
9.68251578824504,  
9.68251578824504,  
10.66694519433398,  
11.464898013549973,  
1.8095532965205083,  
-1.6633278493215808,  
-1.2281091611401596,  
-0.40155726479865544,  
1.7903243850816337,  
0.18661159996017582,  
1.2217850039169107,  
-0.48128156078104645,  
1.438546033666569,  
-0.9466383819139143,  
-0.2179227006066069,  
-0.07921201994836616,  
0.6692914930417907,  
-0.16791294486623565,  
-0.3278463005181308,  
1.2883193159418245,  
1.9001761172388045,  
0.7646920019853412,  
-0.6325477821570596,  
-0.5987552945744136,  
0.5669730115381587,  
0.5983941343774113,  
-0.06179171362000896,  
-0.6867235859693906,  
0.5211737756628548,  
-0.19354588250953578,  
0.6072816218147872,  
0.3472677197742769,  
-0.08031734075212016,  
1.4024126217748347,  
-0.5867181790012919,  
0.809620813948269,  
0.35997425529443994,  
-0.8722967249300235,  
-0.5874818244923429,  
-0.5567926036837068,  
-0.6652314874983639,  
-0.6042054992483096,  
-0.13918430829641074,  
-0.08277488470584692,  
-0.4972293169762719,  
-0.4421668735352916,  
0.6160601456858428,  
-1.1972657609969646,  
-1.1558488364748807,  
-1.4501782622641872,  
0.03989088007781949,  
-0.8684923327267209,  
-0.5569704341339503,

0.15823054121075,  
0.6345578215095505,  
0.3601853745371903,  
-0.42594808878819745,  
0.08979804115834313,  
-0.153043281560756,  
-0.603228229875778,  
-1.1264410002736531,  
0.6895580235946861,  
-0.11045941959152497,  
0.5174109375139814,  
1.3269460586908306,  
-0.3852298542423827,  
-2.4120095755015893,  
0.08807412161753436,  
0.1228551365077638,  
-0.6982591234727157,  
-1.1618488040328845,  
2.5586909942385017,  
-0.24921574033555105,  
-1.9870969070050777,  
-1.0279498295884981,  
-0.7796802357622239,  
0.48428681889730063,  
0.7162815161060118,  
-0.15547297036103372,  
1.0522591887013215,  
1.772822944479854,  
-0.2654037211186137,  
-0.2720110866721671,  
-0.03929478442656517,  
0.34606077605631835,  
0.5533331494282367,  
1.0574846609095763,  
-0.5747611578732846,  
0.4916772893793279,  
0.9875709691916216,  
-0.17857479553023695,  
-1.147281220275154,  
0.37370382177065037,  
2.456815155407461,  
0.6567596591037266,  
0.9507316292553318,  
1.5113928877114242,  
1.8380989093110256,  
-0.1736919900840187,  
-1.2666253947041328,  
-0.554819304070435,  
1.1931643666366285,  
0.4614862178419797,  
1.2040726557184918,  
0.3083618234293392,  
-0.4066692475369416,  
0.3740368412278018,  
-1.684611974494111,  
-0.8650016725760176,  
-1.4838330341878547,  
-0.14344887350922086,  
4.203596189627334,  
1.1133202614474196,  
1.391124117957397,  
1.8627332105499828,  
-0.28192336755973296,  
-1.5416482647725873,  
-1.9612892990030817,  
0.8836928087418303,  
0.300761821046295,  
0.6785848024508535,  
-0.5500277556546446,  
0.5742776326882599,  
-1.181756808209963]],

'noise\_profile': { 'noise\_on\_init\_param': {

'status': False,

'value':

0},



[illegible]

```

'0.5 X '
'4 X 5 '
'+ 0.5 '
'Y 4 Y '
'5 + '
'0.5 Z '
'4 Z 5 '
'+ 0.5 '
'X 5 X '
'6 + '
'0.5 Y '
'5 Y 6 '
'+ 0.5 '
'Z 5 Z '
'6']],
'output': { 'data_points': [ [4, 2, 0, 0, -5.814676484708359],
                              [12, 6, 0, 0, -4.248447309496403],
                              [ 20,
                                10,
                                0,
                                0,
                                -3.0694027528903187]]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                     'identity_factors': [ 0,
                                             0,
                                             0,
                                             0],
                     'noise_level': [4, 2, 0, 0],
                     'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

'status':

True,

'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [ 1,
                        1,
                        0,
                        0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

'status':

True,

'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [ 2,
                        2,
                        0,
                        0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

'status':

True,

'type':

'depolarizing'}},

```

```
        'odd_wires': 4}},
    'run_time_sec': 7.7689526081085205}},
{ 'config': { 'ansatz': { 'gateset': 1,
                        'layer': 30,
                        'ugate': { 'coefficients': { 'bn': [ 0,
                                                             0,
                                                             0,
                                                             0,
                                                             0,
                                                             0,
                                                             0],
                                                             'cn': [
```

```
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
```

```
        'r': 0}},
    'time': { 'max': 10.0,
              'min': 0.0},
    'type': 'heisenberg'}},
'init_param': { 'value': [ 0.16477895719846114,
                           0.16477895719846108,
                           0.7183189156962347,
                           1.8697093861419474,
                           2.105082615571597,
                           3.05308344502201,
                           4.199393321043376,
                           4.199393321043376,
                           4.199393321043375,
                           6.490210948425593,
                           6.4902109484255925,
                           6.490210948425593,
                           6.4902109484255925,
                           6.4902109484255925,
                           6.490210948425593,
                           6.882554174728105,
                           6.882554174728105,
                           6.882554174728105,
                           6.882554174728104,
                           6.8877583035732775,
                           6.8877583035732775,
                           6.8877583035732775,
                           8.21014824639056,
                           8.21014824639056,
                           9.071469420716642,
                           9.120928605341893,
                           9.714944098401723,
                           11.474131735950095,
                           11.474131735950095,
                           11.794551582273902,
                           1.341188628911811,
                           1.6554894539990426,
                           -2.1068974621953425,
                           -1.4171475675653578,
                           0.33211669069513333,
                           0.11331792925356984,
                           -1.3610911099963097,
                           0.46439741779020816,
                           0.9313501387866817,
                           1.0938593094543279,
                           -0.3591727738608774,
                           -0.4732622270970327,
                           1.6321598874818157,
                           -0.2782091348514778,
                           -1.0526781349295347,
                           0.0708703831522549,
                           2.6982701224663113,
                           -0.038867313655444914,
                           -0.10508583152652556,
                           -0.40759365792756236,
                           0.6284849004330764,
                           0.5192751929971827,
                           -1.6282040637266806,
```

0.0014422433007245106,  
-1.8299719264591412,  
2.3182597876656823,  
0.8875167319646391,  
1.5664268415036142,  
1.5052778791259855,  
2.935955436800565,  
1.533101581959507,  
1.8091829332960188,  
0.45080966818917967,  
0.1506883627647002,  
-0.6843548866459184,  
-0.5544883854492364,  
1.2466562002431278,  
-1.1866110136199353,  
1.4521358231995756,  
-1.125608676420736,  
-0.24054383618816966,  
-0.058272145415006006,  
0.410408128597049,  
-1.6441753460137252,  
0.4019816715685168,  
0.4588365987304068,  
1.354346078964423,  
-1.7153251360741875,  
-1.1039978646265602e-06,  
0.7940670488104785,  
0.17979772520560053,  
-0.24385394325110826,  
0.6367160741723578,  
0.8500459957371875,  
0.0559416907316065,  
0.32418668587130467,  
-1.4797636873635434,  
0.11902177942387202,  
0.5185165439317966,  
-0.08399222686641401,  
0.8650918037299421,  
1.4911587670088011,  
0.12792248933645675,  
0.3372262149750348,  
-0.6553154954729696,  
1.1995792367396254,  
0.5132294030998703,  
0.44835115860783636,  
-0.37116980512777586,  
0.7805194563374558,  
-0.854334789795377,  
0.5008527672922033,  
-0.2302685629030402,  
0.6145182391921147,  
-0.6575500079215796,  
0.8657035637529482,  
1.1874516653159721,  
-0.16284802367068918,  
-0.26462171656665856,  
-0.9815102056659819,  
0.23198397744948207,  
-1.087097195512072,  
0.6616385654966559,  
-0.2929637257774683,  
0.03471390505932934,  
0.2048751570049573,  
0.9170017118070749,  
0.39617956766989404,  
0.12006199846995962,  
0.1922705913940127,  
0.8784478594386566,  
0.055479957240883566,  
-0.6634105431569992,  
1.0742951419164057,  
-0.37818200958777604,  
0.28548758229245597,  
-0.6594827056613419,  
1.0235832498557866,

```

-0.19428253177041227,
-0.5531991468121416,
-1.189626464718852,
0.2519110119226656,
-0.6708462316627377,
2.7994352657547057,
-3.8764436680175813,
0.5152327138619494,
-0.3749347648847944,
2.9042167722097862,
1.1265965037549552,
-1.850959186134046,
2.165374611027145,
0.8818414791702859,
1.5039524911129019,
0.06564767423285973,
0.6486215314149069,
-0.08854143781823305,
1.8396223528529987,
-0.00792246728000446,
2.8805879469479487,
3.6337353861266473}],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric3_unifrom_scaling_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
'2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
'2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
'4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
'1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X '
'0 X 1 '
'+ 0.5 '
'Y 0 Y '

```

```

'1 + '
'0.5 Z '
'0 Z 1 '
'+ 0.5 '
'X 1 X '
'2 + '
'0.5 Y '
'1 Y 2 '
'+ 0.5 '
'Z 1 Z '
'2 + '
'0.5 X '
'2 X 3 '
'+ 0.5 '
'Y 2 Y '
'3 + '
'0.5 Z '
'2 Z 3 '
'+ 0.5 '
'X 3 X '
'4 + '
'0.5 Y '
'3 Y 4 '
'+ 0.5 '
'Z 3 Z '
'4 + '
'0.5 X '
'4 X 5 '
'+ 0.5 '
'Y 4 Y '
'5 + '
'0.5 Z '
'4 Z 5 '
'+ 0.5 '
'X 5 X '
'6 + '
'0.5 Y '
'5 Y 6 '
'+ 0.5 '
'Z 5 Z '
'6']],
'output': { 'data_points': [ [4, 2, 0, 0, -5.966171999362981],
                              [12, 6, 0, 0, -4.4917214032040365],
                              [ 20,
                                10,
                                0,
                                0,
                                -3.364633070617193]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                     'identity_factors': [ 0,
                                           0,
                                           0,
                                           0],
                     'noise_level': [4, 2, 0, 0],
                     'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

True,

'depolarizing'},

'status':

'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [ 1,
                      1,
                      0,
                      0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

```

```

'noise_prob': [ 0.001,
0.001,
0,
0],

'status':

True,

'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [ 2,
2,
0,
0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],

'status':

True,

'type':

'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 7.615773439407349}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [

0.5,
0.5,
0.5,
0.5,
0.5,
0.5],

'r': 0},
'time': { 'max': 10.0,
'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.43940602753254654,
0.4524980474487914,
0.6462847510297367,
0.6535145711164267,
0.7019965052930044,
1.0830061860275473,
1.4380021973026182,
2.1860837771467474,
2.1860837771467474,
2.1860837771467474,
2.4875804812430995,
2.911818356328843,
4.9134595358452735,
5.043089843653786,
5.994354774193697,
6.658321281734746,
6.666230857319696,
8.458454027735183,
8.458454027735183,
8.458454027735183,
8.938931772570164,
8.938931772570164,
9.876451730548837,
9.876451730548837,
10.140618079102744,
10.453495471248813,
10.878653713196195,

```

11.282429749250388,  
11.726474998572407,  
11.93229290545428,  
2.9640535214497064,  
-0.6206168106317247,  
-0.4035747848788786,  
-2.067222048924027,  
2.0576259596946604,  
1.364315765000901,  
-0.1480698866383175,  
-1.95043906046908,  
0.7897528850889669,  
1.350582507885341,  
-0.3349044763190947,  
-2.3429833820345465,  
2.04351680973891,  
0.8083219796841106,  
-0.06520770630024467,  
-0.8776318722364843,  
2.4862506381076748,  
0.8345121096737285,  
-0.03071661620417745,  
-0.6225183255138825,  
0.7450777062518694,  
0.12619297185303674,  
0.15620862918286052,  
-0.47540100870445906,  
0.6345315438244892,  
1.451076347224231,  
0.10985833383721234,  
-1.6475696409761669,  
1.1918822544398533,  
1.3235539868194213,  
-0.24222060474147966,  
0.2418944215339802,  
1.0397651583041008,  
1.6773252160624976,  
0.16975786500059598,  
-0.9211027317156172,  
0.7590471244619662,  
1.76540125315151,  
2.43856734239768,  
-0.19488067618654012,  
0.8462629124439717,  
0.9979674075340036,  
2.5775834810620677,  
0.5650956422366618,  
-0.5475934153287456,  
-0.0253449469292375,  
1.2524069066350432,  
-0.605696708865831,  
0.7019502861337156,  
0.2803153244338447,  
-1.0831925759777479,  
1.0082140101851143,  
-0.3762046176346905,  
-0.9535933533256993,  
-1.0422804614435257,  
0.13948594332192887,  
0.5835070530053111,  
0.16086524965091817,  
0.06403444071667018,  
-0.06194188553710435,  
-0.4026223625881385,  
0.2750028468648149,  
0.6789909068622377,  
0.05162849323802493,  
-0.7735332926339995,  
-0.14862918062202837,  
0.7661757453229759,  
-0.16119730427373616,  
0.6482389226852195,  
3.1459456036848104,  
-0.4760920139337192,  
1.6197254159790668,



```

-0.5506328506738539,
0.9968299487743895,
-0.3106735286083523,
-1.2388662013594425,
0.8898580979157581,
0.43256773745092003,
-0.7272220041247079,
0.8716071923554094,
1.5193589139179793,
0.9787540447681606,
-1.4044929205930872,
-0.1984876316951887,
-0.46744984056178585,
-0.7765225748074835,
0.04344696088727837,
0.32373965212791267,
0.9049555024172572,
0.7139278873651953,
-0.8122282267372439,
0.5323405298774778,
-0.08437719753251166,
-0.14277007957413837,
0.7912147308716768,
0.26055493673650715,
0.11357082745857092,
0.3153698930365579,
3.1981441448638614,
0.32109035951393206,
-0.23017443442945684,
0.0316864124540797,
0.20875812581978664,
0.5466872162452653,
1.2918521189433907,
-0.7312547980705957,
1.4958457475939604,
-0.053193686203739404,
-0.4437772137226961,
-0.5271126400646005,
2.5136810835026426,
0.6674244883024821,
-1.0140291771816496,
-1.177197116527103,
2.058315434744553,
0.050372102721390984,
-0.09022974351195023,
-2.296438941834702,
0.3261688389091777,
0.3072223897800251}],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,

```

```

        'status': False,
        'type': 'png'},
        'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric3_uniform_scaling_sample#1'},
        'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                [1, 1, 0, 0],
                                                [2, 2, 0, 0]]},

        'run': 'redundant',
        'state': 'dmatrix',
        'vqe': { 'iteration': 1,
                  'optimization': { 'algorithm': 'SLSQP',
                                    'constraint': True,
                                    'status': False}},
        'zne': { 'data_points': None,
                  'degree': 0,
                  'method': 'richardson',
                  'sampling': 'default'}},
        'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
                                           '2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
                                           '2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
                                           '4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
                                           '1 Z 5 + 1 Z 6',
                    'time_evolution_gate_hamiltonian_string': [ '0.5 X '
                                                                '0 X 1 '
                                                                '+ 0.5 '
                                                                'Y 0 Y '
                                                                '1 + '
                                                                '0.5 Z '
                                                                '0 Z 1 '
                                                                '+ 0.5 '
                                                                'X 1 X '
                                                                '2 + '
                                                                '0.5 Y '
                                                                '1 Y 2 '
                                                                '+ 0.5 '
                                                                'Z 1 Z '
                                                                '2 + '
                                                                '0.5 X '
                                                                '2 X 3 '
                                                                '+ 0.5 '
                                                                'Y 2 Y '
                                                                '3 + '
                                                                '0.5 Z '
                                                                '2 Z 3 '
                                                                '+ 0.5 '
                                                                'X 3 X '
                                                                '4 + '
                                                                '0.5 Y '
                                                                '3 Y 4 '
                                                                '+ 0.5 '
                                                                'Z 3 Z '
                                                                '4 + '
                                                                '0.5 X '
                                                                '4 X 5 '
                                                                '+ 0.5 '
                                                                'Y 4 Y '
                                                                '5 + '
                                                                '0.5 Z '
                                                                '4 Z 5 '
                                                                '+ 0.5 '
                                                                'X 5 X '
                                                                '6 + '
                                                                '0.5 Y '
                                                                '5 Y 6 '
                                                                '+ 0.5 '
                                                                'Z 5 Z '
                                                                '6']},
        'output': { 'data_points': [ [4, 2, 0, 0, -5.966837375471956],
                                       [12, 6, 0, 0, -4.6298501952375855],
                                       [ 20,
                                        10,
                                        0,
                                        0,
                                        -3.5807206753108627]],
                    'noise_details': [ { 'gates_num': [4, 1, 1, 0],

```

```
'noise_on_init_param': { 'status': False,  
    'value': 0},  
'noise_prob': [ 0.001,  
    0.001,  
    0,  
    0],  
  
True,  
  
'depolarizing'},  
  
'noise_on_init_param': { 'status': False,  
    'value': 0},  
'noise_prob': [ 0.001,  
    0.001,  
    0,  
    0],  
  
True,  
  
'depolarizing'},  
  
'noise_on_init_param': { 'status': False,  
    'value': 0},  
'noise_prob': [ 0.001,  
    0.001,  
    0,  
    0],  
  
True,  
  
'depolarizing'},  
  
'noise_on_init_param': { 'status': False,  
    'value': 0},  
'noise_prob': [ 0.001,  
    0.001,  
    0,  
    0],  
  
True,  
  
'depolarizing'},  
  
'odd_wires': 4}},  
{ 'run_time_sec': 7.473593235015869}},  
{ 'config': { 'ansatz': { 'gateset': 1,  
    'layer': 30,  
    'ugate': { 'coefficients': { 'bn': [ 0,  
        0,  
        0,  
        0,  
        0,  
        0,  
        0],  
        'cn': [  
            0.5,  
            0.5,  
            0.5,  
            0.5,  
            0.5,  
            0.5],  
            'r': 0},  
        'time': { 'max': 10.0,  
            'min': 0.0},  
        'type': 'heisenberg'}}},  
    'init_param': { 'value': [ 0.05238332857976487,
```

0.05238332857976488,  
0.05238332857976461,  
0.5882470284735626,  
1.6186245942059996,  
2.2470777294271223,  
2.8315596913723913,  
2.8315596913723913,  
2.8333251330604914,  
3.7474015252366555,  
3.7474015252366555,  
3.7474015252366555,  
3.7474015252366555,  
4.452994588443841,  
4.625910007504636,  
4.625910007504636,  
5.314362007876739,  
7.185299991262795,  
7.185299991262795,  
8.165312898322489,  
8.165312898322489,  
8.165312898322489,  
8.684979613482101,  
9.661121823219345,  
9.674169964387936,  
10.525655511340814,  
10.525655511340814,  
10.525655511340814,  
11.154963299169733,  
11.154963299169733,  
2.50282655917642,  
0.9490947670548783,  
0.70056532212722,  
-0.9370006834105179,  
2.127395945212884,  
1.5529950009292526,  
-0.5538339242405286,  
-0.45109357069990613,  
3.2608593101153462,  
2.1691098922881027,  
0.924351518772188,  
0.7799372105219657,  
2.588492585292434,  
1.4914484649202893,  
0.5111989894903198,  
-1.6854828839595362,  
0.709524102178921,  
-0.3201993643863164,  
0.37756499567776974,  
0.11160463007405702,  
1.4506751210554825,  
-0.1158349928449886,  
-0.4172082421780774,  
-0.47420587439641587,  
2.1318004152619214,  
1.5026342770773617,  
0.9629412747697549,  
-1.017935070811068,  
2.2274033566257083,  
0.9541631607884562,  
2.2865374842341715,  
-0.6901760390806929,  
1.4488496207691695,  
-0.15529093800821045,  
1.378510821815928,  
-0.1238908488185843,  
1.0420944500710088,  
1.8938950235205334,  
-0.40270933293735856,  
-0.4838468076888962,  
-0.7769068081513464,  
2.0570355933263196,  
0.33843722154840217,  
-0.21296684820549192,  
-0.3087457919151385,  
1.6713665097762895,

```
0.7955513549984788,
-0.5031484152839188,
0.2783608989762586,
1.4322280472670237,
0.12038812465567636,
0.8648150791824706,
0.13552183280667268,
0.07182610915111512,
0.3477791234991623,
-0.1584859230597403,
0.5851519083687279,
0.578565105996425,
-1.7921034519484391,
0.9189192684840749,
-0.6139572052593133,
-0.023527142002935514,
-0.6495330854871428,
0.7767670181361933,
0.13616638059771954,
-0.22568119775616352,
0.4192866974084779,
0.1401009023541104,
1.419355971488301,
1.1103093112149183,
-0.8728413553259085,
1.014691351510677,
2.35757700845783,
1.131891326153365,
-1.2979835358031357,
0.42365777146015526,
1.0982786992551208,
1.698510255572029,
1.2090506157632,
-1.3597097700308411,
-0.9049577551064396,
1.0199036275847497,
2.9541844671388584,
-0.42829772740772204,
0.6542829736223691,
3.7916586259391143,
-0.1983670801457003,
0.7855289833525587,
-0.1534574040841844,
1.809122493112309,
0.35293394466185096,
1.0573849517470935,
2.461665111905985,
1.0784030177718114,
-1.585709677044719,
0.8985620342798133,
2.2360691692951646,
0.24022620726925167,
2.6922129347449117,
0.15599094623602128,
2.799936411115923,
0.9657316063780467,
-0.2732772147086647,
-1.448572189075712,
-0.7280589250410919,
0.057973620624421296,
0.9321748335747359,
-1.4338621772181848,
1.3976338029473028,
-0.25504403617708243,
3.210257057781798,
0.03448775329128267,
0.05070056715723011,
-1.3727823101385919,
0.8243579770218447,
0.13142013414460954,
-0.4933237632531999,
1.1105137227416793,
0.7155364379215329,
-0.21063252058278284]],
'noise_profile': { 'noise_on_init_param': {
```

$0\}$ 

```
'noise_prob': [ 0.001,
                0.001,
                0,
                0],
```

```
'nqubits': 7,
```

```
'def': 'ising'},
```

```
'AUTOMATE_heisenberg_noisefree_time_evo_ric3_unifrom_scaling_sample#2'},
```

```
'run': 'redundant',
```

```
'state': 'dmatrix',
```

```
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
```

```
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}}
```

```
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
                                     '2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
                                     '2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
                                     '4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
                                     '1 Z 5 + 1 Z 6',
```

```
'time_evolution_gate_hamiltonian_string': [ '0.5 X '
'0 X 1 '
'+ 0.5 '
'Y 0 Y '
'1 + '
'0.5 Z '
'0 Z 1 '
'+ 0.5 '
'X 1 X '
'2 + '
'0.5 Y '
'1 Y 2 '
'+ 0.5 '
'Z 1 Z '
'2 + '
'0.5 X '
'2 X 3 '
'+ 0.5 '
'Y 2 Y '
'3 + '
'0.5 Z '
'2 Z 3 '
'+ 0.5 '
'X 3 X '
'4 + '
'0.5 Y '
'3 Y 4 '

```

```

+ 0.5 '
'Z 3 Z '
'4 + '
'0.5 X '
'4 X 5 '
+ 0.5 '
'Y 4 Y '
'5 + '
'0.5 Z '
'4 Z 5 '
+ 0.5 '
'X 5 X '
'6 + '
'0.5 Y '
'5 Y 6 '
+ 0.5 '
'Z 5 Z '
'6']],
'output': { 'data_points': [ [4, 2, 0, 0, -6.220556999324399],
[12, 6, 0, 0, -4.682225394272194],
[ 20,
10,
0,
0,
-3.4953983793015833]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [ 0,
0,
0,
0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {

'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],

'status':

'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [ 1,
1,
0,
0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {

'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],

'status':

'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [ 2,
2,
0,
0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],

'status':

```

```

True,
'depolarizing'},
'odd_wires': 4}},
'run_time_sec': 7.230367183685303}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0}},
'time': { 'max': 10.0,
'min': 0.0}},
'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.38848003251483587,
0.3884800325148359,
1.2841735835398218,
1.284173583539822,
1.2841735835398218,
1.818138220668234,
1.818138220668234,
2.7575469841005327,
2.7575469841005327,
2.7575469841005327,
3.0053468968599275,
3.0053468968599275,
3.005346896859927,
4.184079661691832,
4.83635165164968,
4.83635165164968,
5.97926077140412,
6.458805266455043,
6.513102391504654,
6.513102391504654,
7.122105903846713,
7.2188422331450415,
7.988590448127284,
8.268095077127937,
8.268095077127937,
9.164456488648115,
9.164456488648115,
9.782953992889732,
9.782953992889732,
10.467486029517685,
1.5496959718296535,
-1.0300437645832343,
0.425343365508412,
-1.7136674729251273,
0.33645197441382346,
0.2288357961575219,
0.10470230685228102,
-0.6612661793744108,
0.11823315872480306,
0.48571962162230753,
-1.3748501535311368,
0.2563120795974374,
-0.38871520150353267,
-0.18786175076151226,
1.0017996241286973,
0.05598903629217323,
1.501328526357405,
-0.32299727271195017,
0.5715295079657807,
-0.12201961934486968,

```



2.2747823054657927,  
0.16289086097520028,  
0.027619518366160244,  
-0.10165606616500937,  
-0.06321979816820887,  
-0.27543819802246033,  
-0.0048370064103128475,  
0.1330138167350915,  
-0.06428151371988705,  
0.21905201010909556,  
0.25697175483980955,  
-1.462905966720411,  
0.8014511304369155,  
3.456137165485204,  
-0.3560002683832885,  
-0.4886877133354182,  
0.32039145066707037,  
1.6153352350920127,  
0.5940099487759896,  
0.18140087044059483,  
0.27123106498617,  
0.7444341922951362,  
0.170480557625751,  
-0.4688462519246396,  
0.5235839184929864,  
-0.5470964469389679,  
-0.011921500492307424,  
1.4116230981753706,  
0.49972453659747124,  
-0.7800673920851233,  
0.4234227404504273,  
-0.2071635265929523,  
0.14064328933496192,  
-1.2007096247825992,  
0.12047098237640114,  
-0.4125103841815656,  
1.0447620953563077,  
0.0020814149928196773,  
0.4988991062112368,  
-0.34495773827123155,  
-0.12849063482979717,  
0.4280934542561602,  
0.7138444629946918,  
-0.6497712710787925,  
-0.43652659674625793,  
0.917432486791049,  
-0.8523477361785018,  
0.5648987974980545,  
0.3183226113969618,  
0.14295784675778261,  
0.9589824340171335,  
0.9194478619356266,  
1.1001359353915339,  
1.5417377267389083,  
-0.5376003771957187,  
-0.5404528215706331,  
0.21624687748210675,  
0.8814937279455825,  
-0.371639532103812,  
-0.2668100917972658,  
1.3133163210428074,  
0.44574090697479807,  
-1.0940261852319737,  
-0.313830643067749,  
-0.06100275437545863,  
-0.049560783686653447,  
-0.3025056724120473,  
-0.9891529613817422,  
-0.35099332176432035,  
0.5436069706516342,  
-0.722828417704955,  
1.6968661444846564,  
-2.4402971962208975,  
0.7865745542588627,  
1.3437881169309889,

```

0.36108471326554326,
-0.1749159211919777,
-0.014334278530919132,
0.02978377629472008,
1.8533978555002608,
-1.8470426695738211,
0.6272356375919823,
0.44775499409400255,
1.3281153539688288,
0.4583217606753929,
0.6443670392327268,
0.5254233581973354,
2.3087652110195127,
-0.7761319091913014,
-0.7605421959233766,
-0.6461580464596497,
0.7075597766411752,
0.985778508379752,
-1.3130974173457381,
2.8711331564400684,
1.2993543284582694,
1.9493614761217355,
1.1647493000584068,
-0.42731613935458074,
2.7038346000669766]],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1}},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric3_unifrom_scaling_sample#6'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
'2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
'2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
'4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
'1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X '

```



```

'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

True,

'depolarizing'},

'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

True,

'depolarizing'},

'noise_profile': {
    'status':
    'type':
    'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [ 2,
                       2,
                       0,
                       0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
    'status':
    'type':
    'odd_wires': 4}},
    'run_time_sec': 7.105733394622803}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': { 'max': 10.0,
          'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ -1.8784742854218807e-17,
                           -7.763750530158576e-17,
                           0.3802827375258553,
                           0.44096449652630626,
                           0.8040692975576897,
                           1.9224694434519336,
                           1.9224694434519338,
                           1.9224694434519336,
                           1.9224694434519336,
                           1.9224694434519336,
                           1.9224694434519338,
                           2.730288811725591,
                           4.476350841356259,
                           4.476350841356259,
                           4.476350841356259,
                           6.331658137341824,
                           6.331658137341824,
                           6.7621011201584285,
                           6.77851096220289,
                           7.490043179529316,
                           7.490043179529316,
                           7.490043179529316,
                           7.490043179529316,
                           7.511664240193972,

```

8.302259372586072,  
8.36899822047307,  
8.607405767895836,  
9.631163052898822,  
9.874876363637043,  
10.225975825453373,  
2.711573403856553,  
0.20239905137011172,  
-0.4220883549830381,  
-0.8404830976891227,  
1.794332340210785,  
1.5095243517856047,  
0.22326098118939897,  
0.07733371735403745,  
1.280548885023134,  
1.4121496210624682,  
0.9815935680907694,  
-2.975348552150871,  
1.6316643284140941,  
0.8239502945369961,  
0.0314505340316768,  
-1.0892891749800817,  
1.720694113273713,  
0.6634696927679957,  
-0.836512780686814,  
-1.1286873737196692,  
-0.09500137106776224,  
1.0428135848317974,  
-0.4828772957450712,  
-1.129334172148368,  
0.7253737318795237,  
1.4108675361353635,  
0.7588540034470418,  
-0.5039485441412638,  
0.10346857579652805,  
1.2668095290766983,  
0.7994757345637048,  
-0.7393240316081237,  
-0.7818304990031031,  
0.25375980918776664,  
2.228975199542585,  
2.2487625387645873,  
0.6384105819815235,  
0.39434544396871446,  
1.3679129840939837,  
-0.27336699910726836,  
1.3170761670781417,  
1.1159622861844822,  
1.176824183488981,  
0.40583799697229034,  
0.8786168217534174,  
0.2914083315983707,  
-0.8464697846173548,  
-0.032455291822620566,  
-2.0755386823554396,  
-0.11439663923099666,  
0.7312672791487281,  
0.4263196833485598,  
0.11802610051350722,  
1.0445881812565523,  
-1.9566462184988007,  
0.9492303984073598,  
-1.7129593951518396,  
-0.3230601534209437,  
0.3161713641922788,  
-0.4811213940350071,  
0.08327140785409295,  
0.37526634808329173,  
-1.9990814349080968,  
-0.15397700748904192,  
-0.9549084255901845,  
1.1120455683467105,  
-0.42952128451280097,  
0.17929609797141985,  
1.0446016069356951,

```

0.846774755857218,
-0.2784586201121851,
0.23000407229986752,
-0.9198047598183884,
0.996529675185623,
0.34608382599103005,
0.5099375110708237,
2.1948932092248885,
1.3625694142279887,
-0.9306056124011278,
0.6012804875871011,
-0.7788968212470156,
-1.5884735532174328,
1.0361309111992296,
0.015937704739038126,
1.4003797043998856,
2.429422654005534,
-0.27504014116509645,
0.8256449732433587,
1.2146087003914199,
-0.6435553984602482,
0.3046269503778821,
1.0182549333954134,
1.4202224852266074,
1.3511302325707892,
-0.7261672378416364,
1.5992752660640235,
-0.5764295578986515,
-0.8318409785507642,
1.1375736468462807,
0.8529850561064739,
0.9553972898831558,
-0.09161160854677679,
1.617622889574723,
1.4551513261723394,
-0.08817813881493969,
0.8045852859105778,
1.9892741470924016,
1.8347816167556374,
-0.8050652823779443,
0.008511392950551585,
2.1460096989270747,
0.49277581514942953,
-2.4311684786278165,
0.5134791015266132,
0.9751974520662461,
-0.38582649358518695,
0.7746227771853464,
1.7307944301597258,
2.1320333699599043,
1.1654652968447545}],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],

```

[illegible]

```

0,
-3.433794388677785]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                    'identity_factors': [ 0,
                                           0,
                                           0,
                                           0],
                    'noise_level': [4, 2, 0, 0],
                    'noise_profile': {
'noise_on_init_param': { 'status': False,
                        'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],
True,
'depolarizing'},

                                'status':
                                'type':

                    'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [ 1,
                       1,
                       0,
                       0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                        'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],
True,
'depolarizing'},

                                'status':
                                'type':

                    'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [ 2,
                       2,
                       0,
                       0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                        'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],
True,
'depolarizing'},

                                'status':
                                'type':

                    'odd_wires': 4}},
'run_time_sec': 7.748016595840454}},
{ 'config': { 'ansatz': { 'gateset': 1,
                        'layer': 30,
                        'ugate': { 'coefficients': { 'bn': [ 0,
                                                             0,
                                                             0,
                                                             0,
                                                             0,
                                                             0],
                                                             'cn': [
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': { 'max': 10.0,

```



```
        'min': 0.0},
    'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.6189603325174557,
    0.7142372255934472,
    0.818217611349809,
    1.1433975540074377,
    1.9121137997887092,
    1.912113799788709,
    1.9189666863881127,
    2.194219841514053,
    2.734492156740232,
    4.250258815642276,
    4.250258815642276,
    5.774076859791501,
    6.527612880112256,
    6.532834731882501,
    8.049613322901676,
    8.049613322901676,
    8.050730377555883,
    8.561643142317116,
    8.561643142317116,
    8.758357012835646,
    8.758357012835646,
    8.78353884989931,
    9.477076383056275,
    9.536600626467342,
    9.536600626467342,
    9.536600626467342,
    10.241295505019522,
    10.318321333031077,
    10.579129354925781,
    10.82886994059623,
    3.662494394083504,
    0.08309129295248968,
    1.5295376506525808,
    -1.5964000102221196,
    1.8988970610647178,
    -0.07218621526676876,
    0.7238532160702689,
    -1.2917423920622229,
    1.8532222971765195,
    -0.40818119715800666,
    0.469598065996274,
    -1.2652675561295137,
    0.41465882817859046,
    0.48683539382624846,
    -0.15336518315146752,
    -1.6419783820068856,
    1.2136622236743368,
    0.5933123377118196,
    0.9666225223219593,
    0.9539776194708611,
    -0.3793986531891993,
    -0.2570964298405315,
    1.5884302353807402,
    0.19867970725527498,
    1.0036205245072367,
    -1.7266220384949087,
    0.6519864384701275,
    0.173373648086925,
    1.8697046853700252,
    0.5263944462203128,
    2.9785129063723943,
    -0.5937256494260224,
    0.22753174799850245,
    0.24918335157216837,
    1.5438671949833176,
    -0.2981477150404249,
    -0.0503664733834821,
    0.542442835193611,
    1.8096859498837612,
    -2.2260935596321993,
    0.28693396030012636,
    0.9986781622414097,
    -0.01940263773226835,
```

-1.8805315707929653,  
-0.1513202473661221,  
0.1836836320118686,  
-0.5655439481125303,  
-0.30323205019871646,  
-0.4186198812206128,  
0.2357002564872809,  
2.8296979465953833,  
-1.0776781071762758,  
-0.08378558447273823,  
1.7446476514004516,  
-0.4606832586075214,  
-1.762173446350097,  
0.10241780783627007,  
1.6018254886002428,  
0.2621004786967086,  
1.349261138919249,  
0.14987623247602613,  
0.5068543254371847,  
-1.3474781551208477,  
1.0890436270679893,  
1.6662048029626129,  
0.3608718991529565,  
-0.11137748070221386,  
0.5641204379289552,  
2.2546014997074266,  
1.8888740160956543,  
-0.23345107582518032,  
-1.5772444286238798,  
2.1408383357361265,  
-0.4968079560788485,  
0.1533667959779154,  
-0.40238715350257875,  
0.25591729793510365,  
2.947382531044255,  
-0.32162602471486745,  
-0.7587223675916386,  
-0.8983111566200868,  
0.006114119281372181,  
2.9372824954589514,  
0.48288231335139287,  
0.7939297064609614,  
1.9454360656955985,  
2.092519500518508,  
0.8995449331251366,  
0.10171517677156572,  
0.45235144869603666,  
1.02501950409702,  
0.24331156538914245,  
0.48973195386607005,  
2.672871435464254,  
1.313352678455905,  
2.010046934709317,  
-0.42153209835304317,  
-0.13436700176919486,  
-0.6950305532982513,  
0.6026553555930264,  
1.6681913778840949,  
0.4125109526933123,  
0.514533549588801,  
1.0794873063708696,  
-0.9571806916209341,  
0.27630815458061647,  
0.6001387806934945,  
0.5059087494947612,  
-0.5722342732268321,  
0.3986919058890637,  
1.0044202485382987,  
0.3352295947729849,  
1.3777059541173544,  
-2.835684252944388,  
0.6104690716589696,  
1.838086538234438,  
-0.3106134411398272,  
-2.2167272073692903,

```

0.10706372359431235,
-0.17469850626418476]],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric3_unifrom_scaling_sample#3'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
'2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
'2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
'4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
'1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X '
'0 X 1 '
'+ 0.5 '
'Y 0 Y '
'1 + '
'0.5 Z '
'0 Z 1 '
'+ 0.5 '
'X 1 X '
'2 + '
'0.5 Y '
'1 Y 2 '
'+ 0.5 '
'Z 1 Z '
'2 + '
'0.5 X '
'2 X 3 '
'+ 0.5 '
'Y 2 Y '
'3 + '
'0.5 Z '
'2 Z 3 '
'+ 0.5 '
'X 3 X '

```

```

'4 + '
'0.5 Y '
'3 Y 4 '
'+ 0.5 '
'Z 3 Z '
'4 + '
'0.5 X '
'4 X 5 '
'+ 0.5 '
'Y 4 Y '
'5 + '
'0.5 Z '
'4 Z 5 '
'+ 0.5 '
'X 5 X '
'6 + '
'0.5 Y '
'5 Y 6 '
'+ 0.5 '
'Z 5 Z '
'6']],
'output': { 'data_points': [ [4, 2, 0, 0, -6.218690041461777],
                              [12, 6, 0, 0, -4.805156509769758],
                              [ 20,
                                10,
                                0,
                                0,
                                -3.7079207759854302]],
  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                       'identity_factors': [ 0,
                                              0,
                                              0,
                                              0],
                       'noise_level': [4, 2, 0, 0],
                       'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

'status':

True,

'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [ 1,
                        1,
                        0,
                        0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

'status':

True,

'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [ 2,
                        2,
                        0,
                        0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
```

```

0,
0],

True,

'depolarizing'},

                                'odd_wires': 4]],
                                'run_time_sec': 6.773735761642456}},
{ 'config': { 'ansatz': { 'gateset': 1,
                           'layer': 30,
                           'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
                                                                'r': 0},
                                                                'time': { 'max': 10.0,
                                                                'min': 0.0},
                                                                'type': 'heisenberg'}}},
  'init_param': { 'value': [ 0.4022850038273885,
                              0.4222288083135141,
                              0.7644599371513524,
                              0.7900179023917507,
                              1.1026508993249646,
                              1.1630326759467198,
                              1.1630326759467198,
                              1.2119340062926192,
                              1.9859325565890973,
                              1.985932556589097,
                              2.096166401632718,
                              3.378647998605865,
                              3.378647998605865,
                              3.378647998605865,
                              4.354848115861854,
                              6.006218342726225,
                              6.006218342726225,
                              6.009974297352436,
                              8.225327865566033,
                              8.242093148909708,
                              9.222354355246733,
                              9.369468664000962,
                              9.432712219232048,
                              9.692289963799956,
                              9.692829942577658,
                              10.391360826688166,
                              10.391360826688166,
                              10.529867035412478,
                              10.529867035412478,
                              11.06290493838992,
                              2.9062307172979733,
                              -1.7788694936155562,
                              -0.1145266982224492,
                              -0.9311559923392093,
                              0.9691998209476543,
                              1.7463479137973288,
                              -0.7663862807329105,
                              -0.9694574896037749,
                              2.8979112386638413,
                              1.1400097878698292,
                              0.8096361549155084,
                              -1.5900494197653285,
                              0.09829667109053167,
                              0.31839493135320834,
                              0.3886777840539921,
                              0.12229184789371997,
                              1.7250225844898464,

```

1.0065795676456808,  
1.4535641205083867,  
-0.3486770669120958,  
0.2556790893233589,  
1.778531141883236,  
0.269972269049403,  
1.0155903957099945,  
0.8041163886037216,  
0.5381821926966456,  
-0.30108604163317454,  
0.6396533041678052,  
2.1819991440037696,  
1.4978086658278347,  
2.5181040929106753,  
0.4624415671193703,  
-0.17701736987873673,  
0.6910098122382194,  
2.947172461882987,  
-1.0727539032453073,  
0.4023854197196741,  
1.650490750838525,  
0.9313998963798695,  
-0.6769162055305248,  
-0.5620785927454173,  
-0.20885673940707247,  
2.5019757090972443,  
-0.37561416876024456,  
-0.9329392032282731,  
0.7818961506889994,  
0.44350434198669075,  
-0.10644929099379355,  
-2.498928032568615,  
-1.2046085786256906,  
-0.06365416567297402,  
0.17257236645054272,  
1.2516209341031546,  
-0.3591527663232026,  
0.46789807326225935,  
0.24374638092155315,  
0.02110383811013195,  
0.12714835746845662,  
-0.5505736947218767,  
-0.03497727012222505,  
-2.2168334497478877,  
-0.21485512988314215,  
1.7552902914988067,  
0.6189795903733311,  
0.3191491062237487,  
0.522632432692797,  
-1.1121089236913335,  
1.1371618962620422,  
-0.2410043783817164,  
0.24168543661014927,  
0.39418565996934685,  
1.2107667809264395,  
2.398781467533486,  
0.6948257569073976,  
0.6170229142231725,  
0.7050419245924102,  
1.768546262611762,  
1.5562956304120967,  
-0.4269237214365518,  
0.6302835616447369,  
1.7710848704009405,  
1.2281100264507194,  
1.5036530549577243,  
-0.7435268012971183,  
0.7613541379199313,  
0.8523298100708424,  
-0.6655959646469325,  
1.1543911681084875,  
2.2675628634479494,  
1.0299985170060308,  
1.400963430022522,  
0.27759304330136975,

```

0.6960561589746208,
-0.4210335016880339,
0.0336463669485127,
-2.099660094290342,
0.6674819238895001,
0.5049668435179431,
0.48001405045948287,
1.3574871122533543,
-2.2986993170736225,
9.601426007351498e-05,
1.3312470798272018,
0.7582238004326416,
-0.35033967277151296,
-0.4108552112493075,
0.1982910129710702,
0.6700017270602091,
0.26559360983179486,
-0.14563210230012705,
-0.39610135234418875,
1.1727729846793147,
0.6713573564879365,
0.8527070052929181,
0.8268283343075853,
2.2918575835381745,
0.5082103460913493,
1.8600493489550152,
0.49576811175353974,
2.232387985311215]],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1}},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric3_unifrom_scaling_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
'2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
'2 + 1 X 3 X 4 + 1 Z 3 + 1 X '

```

```
'4 X 5 + 1 Z 4 + 1 X 5 X 6 + '  
    '1 Z 5 + 1 Z 6',  
    'time_evolution_gate_hamiltonian_string': [ '0.5 X '  
                                                '0 X 1 '  
                                                '+ 0.5 '  
                                                'Y 0 Y '  
                                                '1 + '  
                                                '0.5 Z '  
                                                '0 Z 1 '  
                                                '+ 0.5 '  
                                                'X 1 X '  
                                                '2 + '  
                                                '0.5 Y '  
                                                '1 Y 2 '  
                                                '+ 0.5 '  
                                                'Z 1 Z '  
                                                '2 + '  
                                                '0.5 X '  
                                                '2 X 3 '  
                                                '+ 0.5 '  
                                                'Y 2 Y '  
                                                '3 + '  
                                                '0.5 Z '  
                                                '2 Z 3 '  
                                                '+ 0.5 '  
                                                'X 3 X '  
                                                '4 + '  
                                                '0.5 Y '  
                                                '3 Y 4 '  
                                                '+ 0.5 '  
                                                'Z 3 Z '  
                                                '4 + '  
                                                '0.5 X '  
                                                '4 X 5 '  
                                                '+ 0.5 '  
                                                'Y 4 Y '  
                                                '5 + '  
                                                '0.5 Z '  
                                                '4 Z 5 '  
                                                '+ 0.5 '  
                                                'X 5 X '  
                                                '6 + '  
                                                '0.5 Y '  
                                                '5 Y 6 '  
                                                '+ 0.5 '  
                                                'Z 5 Z '  
                                                '6']},  
    'output': { 'data_points': [ [4, 2, 0, 0, -5.743389283741309],  
                                  [12, 6, 0, 0, -4.3560016590478785],  
                                  [ 20,  
                                    10,  
                                    0,  
                                    0,  
                                    -3.277640180193779]],  
    'noise_details': [ { 'gates_num': [4, 1, 1, 0],  
                          'identity_factors': [ 0,  
                                                  0,  
                                                  0,  
                                                  0],  
                          'noise_level': [4, 2, 0, 0],  
                          'noise_profile': {  
  
'noise_on_init_param': { 'status': False,  
                           'value': 0},  
    'noise_prob': [ 0.001,  
                    0.001,  
                    0,  
                    0],  
  
                                'status':  
  
                                'type':  
  
                                'odd_wires': 4},  
    { 'gates_num': [12, 3, 1, 0],  
      'identity_factors': [ 1,  
                            1,
```



```

                                0,
                                0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

                                'status':

True,

                                'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [ 2,
                        2,
                        0,
                        0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

                                'status':

True,

                                'type':

'odd_wires': 4}],
'run_time_sec': 7.188068389892578}}],
'vqe': [ { 'config': { 'ansatz': { 'gateset': 1,
                                   'layer': 30,
                                   'ugate': { 'coefficients': { 'bn': [ 0,
                                                                           0,
                                                                           0,
                                                                           0,
                                                                           0,
                                                                           0],
                                                                           'cn': [ 0.5,
                                                                           0.5,
                                                                           0.5,
                                                                           0.5,
                                                                           0.5,
                                                                           0.5],
                                                                           'r': 0},
                                   'time': {'max': 10.0, 'min': 0.0},
                                   'type': 'heisenberg'}}},
  'init_param': {'value': 'random'},
  'noise_profile': { 'noise_on_init_param': { 'status':

False,

                                'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
  'nqubits': 7,
  'observable': { 'coefficients': { 'bn': [ 1.0,
                                             1.0,
                                             1.0,
                                             1.0,
                                             1.0,
                                             1.0],
                                             'cn': [ 0.5,
                                             0.5,
                                             0.5,
                                             0.5,
                                             0.5,
                                             0.5],
                                             'r': 1},
                  'def': 'ising'},

```

```

'output': { 'draw': { 'fig_dpi': 100,
                      'status': True,
                      'type': 'png'},
            'file_name_prefix':

'heisenberg_noise_free_time_evo'},

'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0]]},

'run': 'vqe',
'state': 'dmatrix',
'vqe': { 'iteration': 10,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': True}},

'zne': { 'data_points': None,
         'degree': 1,
         'method': 'richardson',
         'sampling': 'default'}},

'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
                                'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
                                '4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
                                'X 5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 '
                                                         '+ 0.5 Y 0 Y '
                                                         '1 + 0.5 Z 0 '
                                                         'Z 1 + 0.5 X '
                                                         '1 X 2 + 0.5 '
                                                         'Y 1 Y 2 + '
                                                         '0.5 Z 1 Z 2 '
                                                         '+ 0.5 X 2 X '
                                                         '3 + 0.5 Y 2 '
                                                         'Y 3 + 0.5 Z '
                                                         '2 Z 3 + 0.5 '
                                                         'X 3 X 4 + '
                                                         '0.5 Y 3 Y 4 '
                                                         '+ 0.5 Z 3 Z '
                                                         '4 + 0.5 X 4 '
                                                         'X 5 + 0.5 Y '
                                                         '4 Y 5 + 0.5 '
                                                         'Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 '
                                                         '+ 0.5 Y 5 Y '
                                                         '6 + 0.5 Z 5 '
                                                         'Z 6']},

'output': { 'exact_sol': -8.56677223350563,
            'initial_cost_history': [ 5.796866365657828,
                                     5.94197444368484,
                                     5.78867192910188,
                                     5.996879673940564,
                                     5.865062503342141,
                                     5.991390959337936,
                                     5.72582024636959,
                                     5.872963620288267,
                                     5.948869313039893,
                                     5.964755550858089],
            'noise_details': { 'gates_num': [4, 1, 1, 0],
                              'identity_factors': [0, 0, 0, 0],
                              'noise_level': [4, 2, 0, 0],
                              'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [

0.001,
0.001,

0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
'optimized_minimum_cost': [ -5.966837375471974,
                             -6.220556999324403,
                             -6.218690041461848,
                             -6.241465922765082,
                             -5.8146764847083485,
                             -6.144691518305702,

```

```
-5.966791417158719,  
-5.743389283741366,  
-5.966171999363111,  
-6.281301957226982],  
'optimized_parameters': [ [ 0.43940602753254654,  
0.4524980474487914,  
0.6462847510297367,  
0.6535145711164267,  
0.7019965052930044,  
1.0830061860275473,  
1.4380021973026182,  
2.1860837771467474,  
2.1860837771467474,  
2.1860837771467474,  
2.4875804812430995,  
2.911818356328843,  
4.9134595358452735,  
5.043089843653786,  
5.994354774193697,  
6.658321281734746,  
6.666230857319696,  
8.458454027735183,  
8.458454027735183,  
8.458454027735183,  
8.938931772570164,  
8.938931772570164,  
9.876451730548837,  
9.876451730548837,  
10.140618079102744,  
10.453495471248813,  
10.878653713196195,  
11.282429749250388,  
11.726474998572407,  
11.93229290545428,  
2.9640535214497064,  
-0.6206168106317247,  
-0.4035747848788786,  
-2.067222048924027,  
2.0576259596946604,  
1.364315765000901,  
-0.1480698866383175,  
-1.95043906046908,  
0.7897528850889669,  
1.350582507885341,  
-0.3349044763190947,  
-2.3429833820345465,  
2.04351680973891,  
0.8083219796841106,  
-0.06520770630024467,  
-0.8776318722364843,  
2.4862506381076748,  
0.8345121096737285,  
-0.03071661620417745,  
-0.6225183255138825,  
0.7450777062518694,  
0.12619297185303674,  
0.15620862918286052,  
-0.47540100870445906,  
0.6345315438244892,  
1.451076347224231,  
0.10985833383721234,  
-1.6475696409761669,  
1.1918822544398533,  
1.3235539868194213,  
-0.24222060474147966,  
0.2418944215339802,  
1.0397651583041008,  
1.6773252160624976,  
0.16975786500059598,  
-0.9211027317156172,  
0.7590471244619662,  
1.76540125315151,  
2.43856734239768,  
-0.19488067618654012,  
0.8462629124439717,
```

0.9979674075340036,  
2.5775834810620677,  
0.5650956422366618,  
-0.5475934153287456,  
-0.0253449469292375,  
1.2524069066350432,  
-0.605696708865831,  
0.7019502861337156,  
0.2803153244338447,  
-1.0831925759777479,  
1.0082140101851143,  
-0.3762046176346905,  
-0.9535933533256993,  
-1.0422804614435257,  
0.13948594332192887,  
0.5835070530053111,  
0.16086524965091817,  
0.06403444071667018,  
-0.06194188553710435,  
-0.4026223625881385,  
0.2750028468648149,  
0.6789909068622377,  
0.05162849323802493,  
-0.7735332926339995,  
-0.14862918062202837,  
0.7661757453229759,  
-0.16119730427373616,  
0.6482389226852195,  
3.1459456036848104,  
-0.4760920139337192,  
1.6197254159790668,  
-0.5506328506738539,  
0.9968299487743895,  
-0.3106735286083523,  
-1.2388662013594425,  
0.8898580979157581,  
0.43256773745092003,  
-0.7272220041247079,  
0.8716071923554094,  
1.5193589139179793,  
0.9787540447681606,  
-1.4044929205930872,  
-0.1984876316951887,  
-0.46744984056178585,  
-0.7765225748074835,  
0.04344696088727837,  
0.32373965212791267,  
0.9049555024172572,  
0.7139278873651953,  
-0.8122282267372439,  
0.5323405298774778,  
-0.08437719753251166,  
-0.14277007957413837,  
0.7912147308716768,  
0.26055493673650715,  
0.11357082745857092,  
0.3153698930365579,  
3.1981441448638614,  
0.32109035951393206,  
-0.23017443442945684,  
0.0316864124540797,  
0.20875812581978664,  
0.5466872162452653,  
1.2918521189433907,  
-0.7312547980705957,  
1.4958457475939604,  
-0.053193686203739404,  
-0.4437772137226961,  
-0.5271126400646005,  
2.5136810835026426,  
0.6674244883024821,  
-1.0140291771816496,  
-1.177197116527103,  
2.058315434744553,  
0.050372102721390984,

-0.09022974351195023,  
-2.296438941834702,  
0.3261688389091777,  
0.3072223897800251],  
[ 0.05238332857976487,  
0.05238332857976488,  
0.05238332857976461,  
0.5882470284735626,  
1.6186245942059996,  
2.2470777294271223,  
2.8315596913723913,  
2.8315596913723913,  
2.8333251330604914,  
3.7474015252366555,  
3.7474015252366555,  
3.7474015252366555,  
3.7474015252366555,  
4.452994588443841,  
4.625910007504636,  
4.625910007504636,  
5.314362007876739,  
7.185299991262795,  
7.185299991262795,  
8.165312898322489,  
8.165312898322489,  
8.165312898322489,  
8.684979613482101,  
9.661121823219345,  
9.674169964387936,  
10.525655511340814,  
10.525655511340814,  
10.525655511340814,  
11.154963299169733,  
11.154963299169733,  
2.50282655917642,  
0.9490947670548783,  
0.70056532212722,  
-0.9370006834105179,  
2.127395945212884,  
1.5529950009292526,  
-0.5538339242405286,  
-0.45109357069990613,  
3.2608593101153462,  
2.1691098922881027,  
0.924351518772188,  
0.7799372105219657,  
2.588492585292434,  
1.4914484649202893,  
0.5111989894903198,  
-1.6854828839595362,  
0.709524102178921,  
-0.3201993643863164,  
0.37756499567776974,  
0.11160463007405702,  
1.4506751210554825,  
-0.1158349928449886,  
-0.4172082421780774,  
-0.47420587439641587,  
2.1318004152619214,  
1.5026342770773617,  
0.9629412747697549,  
-1.017935070811068,  
2.2274033566257083,  
0.9541631607884562,  
2.2865374842341715,  
-0.6901760390806929,  
1.4488496207691695,  
-0.15529093800821045,  
1.378510821815928,  
-0.1238908488185843,  
1.0420944500710088,  
1.8938950235205334,  
-0.40270933293735856,  
-0.4838468076888962,  
-0.7769068081513464,

2.0570355933263196,  
0.33843722154840217,  
-0.21296684820549192,  
-0.3087457919151385,  
1.6713665097762895,  
0.7955513549984788,  
-0.5031484152839188,  
0.2783608989762586,  
1.4322280472670237,  
0.12038812465567636,  
0.8648150791824706,  
0.13552183280667268,  
0.07182610915111512,  
0.3477791234991623,  
-0.1584859230597403,  
0.5851519083687279,  
0.578565105996425,  
-1.7921034519484391,  
0.9189192684840749,  
-0.6139572052593133,  
-0.023527142002935514,  
-0.6495330854871428,  
0.7767670181361933,  
0.13616638059771954,  
-0.22568119775616352,  
0.4192866974084779,  
0.1401009023541104,  
1.419355971488301,  
1.1103093112149183,  
-0.8728413553259085,  
1.014691351510677,  
2.35757700845783,  
1.131891326153365,  
-1.2979835358031357,  
0.42365777146015526,  
1.0982786992551208,  
1.698510255572029,  
1.2090506157632,  
-1.3597097700308411,  
-0.9049577551064396,  
1.0199036275847497,  
2.9541844671388584,  
-0.42829772740772204,  
0.6542829736223691,  
3.7916586259391143,  
-0.1983670801457003,  
0.7855289833525587,  
-0.1534574040841844,  
1.809122493112309,  
0.35293394466185096,  
1.0573849517470935,  
2.461665111905985,  
1.0784030177718114,  
-1.585709677044719,  
0.8985620342798133,  
2.2360691692951646,  
0.24022620726925167,  
2.6922129347449117,  
0.15599094623602128,  
2.799936411115923,  
0.9657316063780467,  
-0.2732772147086647,  
-1.448572189075712,  
-0.7280589250410919,  
0.057973620624421296,  
0.9321748335747359,  
-1.4338621772181848,  
1.3976338029473028,  
-0.25504403617708243,  
3.210257057781798,  
0.03448775329128267,  
0.05070056715723011,  
-1.3727823101385919,  
0.8243579770218447,  
0.13142013414460954,

-0.4933237632531999,  
1.1105137227416793,  
0.7155364379215329,  
-0.21063252058278284],  
[ 0.6189603325174557,  
0.7142372255934472,  
0.818217611349809,  
1.1433975540074377,  
1.9121137997887092,  
1.912113799788709,  
1.9189666863881127,  
2.194219841514053,  
2.734492156740232,  
4.250258815642276,  
4.250258815642276,  
5.774076859791501,  
6.527612880112256,  
6.532834731882501,  
8.049613322901676,  
8.049613322901676,  
8.050730377555883,  
8.561643142317116,  
8.561643142317116,  
8.758357012835646,  
8.758357012835646,  
8.78353884989931,  
9.477076383056275,  
9.536600626467342,  
9.536600626467342,  
9.536600626467342,  
10.241295505019522,  
10.318321333031077,  
10.579129354925781,  
10.82886994059623,  
3.662494394083504,  
0.08309129295248968,  
1.5295376506525808,  
-1.5964000102221196,  
1.8988970610647178,  
-0.07218621526676876,  
0.7238532160702689,  
-1.2917423920622229,  
1.8532222971765195,  
-0.40818119715800666,  
0.469598065996274,  
-1.2652675561295137,  
0.41465882817859046,  
0.48683539382624846,  
-0.15336518315146752,  
-1.6419783820068856,  
1.2136622236743368,  
0.5933123377118196,  
0.9666225223219593,  
0.9539776194708611,  
-0.3793986531891993,  
-0.2570964298405315,  
1.5884302353807402,  
0.19867970725527498,  
1.0036205245072367,  
-1.7266220384949087,  
0.6519864384701275,  
0.173373648086925,  
1.8697046853700252,  
0.5263944462203128,  
2.9785129063723943,  
-0.5937256494260224,  
0.22753174799850245,  
0.24918335157216837,  
1.5438671949833176,  
-0.2981477150404249,  
-0.0503664733834821,  
0.542442835193611,  
1.8096859498837612,  
-2.2260935596321993,  
0.28693396030012636,

0.9986781622414097,  
-0.01940263773226835,  
-1.8805315707929653,  
-0.1513202473661221,  
0.1836836320118686,  
-0.5655439481125303,  
-0.30323205019871646,  
-0.4186198812206128,  
0.2357002564872809,  
2.8296979465953833,  
-1.0776781071762758,  
-0.08378558447273823,  
1.7446476514004516,  
-0.4606832586075214,  
-1.762173446350097,  
0.10241780783627007,  
1.6018254886002428,  
0.2621004786967086,  
1.349261138919249,  
0.14987623247602613,  
0.5068543254371847,  
-1.3474781551208477,  
1.0890436270679893,  
1.6662048029626129,  
0.3608718991529565,  
-0.11137748070221386,  
0.5641204379289552,  
2.2546014997074266,  
1.8888740160956543,  
-0.23345107582518032,  
-1.5772444286238798,  
2.1408383357361265,  
-0.4968079560788485,  
0.1533667959779154,  
-0.40238715350257875,  
0.25591729793510365,  
2.947382531044255,  
-0.32162602471486745,  
-0.7587223675916386,  
-0.8983111566200868,  
0.006114119281372181,  
2.9372824954589514,  
0.48288231335139287,  
0.7939297064609614,  
1.9454360656955985,  
2.092519500518508,  
0.8995449331251366,  
0.10171517677156572,  
0.45235144869603666,  
1.02501950409702,  
0.24331156538914245,  
0.48973195386607005,  
2.672871435464254,  
1.313352678455905,  
2.010046934709317,  
-0.42153209835304317,  
-0.13436700176919486,  
-0.6950305532982513,  
0.6026553555930264,  
1.6681913778840949,  
0.4125109526933123,  
0.514533549588801,  
1.0794873063708696,  
-0.9571806916209341,  
0.27630815458061647,  
0.6001387806934945,  
0.5059087494947612,  
-0.5722342732268321,  
0.3986919058890637,  
1.0044202485382987,  
0.3352295947729849,  
1.3777059541173544,  
-2.835684252944388,  
0.6104690716589696,  
1.838086538234438,



-0.3106134411398272,  
-2.2167272073692903,  
0.10706372359431235,  
-0.17469850626418476],  
[-2.397634216504411e-17,  
1.429450133825379e-17,  
0.9192297980258759,  
0.9192297980258759,  
2.8984599305110854,  
3.1993874679766523,  
3.199387467976652,  
3.715279848679994,  
3.715919998165357,  
5.126008182976459,  
5.749875525815113,  
5.785995839176617,  
5.785995839176617,  
5.785995839176617,  
5.785995839176617,  
6.315437962379428,  
6.678845841951143,  
7.3578167224936415,  
7.415694801781823,  
7.531263738212295,  
7.949087697575632,  
7.949087697575632,  
8.111169110068786,  
9.407094598577077,  
9.495286031274873,  
9.495286031274873,  
10.993257661103009,  
11.063439993331317,  
11.639888600691357,  
11.75175692668691,  
2.1152038588685538,  
-0.7839988468841306,  
-1.0579861702584952,  
-0.5122509123294313,  
1.0012369417099964,  
0.9275037440003397,  
0.5343037326701707,  
-0.014459274586663672,  
2.31692048955396,  
2.1400689678453872,  
-0.9468421716760329,  
1.3225342455296385,  
2.4229762260600483,  
1.4561600175543838,  
-0.4592924007287594,  
0.6389204073366491,  
0.5578650700802136,  
1.458345504678432,  
-0.11931303728638508,  
0.04406428844113783,  
-0.26144087074192934,  
0.6459890964472403,  
1.2243061606997268,  
0.09770103868863204,  
0.23645607828472368,  
0.3280111145811677,  
0.5390648705936556,  
-0.6034481934191781,  
-1.1942560416831098,  
0.3295059316644399,  
-0.0732996553139216,  
0.5043071925129845,  
0.7399437462813884,  
0.3595686242698361,  
1.4643835231854074,  
-0.1697776944282527,  
0.2588380732750666,  
0.44311592273109757,  
-0.6031987466514527,  
-0.06131410155451245,  
-0.3299395710828798,

-0.45492250592824107,  
0.5555861976799495,  
1.1612177689175078,  
1.833550163228831,  
1.5629483318007886,  
-0.2455585474033218,  
-0.4534768786824923,  
-1.2225865843307935,  
0.20468879325769473,  
1.3398561861341207,  
-0.58709602862573,  
0.07181500566168061,  
0.17010271339345,  
0.36406988692952136,  
-1.689809967880289,  
-1.1677426672173294,  
-0.7977758879892671,  
0.531032719362766,  
-1.7722607960867016,  
0.6332033998224597,  
0.6669814362912183,  
0.218182728116887,  
1.0415656581640258,  
-1.4544893086294475,  
0.5175174925258392,  
-0.9742907090362619,  
-0.30648595673224416,  
1.2400541074634985,  
-0.30003161306087445,  
-0.14406503395842435,  
-0.43061285539013316,  
0.6914697219419143,  
-0.48545379734819916,  
-0.2166375004086177,  
1.2014709434123243,  
1.0734635496959384,  
0.43666289070672293,  
-0.9550440807047608,  
1.2817732673505913,  
0.6254203972471953,  
0.8730111716749767,  
1.1814458389257443,  
-0.5855214911540807,  
0.33647224367417283,  
0.914891547403245,  
-0.10924028322724566,  
0.6731472714644756,  
-0.8672547313943412,  
-1.1628903969680444,  
1.2968110405185924,  
-0.7478342770444015,  
1.0157432273471354,  
0.05866260951598884,  
0.1549884083832883,  
2.402954000164725,  
-0.8510405490988947,  
-0.13394876321797194,  
0.35128800256256376,  
0.03985349181110424,  
1.0891408951797659,  
0.49683980443602116,  
1.3618410332836905,  
0.31089249400158553,  
0.007823999182329802,  
-1.0325531315281817,  
-0.13635517978577905,  
-0.4783006843261583,  
-0.9648987725589863,  
-0.4094326055257113,  
0.0620151507481985,  
-0.3631850012398663,  
-0.9119123598789223,  
-0.3458539889181142,  
0.8501459643039054,  
1.6461875633189593,

0.08799287143090098,  
-0.82318299513447,  
1.17289644669955,  
-0.9455811832961388],  
[ 0.12420123662801165,  
0.138246244841176,  
0.34185010800102933,  
0.8771280515547424,  
0.8771280515547423,  
1.9326762312100456,  
1.9326762312100456,  
2.879806034127527,  
3.4467495190209787,  
3.460588109395402,  
3.4605881093954016,  
3.4605881093954016,  
3.911934955717517,  
3.9564836804547703,  
4.188240551814426,  
5.098640553346409,  
5.098640553346409,  
5.098640553346408,  
6.466332587579958,  
7.457565848827182,  
7.712724508543908,  
7.890302861063261,  
7.898577524812402,  
8.020037295803547,  
8.020037295803547,  
9.289723192898348,  
9.68251578824504,  
9.68251578824504,  
10.66694519433398,  
11.464898013549973,  
1.8095532965205083,  
-1.6633278493215808,  
-1.2281091611401596,  
-0.40155726479865544,  
1.7903243850816337,  
0.18661159996017582,  
1.2217850039169107,  
-0.48128156078104645,  
1.438546033666569,  
-0.9466383819139143,  
-0.2179227006066069,  
-0.07921201994836616,  
0.6692914930417907,  
-0.16791294486623565,  
-0.3278463005181308,  
1.2883193159418245,  
1.9001761172388045,  
0.7646920019853412,  
-0.6325477821570596,  
-0.5987552945744136,  
0.5669730115381587,  
0.5983941343774113,  
-0.06179171362000896,  
-0.6867235859693906,  
0.5211737756628548,  
-0.19354588250953578,  
0.6072816218147872,  
0.3472677197742769,  
-0.08031734075212016,  
1.4024126217748347,  
-0.5867181790012919,  
0.809620813948269,  
0.35997425529443994,  
-0.8722967249300235,  
-0.5874818244923429,  
-0.5567926036837068,  
-0.6652314874983639,  
-0.6042054992483096,  
-0.13918430829641074,  
-0.08277488470584692,  
-0.4972293169762719,

-0.4421668735352916,  
0.6160601456858428,  
-1.1972657609969646,  
-1.1558488364748807,  
-1.4501782622641872,  
0.03989088007781949,  
-0.8684923327267209,  
-0.5569704341339503,  
0.15823054121075,  
0.6345578215095505,  
0.3601853745371903,  
-0.42594808878819745,  
0.08979804115834313,  
-0.153043281560756,  
-0.603228229875778,  
-1.1264410002736531,  
0.6895580235946861,  
-0.11045941959152497,  
0.5174109375139814,  
1.3269460586908306,  
-0.3852298542423827,  
-2.4120095755015893,  
0.08807412161753436,  
0.1228551365077638,  
-0.6982591234727157,  
-1.1618488040328845,  
2.5586909942385017,  
-0.24921574033555105,  
-1.9870969070050777,  
-1.0279498295884981,  
-0.7796802357622239,  
0.48428681889730063,  
0.7162815161060118,  
-0.15547297036103372,  
1.0522591887013215,  
1.772822944479854,  
-0.2654037211186137,  
-0.2720110866721671,  
-0.03929478442656517,  
0.34606077605631835,  
0.5533331494282367,  
1.0574846609095763,  
-0.5747611578732846,  
0.4916772893793279,  
0.9875709691916216,  
-0.17857479553023695,  
-1.147281220275154,  
0.37370382177065037,  
2.456815155407461,  
0.6567596591037266,  
0.9507316292553318,  
1.5113928877114242,  
1.8380989093110256,  
-0.1736919900840187,  
-1.2666253947041328,  
-0.554819304070435,  
1.1931643666366285,  
0.4614862178419797,  
1.2040726557184918,  
0.3083618234293392,  
-0.4066692475369416,  
0.3740368412278018,  
-1.684611974494111,  
-0.8650016725760176,  
-1.4838330341878547,  
-0.14344887350922086,  
4.203596189627334,  
1.1133202614474196,  
1.391124117957397,  
1.8627332105499828,  
-0.28192336755973296,  
-1.5416482647725873,  
-1.9612892990030817,  
0.8836928087418303,  
0.300761821046295,

0.6785848024508535,  
-0.5500277556546446,  
0.5742776326882599,  
-1.181756808209963],  
[ 0.38848003251483587,  
0.3884800325148359,  
1.2841735835398218,  
1.284173583539822,  
1.2841735835398218,  
1.818138220668234,  
1.818138220668234,  
2.7575469841005327,  
2.7575469841005327,  
2.7575469841005327,  
3.0053468968599275,  
3.0053468968599275,  
3.005346896859927,  
4.184079661691832,  
4.83635165164968,  
4.83635165164968,  
5.97926077140412,  
6.458805266455043,  
6.513102391504654,  
6.513102391504654,  
7.122105903846713,  
7.2188422331450415,  
7.988590448127284,  
8.268095077127937,  
8.268095077127937,  
9.164456488648115,  
9.164456488648115,  
9.782953992889732,  
9.782953992889732,  
10.467486029517685,  
1.5496959718296535,  
-1.0300437645832343,  
0.425343365508412,  
-1.7136674729251273,  
0.33645197441382346,  
0.2288357961575219,  
0.10470230685228102,  
-0.6612661793744108,  
0.11823315872480306,  
0.48571962162230753,  
-1.3748501535311368,  
0.2563120795974374,  
-0.38871520150353267,  
-0.18786175076151226,  
1.0017996241286973,  
0.05598903629217323,  
1.501328526357405,  
-0.32299727271195017,  
0.5715295079657807,  
-0.12201961934486968,  
2.2747823054657927,  
0.16289086097520028,  
0.027619518366160244,  
-0.10165606616500937,  
-0.06321979816820887,  
-0.27543819802246033,  
-0.0048370064103128475,  
0.1330138167350915,  
-0.06428151371988705,  
0.21905201010909556,  
0.25697175483980955,  
-1.462905966720411,  
0.8014511304369155,  
3.456137165485204,  
-0.3560002683832885,  
-0.4886877133354182,  
0.32039145066707037,  
1.6153352350920127,  
0.5940099487759896,  
0.18140087044059483,  
0.27123106498617,

0.7444341922951362,  
0.170480557625751,  
-0.4688462519246396,  
0.5235839184929864,  
-0.5470964469389679,  
-0.011921500492307424,  
1.4116230981753706,  
0.49972453659747124,  
-0.7800673920851233,  
0.4234227404504273,  
-0.2071635265929523,  
0.14064328933496192,  
-1.2007096247825992,  
0.12047098237640114,  
-0.4125103841815656,  
1.0447620953563077,  
0.0020814149928196773,  
0.4988991062112368,  
-0.34495773827123155,  
-0.12849063482979717,  
0.4280934542561602,  
0.7138444629946918,  
-0.6497712710787925,  
-0.43652659674625793,  
0.917432486791049,  
-0.8523477361785018,  
0.5648987974980545,  
0.3183226113969618,  
0.14295784675778261,  
0.9589824340171335,  
0.9194478619356266,  
1.1001359353915339,  
1.5417377267389083,  
-0.5376003771957187,  
-0.5404528215706331,  
0.21624687748210675,  
0.8814937279455825,  
-0.371639532103812,  
-0.2668100917972658,  
1.3133163210428074,  
0.44574090697479807,  
-1.0940261852319737,  
-0.313830643067749,  
-0.06100275437545863,  
-0.049560783686653447,  
-0.3025056724120473,  
-0.9891529613817422,  
-0.35099332176432035,  
0.5436069706516342,  
-0.722828417704955,  
1.6968661444846564,  
-2.4402971962208975,  
0.7865745542588627,  
1.3437881169309889,  
0.36108471326554326,  
-0.1749159211919777,  
-0.014334278530919132,  
0.02978377629472008,  
1.8533978555002608,  
-1.8470426695738211,  
0.6272356375919823,  
0.44775499409400255,  
1.3281153539688288,  
0.4583217606753929,  
0.6443670392327268,  
0.5254233581973354,  
2.3087652110195127,  
-0.7761319091913014,  
-0.7605421959233766,  
-0.6461580464596497,  
0.7075597766411752,  
0.985778508379752,  
-1.3130974173457381,  
2.8711331564400684,  
1.2993543284582694,

1.9493614761217355,  
1.1647493000584068,  
-0.42731613935458074,  
2.7038346000669766],  
[-1.8784742854218807e-17,  
-7.763750530158576e-17,  
0.3802827375258553,  
0.44096449652630626,  
0.8040692975576897,  
1.9224694434519336,  
1.9224694434519338,  
1.9224694434519336,  
1.9224694434519336,  
1.9224694434519336,  
1.9224694434519338,  
2.730288811725591,  
4.476350841356259,  
4.476350841356259,  
4.476350841356259,  
6.331658137341824,  
6.331658137341824,  
6.7621011201584285,  
6.77851096220289,  
7.490043179529316,  
7.490043179529316,  
7.490043179529316,  
7.490043179529316,  
7.511664240193972,  
8.302259372586072,  
8.36899822047307,  
8.607405767895836,  
9.631163052898822,  
9.874876363637043,  
10.225975825453373,  
2.711573403856553,  
0.20239905137011172,  
-0.4220883549830381,  
-0.8404830976891227,  
1.794332340210785,  
1.5095243517856047,  
0.22326098118939897,  
0.07733371735403745,  
1.280548885023134,  
1.4121496210624682,  
0.9815935680907694,  
-2.975348552150871,  
1.6316643284140941,  
0.8239502945369961,  
0.0314505340316768,  
-1.0892891749800817,  
1.720694113273713,  
0.6634696927679957,  
-0.836512780686814,  
-1.1286873737196692,  
-0.09500137106776224,  
1.0428135848317974,  
-0.4828772957450712,  
-1.129334172148368,  
0.7253737318795237,  
1.4108675361353635,  
0.7588540034470418,  
-0.5039485441412638,  
0.10346857579652805,  
1.2668095290766983,  
0.7994757345637048,  
-0.7393240316081237,  
-0.7818304990031031,  
0.25375980918776664,  
2.228975199542585,  
2.2487625387645873,  
0.6384105819815235,  
0.39434544396871446,  
1.3679129840939837,  
-0.27336699910726836,  
1.3170761670781417,

1.1159622861844822,  
1.176824183488981,  
0.40583799697229034,  
0.8786168217534174,  
0.2914083315983707,  
-0.8464697846173548,  
-0.032455291822620566,  
-2.0755386823554396,  
-0.11439663923099666,  
0.7312672791487281,  
0.4263196833485598,  
0.11802610051350722,  
1.0445881812565523,  
-1.9566462184988007,  
0.9492303984073598,  
-1.7129593951518396,  
-0.3230601534209437,  
0.3161713641922788,  
-0.4811213940350071,  
0.08327140785409295,  
0.37526634808329173,  
-1.9990814349080968,  
-0.15397700748904192,  
-0.9549084255901845,  
1.1120455683467105,  
-0.42952128451280097,  
0.17929609797141985,  
1.0446016069356951,  
0.846774755857218,  
-0.2784586201121851,  
0.23000407229986752,  
-0.9198047598183884,  
0.996529675185623,  
0.34608382599103005,  
0.5099375110708237,  
2.1948932092248885,  
1.3625694142279887,  
-0.9306056124011278,  
0.6012804875871011,  
-0.7788968212470156,  
-1.5884735532174328,  
1.0361309111992296,  
0.015937704739038126,  
1.4003797043998856,  
2.429422654005534,  
-0.27504014116509645,  
0.8256449732433587,  
1.2146087003914199,  
-0.6435553984602482,  
0.3046269503778821,  
1.0182549333954134,  
1.4202224852266074,  
1.3511302325707892,  
-0.7261672378416364,  
1.5992752660640235,  
-0.5764295578986515,  
-0.8318409785507642,  
1.1375736468462807,  
0.8529850561064739,  
0.9553972898831558,  
-0.09161160854677679,  
1.617622889574723,  
1.4551513261723394,  
-0.08817813881493969,  
0.8045852859105778,  
1.9892741470924016,  
1.8347816167556374,  
-0.8050652823779443,  
0.008511392950551585,  
2.1460096989270747,  
0.49277581514942953,  
-2.4311684786278165,  
0.5134791015266132,  
0.9751974520662461,  
-0.38582649358518695,



0.7746227771853464,  
1.7307944301597258,  
2.1320333699599043,  
1.1654652968447545],  
[ 0.4022850038273885,  
0.4222288083135141,  
0.7644599371513524,  
0.7900179023917507,  
1.1026508993249646,  
1.1630326759467198,  
1.1630326759467198,  
1.2119340062926192,  
1.9859325565890973,  
1.985932556589097,  
2.096166401632718,  
3.378647998605865,  
3.378647998605865,  
3.378647998605865,  
4.354848115861854,  
6.006218342726225,  
6.006218342726225,  
6.009974297352436,  
8.225327865566033,  
8.242093148909708,  
9.222354355246733,  
9.369468664000962,  
9.432712219232048,  
9.692289963799956,  
9.692829942577658,  
10.391360826688166,  
10.391360826688166,  
10.529867035412478,  
10.529867035412478,  
11.06290493838992,  
2.9062307172979733,  
-1.7788694936155562,  
-0.1145266982224492,  
-0.9311559923392093,  
0.9691998209476543,  
1.7463479137973288,  
-0.7663862807329105,  
-0.9694574896037749,  
2.8979112386638413,  
1.1400097878698292,  
0.8096361549155084,  
-1.5900494197653285,  
0.09829667109053167,  
0.31839493135320834,  
0.3886777840539921,  
0.12229184789371997,  
1.7250225844898464,  
1.0065795676456808,  
1.4535641205083867,  
-0.3486770669120958,  
0.2556790893233589,  
1.778531141883236,  
0.269972269049403,  
1.0155903957099945,  
0.8041163886037216,  
0.5381821926966456,  
-0.30108604163317454,  
0.6396533041678052,  
2.1819991440037696,  
1.4978086658278347,  
2.5181040929106753,  
0.4624415671193703,  
-0.17701736987873673,  
0.6910098122382194,  
2.947172461882987,  
-1.0727539032453073,  
0.4023854197196741,  
1.650490750838525,  
0.9313998963798695,  
-0.6769162055305248,  
-0.5620785927454173,

-0.20885673940707247,  
2.5019757090972443,  
-0.37561416876024456,  
-0.9329392032282731,  
0.7818961506889994,  
0.44350434198669075,  
-0.10644929099379355,  
-2.498928032568615,  
-1.2046085786256906,  
-0.06365416567297402,  
0.17257236645054272,  
1.2516209341031546,  
-0.3591527663232026,  
0.46789807326225935,  
0.24374638092155315,  
0.02110383811013195,  
0.12714835746845662,  
-0.5505736947218767,  
-0.03497727012222505,  
-2.2168334497478877,  
-0.21485512988314215,  
1.7552902914988067,  
0.6189795903733311,  
0.3191491062237487,  
0.522632432692797,  
-1.1121089236913335,  
1.1371618962620422,  
-0.2410043783817164,  
0.24168543661014927,  
0.39418565996934685,  
1.2107667809264395,  
2.398781467533486,  
0.6948257569073976,  
0.6170229142231725,  
0.7050419245924102,  
1.768546262611762,  
1.5562956304120967,  
-0.4269237214365518,  
0.6302835616447369,  
1.7710848704009405,  
1.2281100264507194,  
1.5036530549577243,  
-0.7435268012971183,  
0.7613541379199313,  
0.8523298100708424,  
-0.6655959646469325,  
1.1543911681084875,  
2.2675628634479494,  
1.0299985170060308,  
1.400963430022522,  
0.27759304330136975,  
0.6960561589746208,  
-0.4210335016880339,  
0.0336463669485127,  
-2.099660094290342,  
0.6674819238895001,  
0.5049668435179431,  
0.48001405045948287,  
1.3574871122533543,  
-2.2986993170736225,  
9.601426007351498e-05,  
1.3312470798272018,  
0.7582238004326416,  
-0.35033967277151296,  
-0.4108552112493075,  
0.1982910129710702,  
0.6700017270602091,  
0.26559360983179486,  
-0.14563210230012705,  
-0.39610135234418875,  
1.1727729846793147,  
0.6713573564879365,  
0.8527070052929181,  
0.8268283343075853,  
2.2918575835381745,

0.5082103460913493,  
1.8600493489550152,  
0.49576811175353974,  
2.232387985311215],  
[ 0.16477895719846114,  
0.16477895719846108,  
0.7183189156962347,  
1.8697093861419474,  
2.105082615571597,  
3.05308344502201,  
4.199393321043376,  
4.199393321043376,  
4.199393321043375,  
6.490210948425593,  
6.4902109484255925,  
6.490210948425593,  
6.4902109484255925,  
6.4902109484255925,  
6.490210948425593,  
6.882554174728105,  
6.882554174728105,  
6.882554174728105,  
6.882554174728104,  
6.8877583035732775,  
6.8877583035732775,  
6.8877583035732775,  
8.21014824639056,  
8.21014824639056,  
9.071469420716642,  
9.120928605341893,  
9.714944098401723,  
11.474131735950095,  
11.474131735950095,  
11.794551582273902,  
1.341188628911811,  
1.6554894539990426,  
-2.1068974621953425,  
-1.4171475675653578,  
0.33211669069513333,  
0.11331792925356984,  
-1.3610911099963097,  
0.46439741779020816,  
0.9313501387866817,  
1.0938593094543279,  
-0.3591727738608774,  
-0.4732622270970327,  
1.6321598874818157,  
-0.2782091348514778,  
-1.0526781349295347,  
0.0708703831522549,  
2.6982701224663113,  
-0.038867313655444914,  
-0.10508583152652556,  
-0.40759365792756236,  
0.6284849004330764,  
0.5192751929971827,  
-1.6282040637266806,  
0.0014422433007245106,  
-1.8299719264591412,  
2.3182597876656823,  
0.8875167319646391,  
1.5664268415036142,  
1.5052778791259855,  
2.935955436800565,  
1.533101581959507,  
1.8091829332960188,  
0.45080966818917967,  
0.1506883627647002,  
-0.6843548866459184,  
-0.5544883854492364,  
1.2466562002431278,  
-1.1866110136199353,  
1.4521358231995756,  
-1.125608676420736,  
-0.24054383618816966,

-0.058272145415006006,  
0.410408128597049,  
-1.6441753460137252,  
0.4019816715685168,  
0.4588365987304068,  
1.354346078964423,  
-1.7153251360741875,  
-1.1039978646265602e-06,  
0.7940670488104785,  
0.17979772520560053,  
-0.24385394325110826,  
0.6367160741723578,  
0.8500459957371875,  
0.0559416907316065,  
0.32418668587130467,  
-1.4797636873635434,  
0.11902177942387202,  
0.5185165439317966,  
-0.08399222686641401,  
0.8650918037299421,  
1.4911587670088011,  
0.12792248933645675,  
0.3372262149750348,  
-0.6553154954729696,  
1.1995792367396254,  
0.5132294030998703,  
0.44835115860783636,  
-0.37116980512777586,  
0.7805194563374558,  
-0.854334789795377,  
0.5008527672922033,  
-0.2302685629030402,  
0.6145182391921147,  
-0.6575500079215796,  
0.8657035637529482,  
1.1874516653159721,  
-0.16284802367068918,  
-0.26462171656665856,  
-0.9815102056659819,  
0.23198397744948207,  
-1.087097195512072,  
0.6616385654966559,  
-0.2929637257774683,  
0.03471390505932934,  
0.2048751570049573,  
0.9170017118070749,  
0.39617956766989404,  
0.12006199846995962,  
0.1922705913940127,  
0.8784478594386566,  
0.055479957240883566,  
-0.6634105431569992,  
1.0742951419164057,  
-0.37818200958777604,  
0.28548758229245597,  
-0.6594827056613419,  
1.0235832498557866,  
-0.19428253177041227,  
-0.5531991468121416,  
-1.189626464718852,  
0.2519110119226656,  
-0.6708462316627377,  
2.7994352657547057,  
-3.8764436680175813,  
0.5152327138619494,  
-0.3749347648847944,  
2.9042167722097862,  
1.1265965037549552,  
-1.850959186134046,  
2.165374611027145,  
0.8818414791702859,  
1.5039524911129019,  
0.06564767423285973,  
0.6486215314149069,  
-0.08854143781823305,

1.8396223528529987,  
-0.00792246728000446,  
2.8805879469479487,  
3.6337353861266473],  
[ 0.11853625011402234,  
0.11853625011402236,  
1.1173235551611367,  
1.7342580765110573,  
1.7342580765110573,  
2.108144483620023,  
3.054129947242328,  
3.054129947242328,  
3.054129947242328,  
3.056306360633301,  
4.638414750363569,  
5.0621851887275495,  
5.7503913724004905,  
5.774998407238176,  
6.917933224474368,  
6.917933224474368,  
8.061549209526286,  
8.061549209526286,  
8.061549209526286,  
8.591251503132888,  
8.591251503132888,  
9.051235537435975,  
9.081856762230144,  
9.467876152039107,  
9.545932016874406,  
9.591419209848118,  
10.465616352275608,  
10.465616352275608,  
10.465735173309618,  
10.980942228105905,  
2.0734674059611633,  
0.32892201175743896,  
-0.007356440825095051,  
0.7856576253246221,  
2.089457548986907,  
0.7744884921126718,  
-0.35049309306395837,  
-0.6556831494452968,  
2.0369525201874903,  
0.4739652080570001,  
-0.8564345639983049,  
1.25716179603495,  
1.7181260437331554,  
2.3978160665502384,  
1.1152024575020885,  
-1.3335737674295711,  
0.016650799076572978,  
1.6607129762234538,  
0.648059834763191,  
0.2438725527060928,  
-0.27307896000752346,  
1.4369017198677916,  
3.5672448343800007,  
-0.5379702113035718,  
-0.7420664562717484,  
-0.529699891930992,  
0.7301471483152846,  
0.781913925757813,  
0.6004078048346045,  
1.7324865479818374,  
0.4548236607944829,  
-1.4419813608219112,  
-0.684662976785234,  
0.8455512814500156,  
1.97751114408285,  
-0.833202517811791,  
1.110524460863052,  
2.6403320691876733,  
-0.3129427957408566,  
-0.06674204626492235,  
0.5842857778318762,

-0.21132485649138796,  
-0.011842019288790376,  
-0.25743970610802486,  
0.7486616881233721,  
-0.1302029141156864,  
0.09497091477412227,  
-0.3715265429351211,  
0.39570077921274605,  
0.28643868832003017,  
0.7848413456471106,  
-0.7157146817058562,  
0.09411764456438232,  
-0.10910076647953601,  
1.1262761892344808,  
-0.27334997823872975,  
-0.44027652197942063,  
0.6740415100156434,  
-0.336256645457715,  
0.4268157265313067,  
-0.8611696251566416,  
-0.34560928156726306,  
0.5618074077714486,  
0.5866360379174992,  
1.8662876827821717,  
2.21592310898005,  
1.972223656383108,  
1.6141187926643297,  
0.856255815565121,  
-0.34275929095614754,  
-1.0642528745182613,  
-1.0618686751734654,  
0.2379582550153795,  
-0.6501770361983872,  
-0.19408645485522444,  
1.501330829125914,  
1.5726602727591479,  
0.7066066097903853,  
-1.4580936665368467,  
0.46940440748349077,  
-0.1287015677341077,  
-0.9805925033056946,  
-0.3754741669636888,  
-0.026817919501009202,  
1.1067346586651607,  
0.17547923725022047,  
0.8902143171896091,  
-0.22777698610446503,  
0.8082253583749343,  
-1.0674083601412958,  
-0.022706971436593337,  
0.34227899244110566,  
1.3527736523760083,  
2.0767841716125894,  
0.5778568145668401,  
-0.6555502504392442,  
1.2670274746873995,  
0.507694022232518,  
-0.2629991187543805,  
1.7048253080726326,  
1.4088065522309612,  
2.823918413203317,  
1.2763232744235296,  
-1.4348344213353486,  
-0.605496445996402,  
0.09645158262695042,  
0.024639736182597342,  
0.23997550724405606,  
0.9979895378690888,  
-0.40612123795993227,  
1.826790650755685,  
0.029599395583551916,  
-0.4592861834683686,  
0.0328358806035505,  
1.3612120706287358,  
0.8210402794880411,

```

0.05688164146575431,
0.03152531580318861,
2.0316547976974904,
2.795039607579165]],
'run_time_sec': 69142.54766130447}}],
'zne': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.11853625011402234,
0.11853625011402236,
1.1173235551611367,
1.7342580765110573,
1.7342580765110573,
2.108144483620023,
3.054129947242328,
3.054129947242328,
3.054129947242328,
3.056306360633301,
4.638414750363569,
5.0621851887275495,
5.7503913724004905,
5.774998407238176,
6.917933224474368,
6.917933224474368,
8.061549209526286,
8.061549209526286,
8.061549209526286,
8.591251503132888,
8.591251503132888,
9.051235537435975,
9.081856762230144,
9.467876152039107,
9.545932016874406,
9.591419209848118,
10.465616352275608,
10.465616352275608,
10.465735173309618,
10.980942228105905,
2.0734674059611633,
0.32892201175743896,
-0.007356440825095051,
0.7856576253246221,
2.089457548986907,
0.7744884921126718,
-0.35049309306395837,
-0.6556831494452968,
2.0369525201874903,
0.4739652080570001,
-0.8564345639983049,
1.25716179603495,
1.7181260437331554,
2.3978160665502384,
1.1152024575020885,
-1.3335737674295711,
0.016650799076572978,
1.6607129762234538,
0.648059834763191,
0.2438725527060928,
-0.27307896000752346,
1.4369017198677916,

```

3.5672448343800007,  
-0.5379702113035718,  
-0.7420664562717484,  
-0.529699891930992,  
0.7301471483152846,  
0.781913925757813,  
0.6004078048346045,  
1.7324865479818374,  
0.4548236607944829,  
-1.4419813608219112,  
-0.684662976785234,  
0.8455512814500156,  
1.97751114408285,  
-0.833202517811791,  
1.110524460863052,  
2.6403320691876733,  
-0.3129427957408566,  
-0.06674204626492235,  
0.5842857778318762,  
-0.21132485649138796,  
-0.011842019288790376,  
-0.25743970610802486,  
0.7486616881233721,  
-0.1302029141156864,  
0.09497091477412227,  
-0.3715265429351211,  
0.39570077921274605,  
0.28643868832003017,  
0.7848413456471106,  
-0.7157146817058562,  
0.09411764456438232,  
-0.10910076647953601,  
1.1262761892344808,  
-0.27334997823872975,  
-0.44027652197942063,  
0.6740415100156434,  
-0.336256645457715,  
0.4268157265313067,  
-0.8611696251566416,  
-0.34560928156726306,  
0.5618074077714486,  
0.5866360379174992,  
1.8662876827821717,  
2.21592310898005,  
1.972223656383108,  
1.6141187926643297,  
0.856255815565121,  
-0.34275929095614754,  
-1.0642528745182613,  
-1.0618686751734654,  
0.2379582550153795,  
-0.6501770361983872,  
-0.19408645485522444,  
1.501330829125914,  
1.5726602727591479,  
0.7066066097903853,  
-1.4580936665368467,  
0.46940440748349077,  
-0.1287015677341077,  
-0.9805925033056946,  
-0.3754741669636888,  
-0.026817919501009202,  
1.1067346586651607,  
0.17547923725022047,  
0.8902143171896091,  
-0.22777698610446503,  
0.8082253583749343,  
-1.0674083601412958,  
-0.022706971436593337,  
0.34227899244110566,  
1.3527736523760083,  
2.0767841716125894,  
0.5778568145668401,  
-0.6555502504392442,  
1.2670274746873995,



```

0.507694022232518,
-0.2629991187543805,
1.7048253080726326,
1.4088065522309612,
2.823918413203317,
1.2763232744235296,
-1.4348344213353486,
-0.605496445996402,
0.09645158262695042,
0.024639736182597342,
0.23997550724405606,
0.9979895378690888,
-0.40612123795993227,
1.826790650755685,
0.029599395583551916,
-0.4592861834683686,
0.0328358806035505,
1.3612120706287358,
0.8210402794880411,
0.05688164146575431,
0.03152531580318861,
2.0316547976974904,
2.795039607579165]],
'noise_profile': { 'noise_on_init_param': { 'status':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1}},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric3_unifrom_scaling_sample#10'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.28130195722698],
[ 12,
6,
0,
0,
-4.778373581659957],
[ 20,
10,
0,
0,
-3.6190179833186162]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 7.677078247070312e-05,
False,

```

```

'zne_values': { 'degree': 0,
                'extrapolated_value': -7.161605936470123,
                'others': { 'beta_coeffieicients': [ 1.875,
                                                       -1.25,
                                                       0.375],
                            'cost_richardson_zne':
                            'sorted_expectation_vals': [
                                'sorted_noise': [6, 18, 30]],
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -6.28130195722698],
                  [ 12,
                    6,
                    0,
                    0,
                    -4.778373581659957],
                  [ 20,
                    10,
                    0,
                    0,
                    -3.6190179833186162]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                            'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                            'r': 0},
                                'time': {'max': 10.0, 'min': 0.0},
                                'type': 'heisenberg'}}},
  'init_param': { 'value': [ 0.43940602753254654,
                              0.4524980474487914,
                              0.6462847510297367,
                              0.6535145711164267,
                              0.7019965052930044,
                              1.0830061860275473,
                              1.4380021973026182,
                              2.1860837771467474,
                              2.1860837771467474,
                              2.1860837771467474,
                              2.4875804812430995,
                              2.911818356328843,
                              4.9134595358452735,
                              5.043089843653786,
                              5.994354774193697,
                              6.658321281734746,
                              6.666230857319696,
                              8.458454027735183,
                              8.458454027735183,
                              8.458454027735183,
                              8.938931772570164,
                              8.938931772570164,
                              9.876451730548837,
                              9.876451730548837,
                              10.140618079102744,
                              10.453495471248813,
                              10.878653713196195,
                              11.282429749250388,
                              11.726474998572407,

```

11.93229290545428,  
2.9640535214497064,  
-0.6206168106317247,  
-0.4035747848788786,  
-2.067222048924027,  
2.0576259596946604,  
1.364315765000901,  
-0.1480698866383175,  
-1.95043906046908,  
0.7897528850889669,  
1.350582507885341,  
-0.3349044763190947,  
-2.3429833820345465,  
2.04351680973891,  
0.8083219796841106,  
-0.06520770630024467,  
-0.8776318722364843,  
2.4862506381076748,  
0.8345121096737285,  
-0.03071661620417745,  
-0.6225183255138825,  
0.7450777062518694,  
0.12619297185303674,  
0.15620862918286052,  
-0.47540100870445906,  
0.6345315438244892,  
1.451076347224231,  
0.10985833383721234,  
-1.6475696409761669,  
1.1918822544398533,  
1.3235539868194213,  
-0.24222060474147966,  
0.2418944215339802,  
1.0397651583041008,  
1.6773252160624976,  
0.16975786500059598,  
-0.9211027317156172,  
0.7590471244619662,  
1.76540125315151,  
2.43856734239768,  
-0.19488067618654012,  
0.8462629124439717,  
0.9979674075340036,  
2.5775834810620677,  
0.5650956422366618,  
-0.5475934153287456,  
-0.0253449469292375,  
1.2524069066350432,  
-0.605696708865831,  
0.7019502861337156,  
0.2803153244338447,  
-1.0831925759777479,  
1.0082140101851143,  
-0.3762046176346905,  
-0.9535933533256993,  
-1.0422804614435257,  
0.13948594332192887,  
0.5835070530053111,  
0.16086524965091817,  
0.06403444071667018,  
-0.06194188553710435,  
-0.4026223625881385,  
0.2750028468648149,  
0.6789909068622377,  
0.05162849323802493,  
-0.7735332926339995,  
-0.14862918062202837,  
0.7661757453229759,  
-0.16119730427373616,  
0.6482389226852195,  
3.1459456036848104,  
-0.4760920139337192,  
1.6197254159790668,  
-0.5506328506738539,  
0.9968299487743895,

```

-0.3106735286083523,
-1.2388662013594425,
0.8898580979157581,
0.43256773745092003,
-0.7272220041247079,
0.8716071923554094,
1.5193589139179793,
0.9787540447681606,
-1.4044929205930872,
-0.1984876316951887,
-0.46744984056178585,
-0.7765225748074835,
0.04344696088727837,
0.32373965212791267,
0.9049555024172572,
0.7139278873651953,
-0.8122282267372439,
0.5323405298774778,
-0.08437719753251166,
-0.14277007957413837,
0.7912147308716768,
0.26055493673650715,
0.11357082745857092,
0.3153698930365579,
3.1981441448638614,
0.32109035951393206,
-0.23017443442945684,
0.0316864124540797,
0.20875812581978664,
0.5466872162452653,
1.2918521189433907,
-0.7312547980705957,
1.4958457475939604,
-0.053193686203739404,
-0.4437772137226961,
-0.5271126400646005,
2.5136810835026426,
0.6674244883024821,
-1.0140291771816496,
-1.177197116527103,
2.058315434744553,
0.050372102721390984,
-0.09022974351195023,
-2.296438941834702,
0.3261688389091777,
0.3072223897800251]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
'cn': [ 0.5,
        0.5,
        0.5,
        0.5,
        0.5,
        0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noisefree_time_evo_ric3_unifrom_scaling_sample#1'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],

```

```

[2, 2, 0, 0]],
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [ 4,
                           2,
                           0,
                           0,
                           -5.966837375471956],
                          [ 12,
                           6,
                           0,
                           0,
                           -4.6298501952375855],
                          [ 20,
                           10,
                           0,
                           0,
                           -3.5807206753108627]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 0.00010275840759277344,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -6.743277588204508,
                           'others': { 'beta_coeffieicients': [ 1.875,
                                                                -1.25,
                                                                0.375],
                                         'cost_richardson_zne':
                                         'sorted_expectation_vals': [
                                         'sorted_noise': [6, 18, 30]],
            'sampled data': [ [ 4,
                              2,
                              0,
                              0,
                              -5.966837375471956],
                             [ 12,
                              6,
                              0,
                              0,
                              -4.6298501952375855],
                             [ 20,
                              10,
                              0,
                              0,
                              -3.5807206753108627]],
            'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'heisenberg'}},
  'init_param': { 'value': [ -2.397634216504411e-17,
                             1.429450133825379e-17,

```

0.9192297980258759,  
0.9192297980258759,  
2.8984599305110854,  
3.1993874679766523,  
3.199387467976652,  
3.715279848679994,  
3.715919998165357,  
5.126008182976459,  
5.749875525815113,  
5.785995839176617,  
5.785995839176617,  
5.785995839176617,  
5.785995839176617,  
6.315437962379428,  
6.678845841951143,  
7.3578167224936415,  
7.415694801781823,  
7.531263738212295,  
7.949087697575632,  
7.949087697575632,  
8.111169110068786,  
9.407094598577077,  
9.495286031274873,  
9.495286031274873,  
10.993257661103009,  
11.063439993331317,  
11.639888600691357,  
11.75175692668691,  
2.1152038588685538,  
-0.7839988468841306,  
-1.0579861702584952,  
-0.5122509123294313,  
1.0012369417099964,  
0.9275037440003397,  
0.5343037326701707,  
-0.014459274586663672,  
2.31692048955396,  
2.1400689678453872,  
-0.9468421716760329,  
1.3225342455296385,  
2.4229762260600483,  
1.4561600175543838,  
-0.4592924007287594,  
0.6389204073366491,  
0.5578650700802136,  
1.458345504678432,  
-0.11931303728638508,  
0.04406428844113783,  
-0.26144087074192934,  
0.6459890964472403,  
1.2243061606997268,  
0.09770103868863204,  
0.23645607828472368,  
0.3280111145811677,  
0.5390648705936556,  
-0.6034481934191781,  
-1.1942560416831098,  
0.3295059316644399,  
-0.0732996553139216,  
0.5043071925129845,  
0.7399437462813884,  
0.3595686242698361,  
1.4643835231854074,  
-0.1697776944282527,  
0.2588380732750666,  
0.44311592273109757,  
-0.6031987466514527,  
-0.06131410155451245,  
-0.3299395710828798,  
-0.45492250592824107,  
0.5555861976799495,  
1.1612177689175078,  
1.833550163228831,  
1.5629483318007886,  
-0.2455585474033218,

-0.4534768786824923,  
-1.2225865843307935,  
0.20468879325769473,  
1.3398561861341207,  
-0.58709602862573,  
0.07181500566168061,  
0.17010271339345,  
0.36406988692952136,  
-1.689809967880289,  
-1.1677426672173294,  
-0.7977758879892671,  
0.531032719362766,  
-1.7722607960867016,  
0.6332033998224597,  
0.6669814362912183,  
0.218182728116887,  
1.0415656581640258,  
-1.4544893086294475,  
0.5175174925258392,  
-0.9742907090362619,  
-0.30648595673224416,  
1.2400541074634985,  
-0.30003161306087445,  
-0.14406503395842435,  
-0.43061285539013316,  
0.6914697219419143,  
-0.48545379734819916,  
-0.2166375004086177,  
1.2014709434123243,  
1.0734635496959384,  
0.43666289070672293,  
-0.9550440807047608,  
1.2817732673505913,  
0.6254203972471953,  
0.8730111716749767,  
1.1814458389257443,  
-0.5855214911540807,  
0.33647224367417283,  
0.914891547403245,  
-0.10924028322724566,  
0.6731472714644756,  
-0.8672547313943412,  
-1.1628903969680444,  
1.2968110405185924,  
-0.7478342770444015,  
1.0157432273471354,  
0.05866260951598884,  
0.1549884083832883,  
2.402954000164725,  
-0.8510405490988947,  
-0.13394876321797194,  
0.35128800256256376,  
0.03985349181110424,  
1.0891408951797659,  
0.49683980443602116,  
1.3618410332836905,  
0.31089249400158553,  
0.007823999182329802,  
-1.0325531315281817,  
-0.13635517978577905,  
-0.4783006843261583,  
-0.9648987725589863,  
-0.4094326055257113,  
0.0620151507481985,  
-0.3631850012398663,  
-0.9119123598789223,  
-0.3458539889181142,  
0.8501459643039054,  
1.6461875633189593,  
0.08799287143090098,  
-0.82318299513447,  
1.17289644669955,  
-0.9455811832961388}],

'noise\_profile': { 'noise\_on\_init\_param': { 'status':

False,

```

        'value': 0},
        'noise_prob': [0.001, 0.001, 0, 0],
        'status': True,
        'type': 'depolarizing'},
    'nqubits': 7,
    'observable': { 'coefficients': { 'bn': [ 1.0,
        1.0,
        1.0,
        1.0,
        1.0,
        1.0],
        'cn': [ 0.5,
        0.5,
        0.5,
        0.5,
        0.5,
        0.5],
        'r': 1}},
        'def': 'ising'},
    'output': { 'draw': { 'fig_dpi': 100,
        'status': False,
        'type': 'png'},
        'file_name_prefix':
'AUTOMATE_heisenberg_noiseefree_time_evo_ric3_unifrom_scaling_sample#4'},
    'redundant': { 'identity_factors': [ [0, 0, 0, 0],
        [1, 1, 0, 0],
        [2, 2, 0, 0]]},
    'run': 'zne',
    'state': 'dmatrix',
    'vqe': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
        'constraint': True,
        'status': False}},
    'zne': { 'data_points': [ [ 4,
        2,
        0,
        0,
        -6.241465922765086],
        [ 12,
        6,
        0,
        0,
        -4.714681794898787],
        [ 20,
        10,
        0,
        0,
        -3.5395259571477817]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
    'output': { 'exact_sol': -8.566772233505624,
        'run_time_sec': 3.910064697265625e-05,
        'zne_values': { 'degree': 0,
        'extrapolated_value': -7.136718595491471,
        'others': { 'beta_coeffieicients': [ 1.875,
        -1.25,
        0.375],
        'cost_richardson_zne':
5.21875,
        'sorted_expectation_vals': [
-6.241465922765086,
-4.714681794898787,
-3.5395259571477817],
        'sorted_noise': [6, 18, 30]},
        'sampled data': [ [ 4,
        2,
        0,
        0,
        -6.241465922765086],
        [ 12,
        6,
        0,
        0,

```



```

-4.714681794898787]],
[ 20,
 10,
 0,
 0,
-3.5395259571477817]],
'sampling': 'default']}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.16477895719846114,
0.16477895719846108,
0.7183189156962347,
1.8697093861419474,
2.105082615571597,
3.05308344502201,
4.199393321043376,
4.199393321043376,
4.199393321043375,
6.490210948425593,
6.4902109484255925,
6.490210948425593,
6.4902109484255925,
6.4902109484255925,
6.490210948425593,
6.882554174728105,
6.882554174728105,
6.882554174728105,
6.882554174728104,
6.8877583035732775,
6.8877583035732775,
6.8877583035732775,
6.8877583035732775,
8.21014824639056,
8.21014824639056,
9.071469420716642,
9.120928605341893,
9.714944098401723,
11.474131735950095,
11.474131735950095,
11.794551582273902,
1.341188628911811,
1.6554894539990426,
-2.1068974621953425,
-1.4171475675653578,
0.33211669069513333,
0.11331792925356984,
-1.3610911099963097,
0.46439741779020816,
0.9313501387866817,
1.0938593094543279,
-0.3591727738608774,
-0.4732622270970327,
1.6321598874818157,
-0.2782091348514778,
-1.0526781349295347,
0.0708703831522549,
2.6982701224663113,
-0.038867313655444914,
-0.10508583152652556,
-0.40759365792756236,

```

0.6284849004330764,  
0.5192751929971827,  
-1.6282040637266806,  
0.0014422433007245106,  
-1.8299719264591412,  
2.3182597876656823,  
0.8875167319646391,  
1.5664268415036142,  
1.5052778791259855,  
2.935955436800565,  
1.533101581959507,  
1.8091829332960188,  
0.45080966818917967,  
0.1506883627647002,  
-0.6843548866459184,  
-0.5544883854492364,  
1.2466562002431278,  
-1.1866110136199353,  
1.4521358231995756,  
-1.125608676420736,  
-0.24054383618816966,  
-0.058272145415006006,  
0.410408128597049,  
-1.6441753460137252,  
0.4019816715685168,  
0.4588365987304068,  
1.354346078964423,  
-1.7153251360741875,  
-1.1039978646265602e-06,  
0.7940670488104785,  
0.17979772520560053,  
-0.24385394325110826,  
0.6367160741723578,  
0.8500459957371875,  
0.0559416907316065,  
0.32418668587130467,  
-1.4797636873635434,  
0.11902177942387202,  
0.5185165439317966,  
-0.08399222686641401,  
0.8650918037299421,  
1.4911587670088011,  
0.12792248933645675,  
0.3372262149750348,  
-0.6553154954729696,  
1.1995792367396254,  
0.5132294030998703,  
0.44835115860783636,  
-0.37116980512777586,  
0.7805194563374558,  
-0.854334789795377,  
0.5008527672922033,  
-0.2302685629030402,  
0.6145182391921147,  
-0.6575500079215796,  
0.8657035637529482,  
1.1874516653159721,  
-0.16284802367068918,  
-0.26462171656665856,  
-0.9815102056659819,  
0.23198397744948207,  
-1.087097195512072,  
0.6616385654966559,  
-0.2929637257774683,  
0.03471390505932934,  
0.2048751570049573,  
0.9170017118070749,  
0.39617956766989404,  
0.12006199846995962,  
0.1922705913940127,  
0.8784478594386566,  
0.055479957240883566,  
-0.6634105431569992,  
1.0742951419164057,  
-0.37818200958777604,

```

0.28548758229245597,
-0.6594827056613419,
1.0235832498557866,
-0.19428253177041227,
-0.5531991468121416,
-1.189626464718852,
0.2519110119226656,
-0.6708462316627377,
2.7994352657547057,
-3.8764436680175813,
0.5152327138619494,
-0.3749347648847944,
2.9042167722097862,
1.1265965037549552,
-1.850959186134046,
2.165374611027145,
0.8818414791702859,
1.5039524911129019,
0.06564767423285973,
0.6486215314149069,
-0.08854143781823305,
1.8396223528529987,
-0.00792246728000446,
2.8805879469479487,
3.6337353861266473]],
'noise_profile': { 'noise_on_init_param': { 'status':
False,
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric3_unifrom_scaling_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [ 4,
2,
0,
0,
-5.966171999362981],
[ 12,
6,
0,
0,
-4.4917214032040365],
[ 20,
10,
0,
0,

```

```

-3.364633070617193]],
    'degree': 0,
    'method': 'richardson',
    'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 4.1484832763671875e-05,
'zne_values': { 'degree': 0,
    'extrapolated_value': -6.833658146281991,
    'others': { 'beta_coeffieicients': [ 1.875,
-1.25,
0.375],
'cost_richardson_zne':
'sorted_expectation_vals': [
-5.966171999362981,
-4.4917214032040365,
-3.364633070617193],
'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
2,
0,
0,
-5.966171999362981],
[ 12,
6,
0,
0,
-4.4917214032040365],
[ 20,
10,
0,
0,
-3.364633070617193]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}},
'init_param': { 'value': [ 0.12420123662801165,
0.138246244841176,
0.34185010800102933,
0.8771280515547424,
0.8771280515547423,
1.9326762312100456,
1.9326762312100456,
2.879806034127527,
3.4467495190209787,
3.460588109395402,
3.4605881093954016,
3.4605881093954016,
3.911934955717517,
3.9564836804547703,
4.188240551814426,
5.098640553346409,
5.098640553346409,
5.098640553346408,
6.466332587579958,
7.457565848827182,
7.712724508543908,
7.890302861063261,
7.898577524812402,

```

8.020037295803547,  
8.020037295803547,  
9.289723192898348,  
9.68251578824504,  
9.68251578824504,  
10.66694519433398,  
11.464898013549973,  
1.8095532965205083,  
-1.6633278493215808,  
-1.2281091611401596,  
-0.40155726479865544,  
1.7903243850816337,  
0.18661159996017582,  
1.2217850039169107,  
-0.48128156078104645,  
1.438546033666569,  
-0.9466383819139143,  
-0.2179227006066069,  
-0.07921201994836616,  
0.6692914930417907,  
-0.16791294486623565,  
-0.3278463005181308,  
1.2883193159418245,  
1.9001761172388045,  
0.7646920019853412,  
-0.6325477821570596,  
-0.5987552945744136,  
0.5669730115381587,  
0.5983941343774113,  
-0.06179171362000896,  
-0.6867235859693906,  
0.5211737756628548,  
-0.19354588250953578,  
0.6072816218147872,  
0.3472677197742769,  
-0.08031734075212016,  
1.4024126217748347,  
-0.5867181790012919,  
0.809620813948269,  
0.35997425529443994,  
-0.8722967249300235,  
-0.5874818244923429,  
-0.5567926036837068,  
-0.6652314874983639,  
-0.6042054992483096,  
-0.13918430829641074,  
-0.08277488470584692,  
-0.4972293169762719,  
-0.4421668735352916,  
0.6160601456858428,  
-1.1972657609969646,  
-1.1558488364748807,  
-1.4501782622641872,  
0.03989088007781949,  
-0.8684923327267209,  
-0.5569704341339503,  
0.15823054121075,  
0.6345578215095505,  
0.3601853745371903,  
-0.42594808878819745,  
0.08979804115834313,  
-0.153043281560756,  
-0.603228229875778,  
-1.1264410002736531,  
0.6895580235946861,  
-0.11045941959152497,  
0.5174109375139814,  
1.3269460586908306,  
-0.3852298542423827,  
-2.4120095755015893,  
0.08807412161753436,  
0.1228551365077638,  
-0.6982591234727157,  
-1.1618488040328845,  
2.5586909942385017,

```

-0.24921574033555105,
-1.9870969070050777,
-1.0279498295884981,
-0.7796802357622239,
0.48428681889730063,
0.7162815161060118,
-0.15547297036103372,
1.0522591887013215,
1.772822944479854,
-0.2654037211186137,
-0.2720110866721671,
-0.03929478442656517,
0.34606077605631835,
0.5533331494282367,
1.0574846609095763,
-0.5747611578732846,
0.4916772893793279,
0.9875709691916216,
-0.17857479553023695,
-1.147281220275154,
0.37370382177065037,
2.456815155407461,
0.6567596591037266,
0.9507316292553318,
1.5113928877114242,
1.8380989093110256,
-0.1736919900840187,
-1.2666253947041328,
-0.554819304070435,
1.1931643666366285,
0.4614862178419797,
1.2040726557184918,
0.3083618234293392,
-0.4066692475369416,
0.3740368412278018,
-1.684611974494111,
-0.8650016725760176,
-1.4838330341878547,
-0.14344887350922086,
4.203596189627334,
1.1133202614474196,
1.391124117957397,
1.8627332105499828,
-0.28192336755973296,
-1.5416482647725873,
-1.9612892990030817,
0.8836928087418303,
0.300761821046295,
0.6785848024508535,
-0.5500277556546446,
0.5742776326882599,
-1.181756808209963]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1}},
                    'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,

```

False,

```
'status': False,  
    'type': 'png'},  
    'file_name_prefix':  
'AUTOMATE_heisenberg_noisefree_time_evo_ric3_unifrom_scaling_sample#5'},  
    'redundant': { 'identity_factors': [ [0, 0, 0, 0],  
                                          [1, 1, 0, 0],  
                                          [2, 2, 0, 0]]},  
  
    'run': 'zne',  
    'state': 'dmatrix',  
    'vqe': { 'iteration': 1,  
             'optimization': { 'algorithm': 'SLSQP',  
                               'constraint': True,  
                               'status': False}},  
  
    'zne': { 'data_points': [ [ 4,  
                                2,  
                                0,  
                                0,  
                                -5.814676484708359],  
                              [ 12,  
                                6,  
                                0,  
                                0,  
                                -4.248447309496403],  
                              [ 20,  
                                10,  
                                0,  
                                0,  
                                -3.0694027528903187]],  
  
            'degree': 0,  
            'method': 'richardson',  
            'sampling': 'default'}}},  
    'output': { 'exact_sol': -8.566772233505624,  
               'run_time_sec': 3.719329833984375e-05,  
               'zne_values': { 'degree': 0,  
                               'extrapolated_value': -6.7429853042915395,  
                               'others': { 'beta_coeffieicients': [ 1.875,  
                                                                    -1.25],  
  
                                           0.375],  
  
                               5.21875,  
  
                               'cost_richardson_zne':  
  
                               'sorted_expectation_vals': [  
  
                                   'sorted_noise': [6, 18, 30]},  
                'sampled data': [ [ 4,  
                                    2,  
                                    0,  
                                    0,  
                                    -5.814676484708359],  
                                  [ 12,  
                                    6,  
                                    0,  
                                    0,  
                                    -4.248447309496403],  
                                  [ 20,  
                                    10,  
                                    0,  
                                    0,  
                                    -3.0694027528903187]],  
  
                    'sampling': 'default'}}}],  
    { 'config': { 'ansatz': { 'gateset': 1,  
                             'layer': 30,  
                             'ugate': { 'coefficients': { 'bn': [ 0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0],  
                                     'cn': [ 0.5,  
                                              0.5,  
                                              0.5,  
                                              0.5,  
                                              0.5,
```

```
0.5],
      'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}},
'init_param': { 'value': [ 0.05238332857976487,
0.05238332857976488,
0.05238332857976461,
0.5882470284735626,
1.6186245942059996,
2.2470777294271223,
2.8315596913723913,
2.8315596913723913,
2.8333251330604914,
3.7474015252366555,
3.7474015252366555,
3.7474015252366555,
3.7474015252366555,
4.452994588443841,
4.625910007504636,
4.625910007504636,
5.314362007876739,
7.185299991262795,
7.185299991262795,
8.165312898322489,
8.165312898322489,
8.165312898322489,
8.684979613482101,
9.661121823219345,
9.674169964387936,
10.525655511340814,
10.525655511340814,
10.525655511340814,
11.154963299169733,
11.154963299169733,
2.50282655917642,
0.9490947670548783,
0.70056532212722,
-0.9370006834105179,
2.127395945212884,
1.5529950009292526,
-0.5538339242405286,
-0.45109357069990613,
3.2608593101153462,
2.1691098922881027,
0.924351518772188,
0.7799372105219657,
2.588492585292434,
1.4914484649202893,
0.5111989894903198,
-1.6854828839595362,
0.709524102178921,
-0.3201993643863164,
0.37756499567776974,
0.11160463007405702,
1.4506751210554825,
-0.1158349928449886,
-0.4172082421780774,
-0.47420587439641587,
2.1318004152619214,
1.5026342770773617,
0.9629412747697549,
-1.017935070811068,
2.2274033566257083,
0.9541631607884562,
2.2865374842341715,
-0.6901760390806929,
1.4488496207691695,
-0.15529093800821045,
1.378510821815928,
-0.1238908488185843,
1.0420944500710088,
1.8938950235205334,
-0.40270933293735856,
-0.4838468076888962,
-0.7769068081513464,
```



2.0570355933263196,  
0.33843722154840217,  
-0.21296684820549192,  
-0.3087457919151385,  
1.6713665097762895,  
0.7955513549984788,  
-0.5031484152839188,  
0.2783608989762586,  
1.4322280472670237,  
0.12038812465567636,  
0.8648150791824706,  
0.13552183280667268,  
0.07182610915111512,  
0.3477791234991623,  
-0.1584859230597403,  
0.5851519083687279,  
0.578565105996425,  
-1.7921034519484391,  
0.9189192684840749,  
-0.6139572052593133,  
-0.023527142002935514,  
-0.6495330854871428,  
0.7767670181361933,  
0.13616638059771954,  
-0.22568119775616352,  
0.4192866974084779,  
0.1401009023541104,  
1.419355971488301,  
1.1103093112149183,  
-0.8728413553259085,  
1.014691351510677,  
2.35757700845783,  
1.131891326153365,  
-1.2979835358031357,  
0.42365777146015526,  
1.0982786992551208,  
1.698510255572029,  
1.2090506157632,  
-1.3597097700308411,  
-0.9049577551064396,  
1.0199036275847497,  
2.9541844671388584,  
-0.42829772740772204,  
0.6542829736223691,  
3.7916586259391143,  
-0.1983670801457003,  
0.7855289833525587,  
-0.1534574040841844,  
1.809122493112309,  
0.35293394466185096,  
1.0573849517470935,  
2.461665111905985,  
1.0784030177718114,  
-1.585709677044719,  
0.8985620342798133,  
2.2360691692951646,  
0.24022620726925167,  
2.6922129347449117,  
0.15599094623602128,  
2.799936411115923,  
0.9657316063780467,  
-0.2732772147086647,  
-1.448572189075712,  
-0.7280589250410919,  
0.057973620624421296,  
0.9321748335747359,  
-1.4338621772181848,  
1.3976338029473028,  
-0.25504403617708243,  
3.210257057781798,  
0.03448775329128267,  
0.05070056715723011,  
-1.3727823101385919,  
0.8243579770218447,  
0.13142013414460954,

```

-0.4933237632531999,
1.1105137227416793,
0.7155364379215329,
-0.21063252058278284]],
'noise_profile': { 'noise_on_init_param': { 'status':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1}},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric3_unifrom_scaling_sample#2'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [ 4,
2,
0,
0,
-6.220556999324399],
[ 12,
6,
0,
0,
-4.682225394272194],
[ 20,
10,
0,
0,
-3.4953983793015833]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 0.00011301040649414062,
'zne_values': { 'degree': 0,
'extrapolated_value': -7.1215370231311,
'others': { 'beta_coefficients': [ 1.875,
-1.25,
0.375],
'cost_richardson_zne':
5.21875,
'sorted_expectation_vals': [
-6.220556999324399,
-4.682225394272194,
-3.4953983793015833],
'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
2,
0,

```

```

0,
-6.220556999324399],
[ 12,
6,
0,
0,
-4.682225394272194],
[ 20,
10,
0,
0,
-3.4953983793015833]],
'sampling': 'default']}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ -1.8784742854218807e-17,
-7.763750530158576e-17,
0.3802827375258553,
0.44096449652630626,
0.8040692975576897,
1.9224694434519336,
1.9224694434519338,
1.9224694434519336,
1.9224694434519336,
1.9224694434519336,
1.9224694434519338,
2.730288811725591,
4.476350841356259,
4.476350841356259,
4.476350841356259,
6.331658137341824,
6.331658137341824,
6.7621011201584285,
6.77851096220289,
7.490043179529316,
7.490043179529316,
7.490043179529316,
7.490043179529316,
7.511664240193972,
8.302259372586072,
8.36899822047307,
8.607405767895836,
9.631163052898822,
9.874876363637043,
10.225975825453373,
2.711573403856553,
0.20239905137011172,
-0.4220883549830381,
-0.8404830976891227,
1.794332340210785,
1.5095243517856047,
0.22326098118939897,
0.07733371735403745,
1.280548885023134,
1.4121496210624682,
0.9815935680907694,
-2.975348552150871,
1.6316643284140941,
0.8239502945369961,

```

0.0314505340316768,  
-1.0892891749800817,  
1.720694113273713,  
0.6634696927679957,  
-0.836512780686814,  
-1.1286873737196692,  
-0.09500137106776224,  
1.0428135848317974,  
-0.4828772957450712,  
-1.129334172148368,  
0.7253737318795237,  
1.4108675361353635,  
0.7588540034470418,  
-0.5039485441412638,  
0.10346857579652805,  
1.2668095290766983,  
0.7994757345637048,  
-0.7393240316081237,  
-0.7818304990031031,  
0.25375980918776664,  
2.228975199542585,  
2.2487625387645873,  
0.6384105819815235,  
0.39434544396871446,  
1.3679129840939837,  
-0.27336699910726836,  
1.3170761670781417,  
1.1159622861844822,  
1.176824183488981,  
0.40583799697229034,  
0.8786168217534174,  
0.2914083315983707,  
-0.8464697846173548,  
-0.032455291822620566,  
-2.0755386823554396,  
-0.11439663923099666,  
0.7312672791487281,  
0.4263196833485598,  
0.11802610051350722,  
1.0445881812565523,  
-1.9566462184988007,  
0.9492303984073598,  
-1.7129593951518396,  
-0.3230601534209437,  
0.3161713641922788,  
-0.4811213940350071,  
0.08327140785409295,  
0.37526634808329173,  
-1.9990814349080968,  
-0.15397700748904192,  
-0.9549084255901845,  
1.1120455683467105,  
-0.42952128451280097,  
0.17929609797141985,  
1.0446016069356951,  
0.846774755857218,  
-0.2784586201121851,  
0.23000407229986752,  
-0.9198047598183884,  
0.996529675185623,  
0.34608382599103005,  
0.5099375110708237,  
2.1948932092248885,  
1.3625694142279887,  
-0.9306056124011278,  
0.6012804875871011,  
-0.7788968212470156,  
-1.5884735532174328,  
1.0361309111992296,  
0.015937704739038126,  
1.4003797043998856,  
2.429422654005534,  
-0.27504014116509645,  
0.8256449732433587,  
1.2146087003914199,

```

-0.6435553984602482,
0.3046269503778821,
1.0182549333954134,
1.4202224852266074,
1.3511302325707892,
-0.7261672378416364,
1.5992752660640235,
-0.5764295578986515,
-0.8318409785507642,
1.1375736468462807,
0.8529850561064739,
0.9553972898831558,
-0.09161160854677679,
1.617622889574723,
1.4551513261723394,
-0.08817813881493969,
0.8045852859105778,
1.9892741470924016,
1.8347816167556374,
-0.8050652823779443,
0.008511392950551585,
2.1460096989270747,
0.49277581514942953,
-2.4311684786278165,
0.5134791015266132,
0.9751974520662461,
-0.38582649358518695,
0.7746227771853464,
1.7307944301597258,
2.1320333699599043,
1.1654652968447545]],
'noise_profile': { 'noise_on_init_param': { 'status':
False,
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noisefree_time_evo_ric3_unifrom_scaling_sample#7'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]],
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [ 4,
2,
0,
0,
-5.966791417158658],
[ 12,
6,
0,
0,
-5.966791417158658],
[ 20,
10,
0,
0,
-5.966791417158658],
[ 28,
14,
0,
0,
-5.966791417158658],
[ 36,
18,
0,
0,
-5.966791417158658],
[ 44,
22,
0,
0,
-5.966791417158658],
[ 52,
26,
0,
0,
-5.966791417158658],
[ 60,
30,
0,
0,
-5.966791417158658],
[ 68,
34,
0,
0,
-5.966791417158658],
[ 76,
38,
0,
0,
-5.966791417158658],
[ 84,
42,
0,
0,
-5.966791417158658],
[ 92,
46,
0,
0,
-5.966791417158658],
[ 100,
50,
0,
0,
-5.966791417158658],
[ 108,
54,
0,
0,
-5.966791417158658],
[ 116,
58,
0,
0,
-5.966791417158658],
[ 124,
62,
0,
0,
-5.966791417158658],
[ 132,
66,
0,
0,
-5.966791417158658],
[ 140,
70,
0,
0,
-5.966791417158658],
[ 148,
74,
0,
0,
-5.966791417158658],
[ 156,
78,
0,
0,
-5.966791417158658],
[ 164,
82,
0,
0,
-5.966791417158658],
[ 172,
86,
0,
0,
-5.966791417158658],
[ 180,
90,
0,
0,
-5.966791417158658],
[ 188,
94,
0,
0,
-5.966791417158658],
[ 196,
98,
0,
0,
-5.966791417158658],
[ 204,
102,
0,
0,
-5.966791417158658],
[ 212,
106,
0,
0,
-5.966791417158658],
[ 220,
110,
0,
0,
-5.966791417158658],
[ 228,
114,
0,
0,
-5.966791417158658],
[ 236,
118,
0,
0,
-5.966791417158658],
[ 244,
122,
0,
0,
-5.966791417158658],
[ 252,
126,
0,
0,
-5.966791417158658],
[ 260,
130,
0,
0,
-5.966791417158658],
[ 268,
134,
0,
0,
-5.966791417158658],
[ 276,
138,
0,
0,
-5.966791417158658],
[ 284,
142,
0,
0,
-5.966791417158658],
[ 292,
146,
0,
0,
-5.966791417158658],
[ 300,
150,
0,
0,
-5.966791417158658],
[ 308,
154,
0,
0,
-5.966791417158658],
[ 316,
158,
0,
0,
-5.966791417158658],
[ 324,
162,
0,
0,
-5.966791417158658],
[ 332,
166,
0,
0,
-5.966791417158658],
[ 340,
170,
0,
0,
-5.966791417158658],
[ 348,
174,
0,
0,
-5.966791417158658],
[ 356,
178,
0,
0,
-5.966791417158658],
[ 364,
182,
0,
0,
-5.966791417158658],
[ 372,
186,
0,
0,
-5.966791417158658],
[ 380,
190,
0,
0,
-5.966791417158658],
[ 388,
194,
0,
0,
-5.966791417158658],
[ 396,
198,
0,
0,
-5.966791417158658],
[ 404,
202,
0,
0,
-5.966791417158658],
[ 412,
206,
0,
0,
-5.966791417158658],
[ 420,
210,
0,
0,
-5.966791417158658],
[ 428,
214,
0,
0,
-5.966791417158658],
[ 436,
218,
0,
0,
-5.966791417158658],
[ 444,
222,
0,
0,
-5.966791417158658],
[ 452,
226,
0,
0,
-5.966791417158658],
[ 460,
230,
0,
0,
-5.966791417158658],
[ 468,
234,
0,
0,
-5.966791417158658],
[ 476,
238,
0,
0,
-5.966791417158658],
[ 484,
242,
0,
0,
-5.966791417158658],
[ 492,
246,
0,
0,
-5.966791417158658],
[ 500,
250,
0,
0,
-5.966791417158658],
[ 508,
254,
0,
0,
-5.966791417158658],
[ 516,
258,
0,
0,
-5.966791417158658],
[ 524,
262,
0,
0,
-5.966791417158658],
[ 532,
266,
0,
0,
-5.966791417158658],
[ 540,
270,
0,
0,
-5.966791417158658],
[ 548,
274,
0,
0,
-5.966791417158658],
[ 556,
278,
0,
0,
-5.966791417158658],
[ 564,
282,
0,
0,
-5.966791417158658],
[ 572,
286,
0,
0,
-5.966791417158658],
[ 580,
290,
0,
0,
-5.966791417158658],
[ 588,
294,
0,
0,
-5.966791417158658],
[ 596,
298,
0,
0,
-5.966791417158658],
[ 604,
302,
0,
0,
-5.966791417158658],
[ 612,
306,
0,
0,
-5.966791417158658],
[ 620,
310,
0,
0,
-5.966791417158658],
[ 628,
314,
0,
0,
-5.966791417158658],
[ 636,
318,
0,
0,
-5.966791417158658],
[ 644,
322,
0,
0,
-5.966791417158658],
[ 652,
326,
0,
0,
-5.966791417158658],
[ 660,
330,
0,
0,
-5.966791417158
```

```

0,
-4.541488857163632],
[ 20,
10,
0,
0,
-3.433794388677785]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.457069396972656e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -6.798545731472112,
'others': { 'beta_coefficients': [ 1.875,
-1.25,
0.375],
'cost_richardson_zne':
'sorted_expectation_vals': [
'sorted_noise': [6, 18, 30]],
'sampled data': [ [ 4,
2,
0,
0,
-5.966791417158658],
[ 12,
6,
0,
0,
-4.541488857163632],
[ 20,
10,
0,
0,
-3.433794388677785]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.38848003251483587,
0.3884800325148359,
1.2841735835398218,
1.284173583539822,
1.2841735835398218,
1.818138220668234,
1.818138220668234,
2.7575469841005327,
2.7575469841005327,
2.7575469841005327,
3.0053468968599275,
3.0053468968599275,
3.005346896859927,
4.184079661691832,
4.83635165164968,
4.83635165164968,
5.97926077140412,

```

6.458805266455043,  
6.513102391504654,  
6.513102391504654,  
7.122105903846713,  
7.2188422331450415,  
7.988590448127284,  
8.268095077127937,  
8.268095077127937,  
9.164456488648115,  
9.164456488648115,  
9.782953992889732,  
9.782953992889732,  
10.467486029517685,  
1.5496959718296535,  
-1.0300437645832343,  
0.425343365508412,  
-1.7136674729251273,  
0.33645197441382346,  
0.2288357961575219,  
0.10470230685228102,  
-0.6612661793744108,  
0.11823315872480306,  
0.48571962162230753,  
-1.3748501535311368,  
0.2563120795974374,  
-0.38871520150353267,  
-0.18786175076151226,  
1.0017996241286973,  
0.05598903629217323,  
1.501328526357405,  
-0.32299727271195017,  
0.5715295079657807,  
-0.12201961934486968,  
2.2747823054657927,  
0.16289086097520028,  
0.027619518366160244,  
-0.10165606616500937,  
-0.06321979816820887,  
-0.27543819802246033,  
-0.0048370064103128475,  
0.1330138167350915,  
-0.06428151371988705,  
0.21905201010909556,  
0.25697175483980955,  
-1.462905966720411,  
0.8014511304369155,  
3.456137165485204,  
-0.3560002683832885,  
-0.4886877133354182,  
0.32039145066707037,  
1.6153352350920127,  
0.5940099487759896,  
0.18140087044059483,  
0.27123106498617,  
0.7444341922951362,  
0.170480557625751,  
-0.4688462519246396,  
0.5235839184929864,  
-0.5470964469389679,  
-0.011921500492307424,  
1.4116230981753706,  
0.49972453659747124,  
-0.7800673920851233,  
0.4234227404504273,  
-0.2071635265929523,  
0.14064328933496192,  
-1.2007096247825992,  
0.12047098237640114,  
-0.4125103841815656,  
1.0447620953563077,  
0.0020814149928196773,  
0.4988991062112368,  
-0.34495773827123155,  
-0.12849063482979717,  
0.4280934542561602,





[illegible]

```
                                0],
                                'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                'r': 0},
                                'time': {'max': 10.0, 'min': 0.0},
                                'type': 'heisenberg'}},
'init_param': { 'value': [ 0.4022850038273885,
                             0.4222288083135141,
                             0.7644599371513524,
                             0.7900179023917507,
                             1.1026508993249646,
                             1.1630326759467198,
                             1.1630326759467198,
                             1.2119340062926192,
                             1.9859325565890973,
                             1.985932556589097,
                             2.096166401632718,
                             3.378647998605865,
                             3.378647998605865,
                             3.378647998605865,
                             4.354848115861854,
                             6.006218342726225,
                             6.006218342726225,
                             6.009974297352436,
                             8.225327865566033,
                             8.242093148909708,
                             9.222354355246733,
                             9.369468664000962,
                             9.432712219232048,
                             9.692289963799956,
                             9.692829942577658,
                             10.391360826688166,
                             10.391360826688166,
                             10.529867035412478,
                             10.529867035412478,
                             11.06290493838992,
                             2.9062307172979733,
                             -1.7788694936155562,
                             -0.1145266982224492,
                             -0.9311559923392093,
                             0.9691998209476543,
                             1.7463479137973288,
                             -0.7663862807329105,
                             -0.9694574896037749,
                             2.8979112386638413,
                             1.1400097878698292,
                             0.8096361549155084,
                             -1.5900494197653285,
                             0.09829667109053167,
                             0.31839493135320834,
                             0.3886777840539921,
                             0.12229184789371997,
                             1.7250225844898464,
                             1.0065795676456808,
                             1.4535641205083867,
                             -0.3486770669120958,
                             0.2556790893233589,
                             1.778531141883236,
                             0.269972269049403,
                             1.0155903957099945,
                             0.8041163886037216,
                             0.5381821926966456,
                             -0.30108604163317454,
                             0.6396533041678052,
                             2.1819991440037696,
                             1.4978086658278347,
                             2.5181040929106753,
                             0.4624415671193703,
                             -0.17701736987873673,
                             0.6910098122382194,
                             2.947172461882987,
```

-1.0727539032453073,  
0.4023854197196741,  
1.650490750838525,  
0.9313998963798695,  
-0.6769162055305248,  
-0.5620785927454173,  
-0.20885673940707247,  
2.5019757090972443,  
-0.37561416876024456,  
-0.9329392032282731,  
0.7818961506889994,  
0.44350434198669075,  
-0.10644929099379355,  
-2.498928032568615,  
-1.2046085786256906,  
-0.06365416567297402,  
0.17257236645054272,  
1.2516209341031546,  
-0.3591527663232026,  
0.46789807326225935,  
0.24374638092155315,  
0.02110383811013195,  
0.12714835746845662,  
-0.5505736947218767,  
-0.03497727012222505,  
-2.2168334497478877,  
-0.21485512988314215,  
1.7552902914988067,  
0.6189795903733311,  
0.3191491062237487,  
0.522632432692797,  
-1.1121089236913335,  
1.1371618962620422,  
-0.2410043783817164,  
0.24168543661014927,  
0.39418565996934685,  
1.2107667809264395,  
2.398781467533486,  
0.6948257569073976,  
0.6170229142231725,  
0.7050419245924102,  
1.768546262611762,  
1.5562956304120967,  
-0.4269237214365518,  
0.6302835616447369,  
1.7710848704009405,  
1.2281100264507194,  
1.5036530549577243,  
-0.7435268012971183,  
0.7613541379199313,  
0.8523298100708424,  
-0.6655959646469325,  
1.1543911681084875,  
2.2675628634479494,  
1.0299985170060308,  
1.400963430022522,  
0.27759304330136975,  
0.6960561589746208,  
-0.4210335016880339,  
0.0336463669485127,  
-2.099660094290342,  
0.6674819238895001,  
0.5049668435179431,  
0.48001405045948287,  
1.3574871122533543,  
-2.2986993170736225,  
9.601426007351498e-05,  
1.3312470798272018,  
0.7582238004326416,  
-0.35033967277151296,  
-0.4108552112493075,  
0.1982910129710702,  
0.6700017270602091,  
0.26559360983179486,  
-0.14563210230012705,

```

-0.39610135234418875,
1.1727729846793147,
0.6713573564879365,
0.8527070052929181,
0.8268283343075853,
2.2918575835381745,
0.5082103460913493,
1.8600493489550152,
0.49576811175353974,
2.232387985311215]],
'noise_profile': { 'noise_on_init_param': { 'status':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1}},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noiseefree_time_evo_ric3_unifrom_scaling_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [ 4,
2,
0,
0,
-5.743389283741309],
[ 12,
6,
0,
0,
-4.3560016590478785],
[ 20,
10,
0,
0,
-3.277640180193779]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.838539123535156e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -6.552967900777775,
'others': { 'beta_coeffieicients': [ 1.875,
-1.25,
0.375],
'cost_richardson_zne':
5.21875,
'sorted_expectation_vals': [
-5.743389283741309,

```

-4.3560016590478785,  
-3.277640180193779],

```
        'sorted_noise': [6, 18, 30]],  
    'sampled data': [ [ 4,  
                        2,  
                        0,  
                        0,  
                        -5.743389283741309],  
                      [ 12,  
                        6,  
                        0,  
                        0,  
                        -4.3560016590478785],  
                      [ 20,  
                        10,  
                        0,  
                        0,  
                        -3.277640180193779]],  
    'sampling': 'default']},  
{ 'config': { 'ansatz': { 'gateset': 1,  
                          'layer': 30,  
                          'ugate': { 'coefficients': { 'bn': [ 0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0],  
                                                                'cn': [ 0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5],  
                                                                'r': 0},  
                          'time': {'max': 10.0, 'min': 0.0},  
                          'type': 'heisenberg'}},  
  'init_param': { 'value': [ 0.6189603325174557,  
                              0.7142372255934472,  
                              0.818217611349809,  
                              1.1433975540074377,  
                              1.9121137997887092,  
                              1.912113799788709,  
                              1.9189666863881127,  
                              2.194219841514053,  
                              2.734492156740232,  
                              4.250258815642276,  
                              4.250258815642276,  
                              5.774076859791501,  
                              6.527612880112256,  
                              6.532834731882501,  
                              8.049613322901676,  
                              8.049613322901676,  
                              8.050730377555883,  
                              8.561643142317116,  
                              8.561643142317116,  
                              8.758357012835646,  
                              8.758357012835646,  
                              8.78353884989931,  
                              9.477076383056275,  
                              9.536600626467342,  
                              9.536600626467342,  
                              9.536600626467342,  
                              10.241295505019522,  
                              10.318321333031077,  
                              10.579129354925781,  
                              10.82886994059623,  
                              3.662494394083504,  
                              0.08309129295248968,  
                              1.5295376506525808,  
                              -1.5964000102221196,  
                              1.8988970610647178,  
                              -0.07218621526676876,  
                              0.7238532160702689,  
                              -1.2917423920622229,
```

1.8532222971765195,  
-0.40818119715800666,  
0.469598065996274,  
-1.2652675561295137,  
0.41465882817859046,  
0.48683539382624846,  
-0.15336518315146752,  
-1.6419783820068856,  
1.2136622236743368,  
0.5933123377118196,  
0.9666225223219593,  
0.9539776194708611,  
-0.3793986531891993,  
-0.2570964298405315,  
1.5884302353807402,  
0.19867970725527498,  
1.0036205245072367,  
-1.7266220384949087,  
0.6519864384701275,  
0.173373648086925,  
1.8697046853700252,  
0.5263944462203128,  
2.9785129063723943,  
-0.5937256494260224,  
0.22753174799850245,  
0.24918335157216837,  
1.5438671949833176,  
-0.2981477150404249,  
-0.0503664733834821,  
0.542442835193611,  
1.8096859498837612,  
-2.2260935596321993,  
0.28693396030012636,  
0.9986781622414097,  
-0.01940263773226835,  
-1.8805315707929653,  
-0.1513202473661221,  
0.1836836320118686,  
-0.5655439481125303,  
-0.30323205019871646,  
-0.4186198812206128,  
0.2357002564872809,  
2.8296979465953833,  
-1.0776781071762758,  
-0.08378558447273823,  
1.7446476514004516,  
-0.4606832586075214,  
-1.762173446350097,  
0.10241780783627007,  
1.6018254886002428,  
0.2621004786967086,  
1.349261138919249,  
0.14987623247602613,  
0.5068543254371847,  
-1.3474781551208477,  
1.0890436270679893,  
1.6662048029626129,  
0.3608718991529565,  
-0.11137748070221386,  
0.5641204379289552,  
2.2546014997074266,  
1.8888740160956543,  
-0.23345107582518032,  
-1.5772444286238798,  
2.1408383357361265,  
-0.4968079560788485,  
0.1533667959779154,  
-0.40238715350257875,  
0.25591729793510365,  
2.947382531044255,  
-0.32162602471486745,  
-0.7587223675916386,  
-0.8983111566200868,  
0.006114119281372181,  
2.9372824954589514,

```

0.48288231335139287,
0.7939297064609614,
1.9454360656955985,
2.092519500518508,
0.8995449331251366,
0.10171517677156572,
0.45235144869603666,
1.02501950409702,
0.24331156538914245,
0.48973195386607005,
2.672871435464254,
1.313352678455905,
2.010046934709317,
-0.42153209835304317,
-0.13436700176919486,
-0.6950305532982513,
0.6026553555930264,
1.6681913778840949,
0.4125109526933123,
0.514533549588801,
1.0794873063708696,
-0.9571806916209341,
0.27630815458061647,
0.6001387806934945,
0.5059087494947612,
-0.5722342732268321,
0.3986919058890637,
1.0044202485382987,
0.3352295947729849,
1.3777059541173544,
-2.835684252944388,
0.6104690716589696,
1.838086538234438,
-0.3106134411398272,
-2.2167272073692903,
0.10706372359431235,
-0.17469850626418476]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [ 0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5],
                                'r': 1}},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric3_unifrom_scaling_sample#3'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [ 4,
                             2,

```

```

0,
0,
-6.218690041461777],
[ 12,
6,
0,
0,
-4.805156509769758],
[ 20,
10,
0,
0,
-3.7079207759854302]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 7.319450378417969e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -7.044068481523171,
'others': { 'beta_coefficients': [ 1.875,
-1.25,
0.375],
'cost_richardson_zne':
5.21875,
'sorted_expectation_vals': [
-6.218690041461777,
-4.805156509769758,
-3.7079207759854302],
'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
2,
0,
0,
-6.218690041461777],
[ 12,
6,
0,
0,
-4.805156509769758],
[ 20,
10,
0,
0,
-3.7079207759854302]],
'sampling': 'default'}}}],
'heisenberg-ric4-uniform-scaling': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': { 'max': 10.0,
'min': 0.0},
'type': 'heisenberg'}}},
'init_param': {'value': 'random'},
'noise_profile': { 'noise_on_init_param': { 'status':
False,
'value':
0},
'noise_prob': [ 0.001,
0.001,
0.001,
0.001],
'status': False,

```







11.16716557378114,  
2.8450840989270483,  
-0.611567672261254,  
-0.551095997013421,  
-1.0131107784954883,  
0.6825070788337171,  
-0.6162852792596847,  
0.053241771237976535,  
-0.12516614014524466,  
1.004304378969064,  
1.0874046621334863,  
-0.263039228744755,  
-0.10249623387196242,  
1.6330709573383448,  
0.7555807809408442,  
-1.304918472993802,  
-1.1870918453507433,  
-0.1330475605934714,  
-0.5047081392764299,  
0.7756728723196425,  
-0.49278801094288127,  
0.42847067786702214,  
0.5383171641852699,  
-0.1052976007723638,  
-1.2720333725347934,  
0.1951924272458347,  
-0.04277330847061178,  
0.9574239041786494,  
-0.23071352324401823,  
0.594076188896681,  
0.34935689199185954,  
1.343124516909016,  
0.09733282827416712,  
0.30944030008743273,  
0.4457207862171129,  
-0.9683728985035202,  
-1.120837258235465,  
0.5707161794308084,  
1.2158524027070072,  
0.7958721804993727,  
-0.9645697723054423,  
-0.8960337800506504,  
0.19569442936859724,  
0.40224575611741115,  
0.043062302517518566,  
-1.1857970207577537,  
0.1737802328972237,  
-0.6433879386848066,  
-0.09230835161436789,  
-0.5865305292280132,  
-0.4370825940325887,  
-0.2558137517355887,  
0.0011609522641742864,  
0.6539099100207111,  
0.5336009667754404,  
-0.066252982145182,  
-0.5359243057678726,  
-1.3834098071980059,  
1.0212180272076503,  
0.5141425620577187,  
-0.3002279094652444,  
1.9431365651467594,  
1.0552610834283143,  
0.03764625526605462,  
1.0189467943495765,  
-1.1805772107399133,  
0.2812463759993353,  
1.4321423259624626,  
0.004331180480864721,  
-0.009722915333733264,  
0.6451162813005181,  
-1.3276490840851547,  
-0.022791981388308465,  
0.6904663535208042,  
-0.08291995023229079,

-0.4292297662993819,  
0.08451212085763125,  
1.730745239172763,  
-0.4572165915626394,  
-0.5304437424739927,  
0.6917595603044201,  
-0.0834050618602206,  
-0.18753214427540912,  
0.03305271309241428,  
-2.06126875311761,  
1.5412249435528216,  
0.6658854058101124,  
-0.36436553183642006,  
-0.9193216873412987,  
-0.12900157901067746,  
0.00542745656150127,  
-2.171309732970475,  
0.7554637248132821,  
1.249093251376782,  
-0.6445658098419218,  
0.14255909437901,  
1.9827929295292588,  
1.7044112257377888,  
1.3052476731654217,  
-1.2421280078558083,  
0.9803773552514545,  
0.624656679395339,  
1.5450717726138348,  
1.3377635200462674,  
1.6713162630334013,  
1.1434539739578018,  
0.7924845860796002,  
0.7488178629415702,  
-0.22907755928161938,  
0.02068614393688229,  
0.7608745118642098,  
-0.9304086893990576,  
0.32284859123973336,  
1.1891889033470526,  
-2.2276657670493667,  
-0.3847051133881006,  
0.34685342333136693,  
0.549782335235608,  
-0.741267714199706,  
0.26835698412135817,  
-0.3932040836252281],  
[ 0.1668593898896292,  
0.17040712573292452,  
0.1805381301837931,  
0.5412292500635668,  
0.5489811947718172,  
1.6527475146851556,  
2.55163116002801,  
2.5519072608250526,  
3.5532683674980303,  
3.6288880821260254,  
3.628888082126026,  
4.805536133422,  
4.805536133422,  
5.495812833389341,  
7.061809444427505,  
7.061809444427505,  
7.091809082073759,  
7.091809082073759,  
7.177303629807857,  
7.177303629807857,  
8.014949756247965,  
8.530162577551986,  
8.530162577551986,  
8.546061750342906,  
9.04867098177819,  
9.074898072060186,  
9.632422305371618,  
9.634373167303918,  
10.38794675566215,

10.6266488059183,  
1.098346025464491,  
1.5064109656875124,  
-1.345000798816457,  
-1.0112785952191263,  
1.6300712383138607,  
0.8148371701480261,  
-0.28350002839102345,  
-0.33372360425933684,  
1.6208682076493302,  
0.8121027533840469,  
1.424723017228629,  
-2.424990019545176,  
0.082574342220046,  
1.5280227698708746,  
-1.15137171364767,  
0.8821561188139568,  
-1.0160789387304932,  
1.6746733218779515,  
2.4704340348759835,  
0.8258460042877822,  
0.21603078517896931,  
-0.05951632881852065,  
-0.38389794767629976,  
1.262782578763767,  
0.2784323534326924,  
-1.1033559163681899,  
-0.6528860571486432,  
0.2962709573582783,  
0.7373896958863383,  
-0.19469473272588958,  
-0.5648694322067066,  
-0.2865513283590244,  
-0.1568370013695695,  
0.5493402156787225,  
-0.06660698090283595,  
-0.03359282593361995,  
2.386303225482439,  
2.5818639178838447,  
-0.2777126348162844,  
0.9824372498806634,  
-0.39422047955069633,  
-0.2578521646674435,  
-2.3189661125012333,  
3.704222502127313,  
0.0786550943979888,  
-0.4292299615806753,  
1.9657979836656132,  
-2.0589782426096743,  
0.5074656887310783,  
0.529845836294102,  
0.3333899546946687,  
-2.293287544626138,  
0.38495704078578347,  
0.11228231507748758,  
-0.5441382535456334,  
-0.10489456654410802,  
0.20011773016694326,  
0.2071371298105447,  
-2.3651747840346373,  
-4.642753244408169,  
0.31152670002610416,  
0.5022276983536407,  
0.868938175568576,  
0.20348366213849262,  
1.6475591691674232,  
0.3723999247005541,  
-0.6589367341470095,  
-1.1662574597011768,  
-0.6243580701563078,  
0.7131540586709431,  
0.1202680893039496,  
-0.035429417928639004,  
-0.764191314011073,  
1.2086109032075552,

-1.051983148544319,  
0.9246153479653275,  
-1.1427863274072698,  
1.332115914696049,  
-0.27763903875773216,  
-0.836665559266224,  
1.231317184155771,  
1.0584874216549616,  
-1.2625782973678872,  
-0.13344263101573678,  
-0.5438546353631553,  
0.32212207070493337,  
-1.303226737690094,  
-0.01337174800709397,  
1.5589050571537895,  
0.3479397882311206,  
-1.87970134892204,  
2.977494205144941,  
2.126179176803338,  
0.873413305092612,  
0.8500950046844986,  
0.23032349681334924,  
0.3909007718762141,  
1.27926383991169,  
0.4053229000380187,  
0.18190897779649284,  
0.3777935390994293,  
0.16772342823060155,  
0.7412973026981022,  
0.639129360404442,  
0.018341913161260836,  
-1.4541884523192488,  
0.28134413046256895,  
2.4001077951469534,  
1.6611157476326641,  
0.7905510314185135,  
0.3404203970178551,  
2.183912805046456,  
-0.3997518053650227,  
0.053570896670028414,  
-0.357205442227867,  
2.465639862334342,  
0.5537972989863772,  
-0.39728466664110995,  
-0.027817223268321305,  
1.9807706991981826],  
[ 0.5951590437264768,  
0.5951597797898418,  
0.596302078053195,  
1.4089369768482796,  
1.4331037442558932,  
1.9334285070314567,  
3.062681311500457,  
3.0626813115004623,  
3.701592986553387,  
3.7015929865611663,  
4.692693983743045,  
4.692707272250184,  
4.692707272250258,  
4.692707272250313,  
5.273956511551061,  
5.2739565115534885,  
5.274711944180805,  
5.292162333185471,  
6.388031186249758,  
6.706092770308958,  
6.706092773942781,  
7.548703938317144,  
7.681022457823495,  
8.397974590110634,  
8.397974590138377,  
8.714530791128386,  
8.714530791128386,  
10.075092988071805,  
10.075092988073155,

11.341131260513714,  
1.2164966908304873,  
0.5225196146354087,  
-0.34542368185043265,  
-1.252295733833459,  
1.5735101799719247,  
1.0464982053397573,  
1.2394468649734893,  
0.21595542567535536,  
0.6527940529325085,  
1.4145936861598034,  
-0.5380512317672027,  
-1.9014686324238337,  
1.451754133219536,  
2.1987565378949516,  
0.938092448651857,  
-1.6378088277288243,  
0.38538945046186207,  
1.1341127264381634,  
0.4639756379522118,  
0.6078279078278344,  
0.6166736770850927,  
-0.2105783577152824,  
-0.35613934438782024,  
0.019700965332415492,  
-0.1607988588148763,  
2.193665487035956,  
-0.06423342915568941,  
-1.9546338684001463,  
-0.18633224680849803,  
0.7857721800679403,  
-0.6042593641712383,  
0.7490426193215785,  
-1.6440993970557098,  
0.1929003499686422,  
-0.13169470171686798,  
0.1181804780373785,  
0.15693401681144475,  
-0.28658811756127545,  
-0.20708135879200276,  
0.09230795188954338,  
-0.4114468277172402,  
-0.8587939345722652,  
-0.29108154529906144,  
0.5427012646910324,  
-0.25834402839896575,  
0.08607676608574079,  
-1.2954984273935897,  
0.1813204379953717,  
-0.34769281236878496,  
-0.09683800499273743,  
-0.9220596744797915,  
-0.67003274699539,  
0.4888752813745547,  
1.2659094572448748,  
0.11946751252820795,  
-0.2586531113468492,  
0.8859866115247531,  
1.5010226653220677,  
1.2253090413370418,  
-1.41480051306012,  
0.4438287250399343,  
1.1348546909542183,  
-0.26356600881424186,  
-2.0062796648632446,  
-1.5997185613370128,  
0.19365670408843416,  
1.9542746653083636,  
-1.16753432767107,  
-0.8341998310634118,  
-0.8078884986396416,  
1.057969787908329,  
0.11874076530060441,  
-0.37823536664235385,  
-0.26520820180860055,

-0.05623142087332937,  
-0.6351447036627758,  
1.2477313546900863,  
0.09475828495367859,  
1.1570291529547316,  
-0.3159140153065273,  
-0.5798756886838644,  
0.5049917679316769,  
0.17933499272174766,  
-0.6452919120449363,  
0.3093583753904067,  
0.6269418409971109,  
0.536228963471926,  
-0.39297460666924544,  
-0.8585561386083093,  
0.42310038622809626,  
0.4625446959490829,  
0.46551290354297115,  
-0.006225430338097464,  
-0.9498487290783498,  
0.9283489563799108,  
0.5288015885952413,  
-0.6423745714782674,  
0.055608107183735184,  
-0.19141640271906557,  
1.6106743132208,  
-0.930502866063725,  
0.13606233511650948,  
0.7450273046384331,  
-1.862998799714745,  
0.8639045442938115,  
2.2050766695222275,  
2.1209593580448147,  
1.5928713117159927,  
-0.646261951983125,  
0.18338232206466956,  
1.9195145046471642,  
0.9340015251080405,  
0.22314701152636945,  
0.22339358941062268,  
-0.49545999196264406,  
1.6497345768092624,  
-0.37841357670502584,  
0.19313501042389203,  
0.07433308037827455,  
1.831606295240235],  
[ 0.013945989287166007,  
0.014482887559355881,  
0.7020792700957467,  
1.2708090216179468,  
1.8771473361142745,  
1.898764043280349,  
2.8886374873795146,  
2.8887394286496386,  
2.889554540070078,  
2.8895545400700837,  
2.889778536891296,  
2.890175029071649,  
2.8901764691110965,  
3.881547037638128,  
4.589967577258263,  
4.916994542918821,  
5.4213951120408375,  
5.421396236977594,  
5.937049320865825,  
6.879796302074518,  
6.931299553407329,  
7.597215453538154,  
7.941093252873733,  
7.941093304737446,  
9.23283235128487,  
9.232832768748333,  
9.232832769084892,  
11.10587443204972,  
11.182791630116155,



11.297769627933807,  
0.7007490003921656,  
0.8357798277265018,  
-0.006144500286149594,  
-2.002647677865005,  
0.3078229546122665,  
0.6497081019565148,  
-0.5263987300225429,  
-1.3591736982237872,  
0.4978537208919288,  
-1.0703987652029276,  
1.4894572070841317,  
0.10507602812754031,  
1.2060409491957005,  
0.37232709611155723,  
-0.9426439100006672,  
-0.36387040355717715,  
0.9248005896093184,  
1.0383864274136485,  
-0.2845687665108692,  
-1.3700022658840743,  
0.197561542582957,  
-0.32357133547759104,  
-0.5540850172472152,  
0.5749264875292693,  
-0.8790799137852104,  
1.0945413836746756,  
0.3793043522465329,  
-0.4056052817915047,  
-0.03473792548266608,  
0.06466238365347084,  
0.06911551547308,  
0.1689218888799635,  
-0.24055379179177064,  
1.0229644579244672,  
-0.3032356624759471,  
0.7939776889924924,  
0.9000504980210274,  
1.1922086788205504,  
-0.09256238768786877,  
0.5764640092401906,  
0.20671868793560919,  
1.5137094250639866,  
-0.17335127063306519,  
0.8566284172009878,  
-0.14321647694006984,  
1.3125145841881363,  
1.3592268317355658,  
0.1512217749645529,  
0.40406540571588334,  
0.048383985681794354,  
0.19259007229061106,  
0.09976438753283409,  
-0.8546571821237718,  
0.6621369033183476,  
-0.1702351863826035,  
0.36026352288591695,  
-0.8538518608539489,  
0.5392868667124087,  
1.1279014251126462,  
-0.36128436957709814,  
0.388999106940785,  
0.6046833425816769,  
0.22322275018396126,  
0.19171695999278726,  
-0.909915166057891,  
0.21776193961543494,  
0.28996753900858246,  
-0.5842323028487328,  
-0.23864599488371552,  
0.5243326463982184,  
0.32056321937714066,  
0.5356836550343521,  
-0.3036011562711703,  
0.28802877152454115,

-0.33781577627567244,  
0.7960023934710929,  
-0.34238272839391165,  
-0.755152052016237,  
-0.44352996180502197,  
0.07213680417312635,  
-0.10190373256064952,  
0.6647215855084265,  
-0.9303498099091333,  
0.9785859773141862,  
2.090431130104361,  
-0.3615944398761197,  
-0.05657593308707301,  
-0.4893006812698228,  
2.169089562284795,  
-0.2512716878005756,  
0.5324061192252376,  
-0.35101147654456727,  
0.809248070031391,  
1.4509839161975397,  
-0.14911304722907706,  
0.009330045236156378,  
0.16685413556340573,  
-1.0472061077948698,  
1.6539137014575498,  
1.3611819463379937,  
-0.1612641139265809,  
-1.2962247052632323,  
-1.3797066485510583,  
0.7614302908946665,  
0.5091243097447496,  
-1.034844537010192,  
1.0872752511102444,  
-0.476692079414531,  
0.49649227376774574,  
-1.1491063122969838,  
0.5155370403129137,  
2.9855835289421178,  
1.332632811562063,  
-0.4511213152168112,  
-0.18076672982111605,  
-0.6499435359167832,  
-0.1697346678000319,  
1.4081723136905224,  
0.442588820936982,  
1.722678503402018],  
[ 0.6039929180328771,  
0.6039929180328772,  
1.1870458270689,  
1.1870458270688995,  
1.412745515623535,  
2.7932578893846336,  
3.721244973412882,  
4.900800320776727,  
6.39210348373028,  
6.39210348373028,  
7.061133772685592,  
7.061133772685592,  
7.061133772685592,  
7.064294030691084,  
7.896781244010901,  
7.896781244010901,  
7.998168023342792,  
8.09271241991372,  
8.09271241991372,  
9.328885229004163,  
9.328906326502109,  
9.56647323827175,  
9.587868480377287,  
9.606795901338938,  
9.632809215929381,  
9.925261433896223,  
10.67745113859835,  
11.226267254217802,  
11.25813692634961,

11.259219336255413,  
1.5276356326766196,  
-1.2318130242699923,  
0.07924764105056724,  
-3.11015247863868,  
1.71979592089301,  
2.1636204056140302,  
-0.44284897868332995,  
-1.9599373218939633,  
0.06248244737264575,  
1.4749130816585614,  
0.6808242800852113,  
-2.8378068229153226,  
1.7023278591356004,  
1.50553848610602,  
0.9365133390345636,  
-2.1922613442274193,  
2.8432021818280635,  
0.1855585942894919,  
-1.305416067894503,  
0.1905478234118404,  
0.7393995701939485,  
0.19798052248890954,  
-0.8075009715521676,  
0.3948611135767452,  
0.2802743807361451,  
-1.4516873620037638,  
1.5556285183865062,  
-1.0754052466574715,  
-0.26931261584286686,  
1.2336702516634759,  
-0.8384600779602994,  
0.1263891070094113,  
1.371252832802525,  
0.215177045818575,  
0.6381629880602765,  
-0.10309421117565558,  
0.4124383487994645,  
-0.655499258712117,  
0.4988310520659948,  
0.9884276098863405,  
1.4367219570983862,  
2.175763151095631,  
0.4657848221151968,  
-0.43932071710829274,  
0.9992343531072873,  
2.543795366459747,  
1.4484903663678823,  
-1.0884458694866728,  
1.5946427529603922,  
1.6036026746991174,  
0.5049418933876622,  
-1.0871394525284908,  
1.0140119509472394,  
0.5109229333717124,  
0.8743589388253838,  
0.09626392588768701,  
-1.263331036369507,  
0.7924497462635596,  
0.7602243892770352,  
-0.02425703489356225,  
-0.9488939939602019,  
2.6693155936644737,  
0.5100002820942202,  
0.595619937330169,  
-0.8296192082845288,  
0.03973961449691636,  
-1.7144893205098422,  
1.1592271204386744,  
0.04896218554826232,  
0.6673584031026698,  
-0.8454442747231521,  
1.0304518931414424,  
0.8556412792926265,  
0.538780781704616,

-2.308898512383933,  
1.5082121217292006,  
0.9522091008412682,  
-0.6026951427085929,  
-0.561943926102551,  
0.0993983558744849,  
0.4791162049419018,  
0.10320414203165484,  
0.3730055252741846,  
-0.47083232270591907,  
1.8673303303286475,  
0.11712430229385423,  
-0.6044688726688213,  
-0.9010581315425702,  
0.8870944114042272,  
-0.6585959519901412,  
1.4737812112349316,  
-0.08789784470103781,  
2.094313922775301,  
-0.33880630598079,  
2.0864279335765668,  
-0.3541510297313768,  
-0.1447960879675017,  
1.1237218765827641,  
0.7472353955833465,  
0.43980261574830926,  
0.6534205210717992,  
1.2606259200129655,  
-0.17935209951086067,  
1.6469967332630842,  
-1.0541245665671384,  
-1.9424469299865808,  
-0.18975499615277758,  
1.967627931161089,  
-0.5610576072704585,  
-1.4036970670846107,  
2.6946925238411343,  
-0.9860662529475024,  
-0.6528571620700129,  
-0.6551571328219318,  
0.9777230807240078,  
0.003267369094500521,  
-1.3217863730621935,  
0.3048209868145306,  
2.1104722024376037,  
-0.13744008360720306],  
[ 0.25527267369507034,  
0.25565792243175783,  
0.2647851751522132,  
0.5363821708593047,  
0.5363873360294482,  
0.7233633669048282,  
1.469495303301716,  
2.6782106232033085,  
3.0738233934797257,  
3.0740346152756928,  
3.0740346154225127,  
3.5401415295205747,  
4.384558950933806,  
4.384564402805264,  
5.187694707345863,  
5.431645815108105,  
5.489249393218873,  
5.489270645046236,  
5.4892706450864015,  
6.745887429448721,  
6.751180124796475,  
6.975059797459636,  
7.4852253234058015,  
7.485225323406553,  
7.485225336458803,  
8.65422617922401,  
9.588402512165866,  
9.885475791973308,  
10.59890299271783,

10.69671178550786,  
1.7193952291225598,  
-2.699905058742405,  
-1.223597261476082,  
1.010311557825714,  
2.412320728895392,  
0.01205800479020808,  
0.07148434641220561,  
-0.1717056232391439,  
0.7382566227367261,  
1.1624421524382496,  
-0.9704132592114074,  
0.007350927807351759,  
2.3582361698297074,  
1.1487298862005386,  
-0.5298367489795935,  
-0.09976600187590766,  
0.7543852753586129,  
1.401553978295213,  
0.3078871075376248,  
-0.35588965288410024,  
0.15554254602359127,  
0.3425968302644435,  
-1.202384247417669,  
-0.987347192012539,  
0.4529373843839761,  
0.4903191821294036,  
-0.3596344497958935,  
-0.17493820576367525,  
1.3619720378391473,  
-0.2517632245160441,  
0.6511229549349082,  
-0.07544040749490964,  
-0.04771613185909407,  
-0.3755018325798389,  
0.9938372515787193,  
-2.617459009880976,  
-1.1600518599196699,  
1.385641845308893,  
1.3078548392623544,  
-1.3438342667259302,  
0.06225569718179881,  
2.197693302377489,  
1.042516443745511,  
0.03537145740203309,  
-0.4361466628046714,  
0.5235506730441506,  
-0.526852610863259,  
0.2683619694707144,  
0.4190531675420984,  
1.1917182306749494,  
-0.22315973823529625,  
0.3724063269005885,  
-0.2016113706580773,  
-0.6608684665627687,  
-0.5566572791655187,  
-0.6080637139710359,  
-1.3764025932169088,  
0.06381643974581075,  
-0.12239416020448966,  
0.8768915165514672,  
0.9734732325585186,  
0.43086234391719236,  
-1.2868778636436715,  
0.2387140460098626,  
0.9650786815364466,  
-0.8088454790489977,  
0.3379873670823351,  
-0.5777804082620341,  
0.5336495835071627,  
2.9920059240641073,  
0.6079052241489462,  
0.5309531439532562,  
-0.3169545414432997,  
-2.3335729587340226,

1.4959043429555212,  
-0.5568960671660346,  
1.653532167337357,  
0.35120291709985135,  
-1.2609025397237739,  
-0.1931706005433399,  
-0.7761167208985412,  
-0.07661975220377984,  
-0.5351965211836152,  
-0.0031199845298622592,  
-1.0423575145047397,  
0.1404336078605159,  
-0.2659485743030148,  
-1.6615430856264528,  
0.43884229259462737,  
0.6812026744892391,  
0.39460126400851775,  
0.9189185317254136,  
1.0545864345697524,  
1.1559068061784519,  
1.0720705313960006,  
2.514687033544068,  
2.0122769373294087,  
1.2260219872848024,  
-1.3734724775008675,  
2.3904026332666466,  
-2.404362121009983,  
-0.8308162974608817,  
-0.49116355387064226,  
1.4544417316540983,  
1.2021789553657038,  
-0.045966888650276455,  
-0.5647889892892385,  
0.6643832758564343,  
1.3569537910410745,  
-0.9183847616510102,  
0.945220285616687,  
-0.2507148012652629,  
0.7511336622169466,  
-0.9416337312429676,  
-1.4793772681330912,  
0.4334847087508488,  
-0.02256141084202589,  
-0.8421263780740565,  
0.7532984525691246,  
-0.4880194119115941],  
[ 0.008743077103622827,  
0.009882832507877682,  
0.7050944318623401,  
0.710375902327237,  
1.3735081730499452,  
1.9102715342756955,  
2.4433320146909057,  
2.4516882946549723,  
2.451688347950266,  
2.451688347950339,  
2.843659132454273,  
2.8437290613274957,  
4.1600447531010465,  
4.306699526502985,  
4.306699526503065,  
5.241123177068926,  
5.241123178389404,  
5.24112317839451,  
5.241123178416889,  
5.24112317841696,  
5.540975568888287,  
5.540975570417886,  
5.941112811664419,  
8.170699047520403,  
8.170699047520507,  
8.170699047530466,  
8.255093472901638,  
10.272293989986627,  
10.424665220800923,

11.465171522837265,  
3.9395345563718758,  
0.4691052202571919,  
-1.862560190849311,  
-0.5409749194015872,  
0.6809788356765686,  
1.8042992706436805,  
-0.26820425656414737,  
0.1583592390805078,  
2.570139180175488,  
1.9730281302693196,  
-1.463840299189443,  
-0.6685636516618708,  
1.7639202171290544,  
-0.25593154759594605,  
-0.2985776439588054,  
-2.380396900296592,  
0.702730788267215,  
0.1111013414139888,  
0.8409172298864358,  
-1.2895389501906573,  
-0.6495780843509739,  
-0.7851296452736322,  
0.55111177160635,  
-0.7726813911354989,  
0.5538939215319534,  
0.03671507307592432,  
0.3611092546557634,  
-1.1244512927039525,  
0.9979933722488747,  
2.1458567471834726,  
0.6045511633065316,  
-2.057454443497708,  
1.252679002491011,  
1.430968651076373,  
0.1975347289978355,  
-1.299395231227167,  
1.3709528213003457,  
0.1431677222477642,  
-0.5468176167431326,  
-1.363138690512715,  
3.0723179570358097,  
0.09197418207209145,  
0.552028513182037,  
-0.14805587495457423,  
0.6542791830341044,  
-0.6463721623376274,  
0.594458988807259,  
0.36313400085196706,  
-0.22487670595801615,  
-0.5600947295073319,  
-0.13194082373612193,  
-0.7877948735702447,  
0.37453010501171596,  
0.4466259555663157,  
1.308811697533367,  
0.18300565834449778,  
0.28722746055568227,  
0.11593248147227052,  
-0.22092771987873516,  
-0.3830228539100271,  
-1.1848305159650747,  
0.5197091232696622,  
-0.20788874837533922,  
-0.6085287569162429,  
0.622048119692812,  
0.36154402486320714,  
-1.283336122338554,  
0.06614563071195226,  
-0.10338801392549199,  
-0.6587068471684263,  
1.34100892693596,  
1.611824691291148,  
0.6916042008757854,  
1.6327439292692163,

-0.6648342512722216,  
0.37654710496224697,  
-0.24718958516166675,  
-0.7065038375487233,  
0.11746925267221191,  
-0.5800210884330035,  
-0.5819296114685866,  
0.01696046668851879,  
0.08164598903007107,  
0.39930256073308995,  
-0.22041497304878216,  
-0.13569368036844073,  
-0.734071731705797,  
-0.10448732621745443,  
0.4350514428273773,  
-0.4345336137549378,  
0.39154417527507906,  
1.0175423593468684,  
2.0822612023831226,  
2.2518057581506135,  
-0.4050083292569126,  
-1.3225723626396935,  
0.2066177197668252,  
0.3518219705658924,  
0.7692056892056433,  
1.1078718838725619,  
0.6955122293015593,  
2.6391129283967607,  
-0.5193467200233968,  
0.16205999751797937,  
1.0319480004914923,  
0.0466744549888964,  
0.8866401912062555,  
0.6199118226017315,  
0.9594432756697039,  
0.30783399339708145,  
2.007890427791846,  
-0.42290702105473665,  
-1.4981000967272742,  
0.1246045734342663,  
1.4175139007816862,  
0.730422807509675,  
-1.0203109099547352,  
1.2475764531977165,  
1.172103834016867,  
2.0417923602468857],  
[ 0.3006295792025693,  
0.5011825648484141,  
1.736075427951676,  
1.7894431127664152,  
2.4859557870150857,  
3.6898895058559917,  
3.73290444462633,  
3.73290444462633,  
3.741728259130309,  
4.1342678631525835,  
4.145528657970977,  
4.615983426127272,  
5.6679892124870985,  
5.692197651053977,  
5.773115344270512,  
6.56178194421021,  
6.56178194421021,  
6.56178194421021,  
6.56178194421021,  
6.56178194421021,  
6.561820835625042,  
6.6476324960056985,  
7.649631249906491,  
8.361638748929934,  
8.576867085540188,  
8.77036061445696,  
9.827286891841206,  
10.5379658375992,  
10.558826131428928,



11.83004188936984,  
1.5987671786815294,  
-1.5058826811902317,  
2.0440908601375476,  
-1.481172398738803,  
1.4265067306792671,  
1.3375234069756785,  
-1.0089917144708827,  
-1.8440331252413595,  
-0.062239877224771915,  
0.18483713323292328,  
1.8795821846896128,  
-2.058552713287731,  
0.9708425302661001,  
0.8840527876953188,  
0.5964490041287303,  
-1.4043070469033054,  
0.14533141919970372,  
0.022743431858071796,  
-0.3923086391326145,  
0.11023448615420071,  
-0.4204112521530586,  
0.5529792020785508,  
-0.6330031478534407,  
0.23236293228773558,  
-0.4459800436834905,  
2.5876988326738504,  
0.6844024813933239,  
0.1732372067049823,  
0.7384853056565549,  
2.8826092918303563,  
-0.11204335589185775,  
-0.2241007440171772,  
-0.4845273525281558,  
0.2744214554588425,  
0.26177442491958286,  
0.4512467910671607,  
-0.6063187184164835,  
-1.2386469417803163,  
-1.1719897599242013,  
1.9705273482015357,  
1.945221133626245,  
0.15309311442469994,  
0.690693149150703,  
0.22188036413222653,  
0.47722534320651633,  
0.12444414704260098,  
-1.0057594761976716,  
-0.3351811680967541,  
1.0750707752291546,  
-0.04597654655420585,  
-1.4770936089010136,  
0.1839119320523196,  
1.0453831678930239,  
1.6851715686961402,  
2.1701829049155683,  
1.692817047863365,  
0.44152889324253053,  
-0.3402272157802259,  
-0.4600811596334244,  
2.365566181908148,  
1.166608300050211,  
-0.12230572309949261,  
-0.07192631995381693,  
-0.48825404466402955,  
1.202761995004197,  
0.503733093641068,  
-0.2613796073125891,  
0.7323467617888468,  
0.30547819787235264,  
0.46207631030173263,  
0.034964002783702264,  
-0.30773087511026637,  
2.2827399003210256,  
0.773042400324002,

0.07466204753764587,  
-2.812532590652055,  
0.7925074856015164,  
3.3306642432255886,  
-0.8558810509247932,  
-0.9283746444488663,  
0.3079774400122357,  
0.5580467297921388,  
0.5588934104639726,  
0.6444350594161403,  
1.5119717259179621,  
0.14573434197560214,  
0.7631266139944589,  
-0.43452714539522225,  
0.38832086457140946,  
0.36234082213113916,  
-1.3222695581402877,  
-0.6140190631377459,  
2.2873566508452354,  
1.0349767974312705,  
-0.5734592440854204,  
0.5234040439377924,  
-0.8213429806368828,  
-0.8621355796854082,  
-0.5355268774606846,  
1.8804920616270637,  
0.022682713405259486,  
1.3625464560687972,  
-0.48449497738356756,  
1.6018376883784673,  
-1.3963097787223904,  
-3.511711037561943,  
1.3223211880663501,  
2.1298031669093946,  
0.24542774430512565,  
0.7034284248706182,  
-0.37346698797179273,  
-0.43051209966139187,  
-0.1034377630705127,  
-0.07417862116176438,  
0.2595758000914042,  
0.9523286668350031,  
0.2556898901330524,  
0.22603519843353895,  
0.9866656966967039,  
2.5031147117731094],  
[ 0.6608465720820748,  
0.9671982645454077,  
1.5458030244804597,  
1.5458030244804597,  
2.2589946156031733,  
2.2589946156031733,  
2.2589946156031733,  
2.6595607382107107,  
3.734699662125929,  
4.07592175958283,  
4.611631942641649,  
4.831287600721991,  
4.831287600721991,  
5.914025831134952,  
5.914025831134952,  
6.072969066301945,  
6.991999801396327,  
6.991999801396326,  
7.161687480905546,  
7.673022292320241,  
7.821921961804373,  
7.912193421610441,  
8.287160283389671,  
8.956173402171897,  
8.956173402171897,  
9.75268721078065,  
9.941478738047602,  
9.941478738047602,  
9.945621910117605,

10.438880525762482,  
1.4707024445054038,  
1.5353178524994073,  
0.8263465992797864,  
0.5104925709601137,  
0.0752285958369072,  
-0.1142202547489564,  
-1.4526020976761953,  
-1.3531650678039584,  
-0.5250403673431315,  
2.237334263415747,  
0.2921144645165799,  
-1.3764237769851546,  
0.48788675650681135,  
0.8685067508645514,  
0.519063599878773,  
1.1970126362568978,  
0.35376457746361467,  
2.1361591146989944,  
1.704664258187609,  
1.1956277779681033,  
-0.8317273346515459,  
1.1961203419780542,  
0.6738815365004568,  
2.0453196594697167,  
-0.3197500197249862,  
0.3940149430820266,  
-0.03491413991246975,  
1.9231424652296574,  
-0.7553371587587144,  
0.5536882090799309,  
-1.1151355813488422,  
0.06532487835880797,  
-0.03610632383025197,  
-0.721099071948806,  
-0.7712693743746337,  
0.2581737620009136,  
0.6969815452179084,  
-0.4519889309472695,  
-0.6781990341468844,  
0.3896669141200773,  
0.746036455743935,  
0.10534513312025831,  
-0.7953867627526213,  
-0.17196672908166516,  
1.1080637640216904,  
-0.36906579226317304,  
0.3903518027422727,  
0.7340380536410088,  
0.16483545086429002,  
0.12911772875241279,  
-0.11978924907966522,  
-0.5410781247103603,  
0.27894738356501725,  
-0.04603280575778243,  
0.3301412555435043,  
0.020942359039511207,  
-0.535470327679227,  
0.26379415288467284,  
0.7549681986050077,  
-0.774180168996079,  
0.3042677541816752,  
0.2314702730743271,  
0.4347582057672544,  
0.5269984906212896,  
-0.5883800499089586,  
0.4216788732962846,  
-0.39154710450095487,  
-0.20962806789618654,  
0.008988716066278926,  
0.42160932452985955,  
-0.4362625059483254,  
0.7149808650234762,  
-0.9606565556866927,  
0.02867923202735973,

0.6474453926631074,  
0.3125034088891559,  
0.24941070182093517,  
-1.0996459114603814,  
0.42918254303405223,  
1.1958230549534523,  
-0.23035300079654375,  
0.43394127898307777,  
-1.1958360530234091,  
0.2490392548916114,  
0.956337072693143,  
-0.9098880983840639,  
0.24421397010525564,  
0.32228144879356985,  
-0.04019115817841665,  
0.601865593110944,  
-1.0390070893344725,  
-0.3870853595246112,  
1.5254374970388465,  
-0.06482825900051802,  
1.508536156596221,  
-0.4193438972827081,  
-0.2124704995099638,  
0.7982743594716017,  
0.625924999124879,  
-1.2144964531756246,  
-0.7306315051046057,  
-1.3775043670320717,  
-0.5254300493631905,  
0.24182169388976885,  
0.05618119509583439,  
-1.1649033986061088,  
0.4414909596355956,  
1.1243259379005652,  
0.9623501696515389,  
-1.0198159738874641,  
0.6746700507964939,  
0.9071271136722682,  
-1.490119256375095,  
-1.8915932031257203,  
1.4861820000050194,  
0.020835967248483293,  
0.2672579153437498,  
1.1487299094399863,  
1.7394956603554965,  
2.161406077992875],  
[ 0.009700543149373924,  
0.009700543149373951,  
0.00970054314937392,  
1.382070146567131,  
1.7587904521787645,  
2.560406827400793,  
3.0924393369175114,  
3.3853584719898073,  
3.3853584719898073,  
3.3855655528609647,  
3.9151369396989866,  
3.9151369396989866,  
5.054043379727587,  
5.058642146366078,  
6.082229999853835,  
6.348636465887238,  
6.754028454322125,  
6.777976106859175,  
7.783524996765277,  
7.783524996765276,  
7.783524996765276,  
7.995280883445485,  
7.995280883445485,  
8.645089634948334,  
8.925040343314908,  
9.356899631457969,  
9.439062141544271,  
9.717990345174004,  
9.717990345174004,

10.595210012065888,  
0.8074121230882934,  
-0.11817978440691497,  
2.3039735343549332,  
-2.1294851108225332,  
0.6714134591558454,  
0.45516684502263977,  
-0.8318799457604262,  
-1.6937930072137053,  
0.039287662842651484,  
0.5223639661903685,  
-1.2122069881806565,  
0.27186944236208743,  
0.22304871394760792,  
-0.08855679301585977,  
1.1988033553075006,  
-0.9660581453773212,  
1.393585655420428,  
0.524497607950108,  
-0.22549193465024678,  
-0.20940428560116026,  
-0.22546417020605838,  
-0.06641646114084936,  
0.3531991811801793,  
-0.06811222553567531,  
1.0762936524340476,  
0.17762298521732672,  
-0.24437612021854904,  
-1.0622868736463833,  
0.41092319903165814,  
-0.5877006275418265,  
1.2299752305066975,  
-1.5519910987794148,  
0.6657478217748831,  
-0.027661876184918333,  
0.011781258679136937,  
0.9082970931589502,  
0.006644189925206108,  
0.3712893817061966,  
-0.04659784477089089,  
0.2991695519878787,  
1.4480032246106211,  
0.3765628272855095,  
0.3810659512210775,  
-0.4053198419433054,  
-0.06957688452126994,  
0.08768201200938007,  
-0.16514507742174195,  
0.05923670456485792,  
-1.0025267882306543,  
-0.041476053822733706,  
0.4728058870419665,  
-0.09799142504381375,  
-0.642516889827151,  
-0.521645479249954,  
0.18062390558973918,  
-0.5137105837376863,  
0.315588961893638,  
1.0102820620809385,  
-1.412161058774387,  
0.5136468128759858,  
-0.5616754178138471,  
0.11099281329082958,  
-0.4065421947836274,  
-0.8520422495977672,  
1.5662481725135406,  
-2.09542418518098,  
1.2116955825236206,  
0.8221816705323761,  
0.041900809919046114,  
-0.09736226691448804,  
-0.6600925025551557,  
-1.1656564284287168,  
0.8214103261157102,  
0.28477271669010623,

```
0.5992804506866763,
-0.21193327493741926,
0.6490050812244267,
0.8872065875645788,
0.2758198961026023,
-0.3259804283588707,
0.5954957550354935,
0.8064107897831347,
0.15673794452304002,
-0.5606863141571317,
1.1354810000650886,
0.29170605524887394,
-0.6471431342469229,
-0.29364595444579666,
0.05289373230476578,
0.03489286830366231,
-0.10405686076243598,
0.4547289014370767,
-0.1747513431047453,
-0.28439942445332933,
0.010516254927139741,
0.11813385237732216,
0.3966163987420368,
-1.37250350754582,
0.06601400397758364,
-0.3662241908629097,
-0.07601408247331909,
1.737776242565087,
2.1849230369400683,
-0.5785032754175823,
-0.5063968590594791,
-0.23335270192508997,
2.320012252653636,
0.6182382779358941,
0.7875200859675175,
-0.009873677663214134,
0.7482624361366613,
-0.35875384806276184,
-0.5357091554695692,
0.4397736267416906,
0.16706548411788932,
0.9251966251074774,
0.053252937203382235,
-0.23592171730002592,
1.2877035765438765,
2.1426518726936172]],
'run_time_sec': 43067.655497312546}}],
'redundant': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': { 'max': 10.0,
'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.6189603325174557,
0.7142372255934472,
0.818217611349809,
1.1433975540074377,
1.9121137997887092,
1.912113799788709,
1.9189666863881127,
2.194219841514053,
```

2.734492156740232,  
4.250258815642276,  
4.250258815642276,  
5.774076859791501,  
6.527612880112256,  
6.532834731882501,  
8.049613322901676,  
8.049613322901676,  
8.050730377555883,  
8.561643142317116,  
8.561643142317116,  
8.758357012835646,  
8.758357012835646,  
8.78353884989931,  
9.477076383056275,  
9.536600626467342,  
9.536600626467342,  
9.536600626467342,  
10.241295505019522,  
10.318321333031077,  
10.579129354925781,  
10.82886994059623,  
3.662494394083504,  
0.08309129295248968,  
1.5295376506525808,  
-1.5964000102221196,  
1.8988970610647178,  
-0.07218621526676876,  
0.7238532160702689,  
-1.2917423920622229,  
1.8532222971765195,  
-0.40818119715800666,  
0.469598065996274,  
-1.2652675561295137,  
0.41465882817859046,  
0.48683539382624846,  
-0.15336518315146752,  
-1.6419783820068856,  
1.2136622236743368,  
0.5933123377118196,  
0.9666225223219593,  
0.9539776194708611,  
-0.3793986531891993,  
-0.2570964298405315,  
1.5884302353807402,  
0.19867970725527498,  
1.0036205245072367,  
-1.7266220384949087,  
0.6519864384701275,  
0.173373648086925,  
1.8697046853700252,  
0.5263944462203128,  
2.9785129063723943,  
-0.5937256494260224,  
0.22753174799850245,  
0.24918335157216837,  
1.5438671949833176,  
-0.2981477150404249,  
-0.0503664733834821,  
0.542442835193611,  
1.8096859498837612,  
-2.2260935596321993,  
0.28693396030012636,  
0.9986781622414097,  
-0.01940263773226835,  
-1.8805315707929653,  
-0.1513202473661221,  
0.1836836320118686,  
-0.5655439481125303,  
-0.30323205019871646,  
-0.4186198812206128,  
0.2357002564872809,  
2.8296979465953833,  
-1.0776781071762758,  
-0.08378558447273823,

1.7446476514004516,  
-0.4606832586075214,  
-1.762173446350097,  
0.10241780783627007,  
1.6018254886002428,  
0.2621004786967086,  
1.349261138919249,  
0.14987623247602613,  
0.5068543254371847,  
-1.3474781551208477,  
1.0890436270679893,  
1.6662048029626129,  
0.3608718991529565,  
-0.11137748070221386,  
0.5641204379289552,  
2.2546014997074266,  
1.8888740160956543,  
-0.23345107582518032,  
-1.5772444286238798,  
2.1408383357361265,  
-0.4968079560788485,  
0.1533667959779154,  
-0.40238715350257875,  
0.25591729793510365,  
2.947382531044255,  
-0.32162602471486745,  
-0.7587223675916386,  
-0.8983111566200868,  
0.006114119281372181,  
2.9372824954589514,  
0.48288231335139287,  
0.7939297064609614,  
1.9454360656955985,  
2.092519500518508,  
0.8995449331251366,  
0.10171517677156572,  
0.45235144869603666,  
1.02501950409702,  
0.24331156538914245,  
0.48973195386607005,  
2.672871435464254,  
1.313352678455905,  
2.010046934709317,  
-0.42153209835304317,  
-0.13436700176919486,  
-0.6950305532982513,  
0.6026553555930264,  
1.6681913778840949,  
0.4125109526933123,  
0.514533549588801,  
1.0794873063708696,  
-0.9571806916209341,  
0.27630815458061647,  
0.6001387806934945,  
0.5059087494947612,  
-0.5722342732268321,  
0.3986919058890637,  
1.0044202485382987,  
0.3352295947729849,  
1.3777059541173544,  
-2.835684252944388,  
0.6104690716589696,  
1.838086538234438,  
-0.3106134411398272,  
-2.2167272073692903,  
0.10706372359431235,  
-0.17469850626418476]],

'noise\_profile': { 'noise\_on\_init\_param': {

'value':

'status': False,

0},

'noise\_prob': [ 0.001,  
0.001,  
0,  
0],



```

        'status': True,
        'type': 'depolarizing'},
    'nqubits': 7,
    'observable': { 'coefficients': { 'bn': [ 1.0,
        1.0,
        1.0,
        1.0,
        1.0,
        1.0,
        1.0],
        'cn': [ 0.5,
        0.5,
        0.5,
        0.5,
        0.5,
        0.5],
        'r': 1},
        'def': 'ising'},
    'output': { 'draw': { 'fig_dpi': 100,
        'status': False,
        'type': 'png'},
        'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#3'},
    'redundant': { 'identity_factors': [ [0, 0, 0, 0],
        [1, 1, 0, 0],
        [2, 2, 0, 0],
        [3, 3, 0, 0]]},
    'run': 'redundant',
    'state': 'dmatrix',
    'vqe': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
        'constraint': True,
        'status': False}},
    'zne': { 'data_points': None,
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
    'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
        '2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
        '2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
        '4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
        '1 Z 5 + 1 Z 6',
        'time_evolution_gate_hamiltonian_string': [ '0.5 X '
        '0 X 1 '
        '+ 0.5 '
        'Y 0 Y '
        '1 + '
        '0.5 Z '
        '0 Z 1 '
        '+ 0.5 '
        'X 1 X '
        '2 + '
        '0.5 Y '
        '1 Y 2 '
        '+ 0.5 '
        'Z 1 Z '
        '2 + '
        '0.5 X '
        '2 X 3 '
        '+ 0.5 '
        'Y 2 Y '
        '3 + '
        '0.5 Z '
        '2 Z 3 '
        '+ 0.5 '
        'X 3 X '
        '4 + '
        '0.5 Y '
        '3 Y 4 '
        '+ 0.5 '
        'Z 3 Z '
        '4 + '
        '0.5 X '
        '4 X 5 '
        '+ 0.5 '
        'Y 4 Y '
        '5 + '
        '0.5 Z '
        '4 Z 5 '
        '+ 0.5 '
        'X 5 X '
        '6 + '
        '0.5 X '
        '6 X 7 '
        '+ 0.5 '
        'Y 6 Y '
        '7 + '
        '0.5 Z '
        '6 Z 7 '
        '+ 0.5 '
        'X 7 X '
        '8 + '
        '0.5 Y '
        '7 Y 8 '
        '+ 0.5 '
        'Z 7 Z '
        '8 + '
        '0.5 X '
        '8 X 9 '
        '+ 0.5 '
        'Y 8 Y '
        '9 + '
        '0.5 Z '
        '8 Z 9 '
        '+ 0.5 '
        'X 9 X '
        '10 + '
        '0.5 Y '
        '9 Y 10 '
        '+ 0.5 '
        'Z 9 Z '
        '10 + '
        '0.5 X '
        '10 X 11 '
        '+ 0.5 '
        'Y 10 Y '
        '11 + '
        '0.5 Z '
        '10 Z 11 '
        '+ 0.5 '
        'X 11 X '
        '12 + '
        '0.5 Y '
        '11 Y 12 '
        '+ 0.5 '
        'Z 11 Z '
        '12 + '
        '0.5 X '
        '12 X 13 '
        '+ 0.5 '
        'Y 12 Y '
        '13 + '
        '0.5 Z '
        '12 Z 13 '
        '+ 0.5 '
        'X 13 X '
        '14 + '
        '0.5 Y '
        '13 Y 14 '
        '+ 0.5 '
        'Z 13 Z '
        '14 + '
        '0.5 X '
        '14 X 15 '
        '+ 0.5 '
        'Y 14 Y '
        '15 + '
        '0.5 Z '
        '14 Z 15 '
        '+ 0.5 '
        'X 15 X '
        '16 + '
        '0.5 Y '
        '15 Y 16 '
        '+ 0.5 '
        'Z 15 Z '
        '16 + '
        '0.5 X '
        '16 X 17 '
        '+ 0.5 '
        'Y 16 Y '
        '17 + '
        '0.5 Z '
        '16 Z 17 '
        '+ 0.5 '
        'X 17 X '
        '18 + '
        '0.5 Y '
        '17 Y 18 '
        '+ 0.5 '
        'Z 17 Z '
        '18 + '
        '0.5 X '
        '18 X 19 '
        '+ 0.5 '
        'Y 18 Y '
        '19 + '
        '0.5 Z '
        '18 Z 19 '
        '+ 0.5 '
        'X 19 X '
        '20 + '
        '0.5 Y '
        '19 Y 20 '
        '+ 0.5 '
        'Z 19 Z '
        '20 + '
        '0.5 X '
        '20 X 21 '
        '+ 0.5 '
        'Y 20 Y '
        '21 + '
        '0.5 Z '
        '20 Z 21 '
        '+ 0.5 '
        'X 21 X '
        '22 + '
        '0.5 Y '
        '21 Y 22 '
        '+ 0.5 '
        'Z 21 Z '
        '22 + '
        '0.5 X '
        '22 X 23 '
        '+ 0.5 '
        'Y 22 Y '
        '23 + '
        '0.5 Z '
        '22 Z 23 '
        '+ 0.5 '
        'X 23 X '
        '24 + '
        '0.5 Y '
        '23 Y 24 '
        '+ 0.5 '
        'Z 23 Z '
        '24 + '
        '0.5 X '
        '24 X 25 '
        '+ 0.5 '
        'Y 24 Y '
        '25 + '
        '0.5 Z '
        '24 Z 25 '
        '+ 0.5 '
        'X 25 X '
        '26 + '
        '0.5 Y '
        '25 Y 26 '
        '+ 0.5 '
        'Z 25 Z '
        '26 + '
        '0.5 X '
        '26 X 27 '
        '+ 0.5 '
        'Y 26 Y '
        '27 + '
        '0.5 Z '
        '26 Z 27 '
        '+ 0.5 '
        'X 27 X '
        '28 + '
        '0.5 Y '
        '27 Y 28 '
        '+ 0.5 '
        'Z 27 Z '
        '28 + '
        '0.5 X '
        '28 X 29 '
        '+ 0.5 '
        'Y 28 Y '
        '29 + '
        '0.5 Z '
        '28 Z 29 '
        '+ 0.5 '
        'X 29 X '
        '30 + '
        '0.5 Y '
        '29 Y 30 '
        '+ 0.5 '
        'Z 29 Z '
        '30 + '
        '0.5 X '
        '30 X 31 '
        '+ 0.5 '
        'Y 30 Y '
        '31 + '
        '0.5 Z '
        '30 Z 31 '
        '+ 0.5 '
        'X 31 X '
        '32 + '
        '0.5 Y '
        '31 Y 32 '
        '+ 0.5 '
        'Z 31 Z '
        '32 + '
        '0.5 X '
        '32 X 33 '
        '+ 0.5 '
        'Y 32 Y '
        '33 + '
        '0.5 Z '
        '32 Z 33 '
        '+ 0.5 '
        'X 33 X '
        '34 + '
        '0.5 Y '
        '33 Y 34 '
        '+ 0.5 '
        'Z 33 Z '
        '34 + '
        '0.5 X '
        '34 X 35 '
        '+ 0.5 '
        'Y 34 Y '
        '35 + '
        '0.5 Z '
        '34 Z 35 '
        '+ 0.5 '
        'X 35 X '
        '36 + '
        '0.5 Y '
        '35 Y 36 '
        '+ 0.5 '
        'Z 35 Z '
        '36 + '
        '0.5 X '
        '36 X 37 '
        '+ 0.5 '
        'Y 36 Y '
        '37 + '
        '0.5 Z '
        '36 Z 37 '
        '+ 0.5 '
        'X 37 X '
        '38 + '
        '0.5 Y '
        '37 Y 38 '
        '+ 0.5 '
        'Z 37 Z '
        '38 + '
        '0.5 X '
        '38 X 39 '
        '+ 0.5 '
        'Y 38 Y '
        '39 + '
        '0.5 Z '
        '38 Z 39 '
        '+ 0.5 '
        'X 39 X '
        '40 + '
        '0.5 Y '
        '39 Y 40 '
        '+ 0.5 '
        'Z 39 Z '
        '40 + '
        '0.5 X '
        '40 X 41 '
        '+ 0.5 '
        'Y 40 Y '
        '41 + '
        '0.5 Z '
        '40 Z 41 '
        '+ 0.5 '
        'X 41 X '
        '42 + '
        '0.5 Y '
        '41 Y 42 '
        '+ 0.5 '
        'Z 41 Z '
        '42 + '
        '0.5 X '
        '42 X 43 '
        '+ 0.5 '
        'Y 42 Y '
        '43 + '
        '0.5 Z '
        '42 Z 43 '
        '+ 0.5 '
        'X 43 X '
        '44 + '
        '0.5 Y '
        '43 Y 44 '
        '+ 0.5 '
        'Z 43 Z '
        '44 + '
        '0.5 X '
        '44 X 45 '
        '+ 0.5 '
        'Y 44 Y '
        '45 + '
        '0.5 Z '
        '44 Z 45 '
        '+ 0.5 '
        'X 45 X '
        '46 + '
        '0.5 Y '
        '45 Y 46 '
        '+ 0.5 '
        'Z 45 Z '
        '46 + '
        '0.5 X '
        '46 X 47 '
        '+ 0.5 '
        'Y 46 Y '
        '47 + '
        '0.5 Z '
        '46 Z 47 '
        '+ 0.5 '
        'X 47 X '
        '48 + '
        '0.5 Y '
        '47 Y 48 '
        '+ 0.5 '
        'Z 47 Z '
        '48 + '
        '0.5 X '
        '48 X 49 '
        '+ 0.5 '
        'Y 48 Y '
        '49 + '
        '0.5 Z '
        '48 Z 49 '
        '+ 0.5 '
        'X 49 X '
        '50 + '
        '0.5 Y '
        '49 Y 50 '
        '+ 0.5 '
        'Z 49 Z '
        '50 + '
        '0.5 X '
        '50 X 51 '
        '+ 0.5 '
        'Y 50 Y '
        '51 + '
        '0.5 Z '
        '50 Z 51 '
        '+ 0.5 '
        'X 51 X '
        '52 + '
        '0.5 Y '
        '51 Y 52 '
        '+ 0.5 '
        'Z 51 Z '
        '52 + '
        '0.5 X '
        '52 X 53 '
        '+ 0.5 '
        'Y 52 Y '
        '53 + '
        '0.5 Z '
        '52 Z 53 '
        '+ 0.5 '
        'X 53 X '
        '54 + '
        '0.5 Y '
        '53 Y 54 '
        '+ 0.5 '
        'Z 53 Z '
        '54 + '
        '0.5 X '
        '54 X 55 '
        '+ 0.5 '
        'Y 54 Y '
        '55 + '
        '0.5 Z '
        '54 Z 55 '
        '+ 0.5 '
        'X 55 X '
        '56 + '
        '0.5 Y '
        '55 Y 56 '
        '+ 0.5 '
        'Z 55 Z '
        '56 + '
        '0.5 X '
        '56 X 57 '
        '+ 0.5 '
        'Y 56 Y '
        '57 + '
        '0.5 Z '
        '56 Z 57 '
        '+ 0.5 '
        'X 57 X '
        '58 + '
        '0.5 Y '
        '57 Y 58 '
        '+ 0.5 '
        'Z 57 Z '
        '58 + '
        '0.5 X '
        '58 X 59 '
```

```

'Y 4 Y '
'5 + '
'0.5 Z '
'4 Z 5 '
'+ 0.5 '
'X 5 X '
'6 + '
'0.5 Y '
'5 Y 6 '
'+ 0.5 '
'Z 5 Z '
'6']],
'output': { 'data_points': [ [4, 2, 0, 0, -6.218690041461777],
                              [12, 6, 0, 0, -4.805156509769758],
                              [ 20,
                                10,
                                0,
                                0,
                                -3.7079207759854302],
                              [ 28,
                                14,
                                0,
                                0,
                                -2.8469331605050203]]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                     'identity_factors': [ 0,
                                           0,
                                           0,
                                           0],
                     'noise_level': [4, 2, 0, 0],
                     'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],
True,
'depolarizing'},

'status':

'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [ 1,
                      1,
                      0,
                      0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],
True,
'depolarizing'},

'status':

'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [ 2,
                      2,
                      0,
                      0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],
True,
'depolarizing'},

'status':

```

```

'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

True,

'depolarizing'},

'odd_wires': 4}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
                                                                'r': 0},
                          'time': { 'max': 10.0,
                                    'min': 0.0},
                          'type': 'heisenberg'}}},
  'init_param': { 'value': [ 0.05238332857976487,
                             0.05238332857976488,
                             0.05238332857976461,
                             0.5882470284735626,
                             1.6186245942059996,
                             2.2470777294271223,
                             2.8315596913723913,
                             2.8315596913723913,
                             2.8333251330604914,
                             3.7474015252366555,
                             3.7474015252366555,
                             3.7474015252366555,
                             3.7474015252366555,
                             4.452994588443841,
                             4.625910007504636,
                             4.625910007504636,
                             5.314362007876739,
                             7.185299991262795,
                             7.185299991262795,
                             8.165312898322489,
                             8.165312898322489,
                             8.165312898322489,
                             8.684979613482101,
                             9.661121823219345,
                             9.674169964387936,
                             10.525655511340814,
                             10.525655511340814,
                             10.525655511340814,
                             11.154963299169733,
                             11.154963299169733,
                             2.50282655917642,
                             0.9490947670548783,
                             0.70056532212722,

```

-0.9370006834105179,  
2.127395945212884,  
1.5529950009292526,  
-0.5538339242405286,  
-0.45109357069990613,  
3.2608593101153462,  
2.1691098922881027,  
0.924351518772188,  
0.7799372105219657,  
2.588492585292434,  
1.4914484649202893,  
0.5111989894903198,  
-1.6854828839595362,  
0.709524102178921,  
-0.3201993643863164,  
0.37756499567776974,  
0.11160463007405702,  
1.4506751210554825,  
-0.1158349928449886,  
-0.4172082421780774,  
-0.47420587439641587,  
2.1318004152619214,  
1.5026342770773617,  
0.9629412747697549,  
-1.017935070811068,  
2.2274033566257083,  
0.9541631607884562,  
2.2865374842341715,  
-0.6901760390806929,  
1.4488496207691695,  
-0.15529093800821045,  
1.378510821815928,  
-0.1238908488185843,  
1.0420944500710088,  
1.8938950235205334,  
-0.40270933293735856,  
-0.4838468076888962,  
-0.7769068081513464,  
2.0570355933263196,  
0.33843722154840217,  
-0.21296684820549192,  
-0.3087457919151385,  
1.6713665097762895,  
0.7955513549984788,  
-0.5031484152839188,  
0.2783608989762586,  
1.4322280472670237,  
0.12038812465567636,  
0.8648150791824706,  
0.13552183280667268,  
0.07182610915111512,  
0.3477791234991623,  
-0.1584859230597403,  
0.5851519083687279,  
0.578565105996425,  
-1.7921034519484391,  
0.9189192684840749,  
-0.6139572052593133,  
-0.023527142002935514,  
-0.6495330854871428,  
0.7767670181361933,  
0.13616638059771954,  
-0.22568119775616352,  
0.4192866974084779,  
0.1401009023541104,  
1.419355971488301,  
1.1103093112149183,  
-0.8728413553259085,  
1.014691351510677,  
2.35757700845783,  
1.131891326153365,  
-1.2979835358031357,  
0.42365777146015526,  
1.0982786992551208,  
1.698510255572029,

```

1.2090506157632,
-1.3597097700308411,
-0.9049577551064396,
1.0199036275847497,
2.9541844671388584,
-0.42829772740772204,
0.6542829736223691,
3.7916586259391143,
-0.1983670801457003,
0.7855289833525587,
-0.1534574040841844,
1.809122493112309,
0.35293394466185096,
1.0573849517470935,
2.461665111905985,
1.0784030177718114,
-1.585709677044719,
0.8985620342798133,
2.2360691692951646,
0.24022620726925167,
2.6922129347449117,
0.15599094623602128,
2.799936411115923,
0.9657316063780467,
-0.2732772147086647,
-1.448572189075712,
-0.7280589250410919,
0.057973620624421296,
0.9321748335747359,
-1.4338621772181848,
1.3976338029473028,
-0.25504403617708243,
3.210257057781798,
0.03448775329128267,
0.05070056715723011,
-1.3727823101385919,
0.8243579770218447,
0.13142013414460954,
-0.4933237632531999,
1.1105137227416793,
0.7155364379215329,
-0.21063252058278284]],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1}},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#2'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],

```

```
[2, 2, 0, 0],  
[3, 3, 0, 0]]},  
  
    'run': 'redundant',  
    'state': 'dmatrix',  
    'vqe': { 'iteration': 1,  
              'optimization': { 'algorithm': 'SLSQP',  
                                'constraint': True,  
                                'status': False}},  
    'zne': { 'data_points': None,  
             'degree': 0,  
             'method': 'richardson',  
             'sampling': 'default'}},  
    'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '  
               '2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '  
               '2 + 1 X 3 X 4 + 1 Z 3 + 1 X '  
               '4 X 5 + 1 Z 4 + 1 X 5 X 6 + '  
               '1 Z 5 + 1 Z 6',  
    'time_evolution_gate_hamiltonian_string': [ '0.5 X '  
                                                '0 X 1 '  
                                                '+ 0.5 '  
                                                'Y 0 Y '  
                                                '1 + '  
                                                '0.5 Z '  
                                                '0 Z 1 '  
                                                '+ 0.5 '  
                                                'X 1 X '  
                                                '2 + '  
                                                '0.5 Y '  
                                                '1 Y 2 '  
                                                '+ 0.5 '  
                                                'Z 1 Z '  
                                                '2 + '  
                                                '0.5 X '  
                                                '2 X 3 '  
                                                '+ 0.5 '  
                                                'Y 2 Y '  
                                                '3 + '  
                                                '0.5 Z '  
                                                '2 Z 3 '  
                                                '+ 0.5 '  
                                                'X 3 X '  
                                                '4 + '  
                                                '0.5 Y '  
                                                '3 Y 4 '  
                                                '+ 0.5 '  
                                                'Z 3 Z '  
                                                '4 + '  
                                                '0.5 X '  
                                                '4 X 5 '  
                                                '+ 0.5 '  
                                                'Y 4 Y '  
                                                '5 + '  
                                                '0.5 Z '  
                                                '4 Z 5 '  
                                                '+ 0.5 '  
                                                'X 5 X '  
                                                '6 + '  
                                                '0.5 Y '  
                                                '5 Y 6 '  
                                                '+ 0.5 '  
                                                'Z 5 Z '  
                                                '6']},  
    'output': { 'data_points': [ [4, 2, 0, 0, -6.220556999324399],  
                                  [12, 6, 0, 0, -4.682225394272194],  
                                  [20, 10, 0, 0, -3.495398379301583],  
                                  [ 28,  
                                    14,  
                                    0,  
                                    0,  
                                   -2.571924591189056]],  
    'noise_details': [ { 'gates_num': [4, 1, 1, 0],  
                        'identity_factors': [ 0,  
                                              0,  
                                              0,
```

```
'noise_level': [4, 2, 0, 0],
'noise_profile': {

'status':

'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [ 1,
1,
0,
0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {

'status':

'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [ 2,
2,
0,
0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'status':

'type':

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
'identity_factors': [ 3,
3,
0,
0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {

'status':

'type':

'odd_wires': 4}]],
'run_time_sec': 10.564200401306152}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
```

0,  
0],

'cn': [

0.5,  
0.5,  
0.5,  
0.5,  
0.5,  
0.5],

'r': 0},  
'time': { 'max': 10.0,  
          'min': 0.0},  
          'type': 'heisenberg'}},  
'init\_param': { 'value': [ 0.12420123662801165,  
                            0.138246244841176,  
                            0.34185010800102933,  
                            0.8771280515547424,  
                            0.8771280515547423,  
                            1.9326762312100456,  
                            1.9326762312100456,  
                            2.879806034127527,  
                            3.4467495190209787,  
                            3.460588109395402,  
                            3.4605881093954016,  
                            3.4605881093954016,  
                            3.911934955717517,  
                            3.9564836804547703,  
                            4.188240551814426,  
                            5.098640553346409,  
                            5.098640553346409,  
                            5.098640553346408,  
                            6.466332587579958,  
                            7.457565848827182,  
                            7.712724508543908,  
                            7.890302861063261,  
                            7.898577524812402,  
                            8.020037295803547,  
                            8.020037295803547,  
                            9.289723192898348,  
                            9.68251578824504,  
                            9.68251578824504,  
                            10.66694519433398,  
                            11.464898013549973,  
                            1.8095532965205083,  
                            -1.6633278493215808,  
                            -1.2281091611401596,  
                            -0.40155726479865544,  
                            1.7903243850816337,  
                            0.18661159996017582,  
                            1.2217850039169107,  
                            -0.48128156078104645,  
                            1.438546033666569,  
                            -0.9466383819139143,  
                            -0.2179227006066069,  
                            -0.07921201994836616,  
                            0.6692914930417907,  
                            -0.16791294486623565,  
                            -0.3278463005181308,  
                            1.2883193159418245,  
                            1.9001761172388045,  
                            0.7646920019853412,  
                            -0.6325477821570596,  
                            -0.5987552945744136,  
                            0.5669730115381587,  
                            0.5983941343774113,  
                            -0.06179171362000896,  
                            -0.6867235859693906,  
                            0.5211737756628548,  
                            -0.19354588250953578,  
                            0.6072816218147872,  
                            0.3472677197742769,  
                            -0.08031734075212016,  
                            1.4024126217748347,  
                            -0.5867181790012919,  
                            0.809620813948269,



0.35997425529443994,  
-0.8722967249300235,  
-0.5874818244923429,  
-0.5567926036837068,  
-0.6652314874983639,  
-0.6042054992483096,  
-0.13918430829641074,  
-0.08277488470584692,  
-0.4972293169762719,  
-0.4421668735352916,  
0.6160601456858428,  
-1.1972657609969646,  
-1.1558488364748807,  
-1.4501782622641872,  
0.03989088007781949,  
-0.8684923327267209,  
-0.5569704341339503,  
0.15823054121075,  
0.6345578215095505,  
0.3601853745371903,  
-0.42594808878819745,  
0.08979804115834313,  
-0.153043281560756,  
-0.603228229875778,  
-1.1264410002736531,  
0.6895580235946861,  
-0.11045941959152497,  
0.5174109375139814,  
1.3269460586908306,  
-0.3852298542423827,  
-2.4120095755015893,  
0.08807412161753436,  
0.1228551365077638,  
-0.6982591234727157,  
-1.1618488040328845,  
2.5586909942385017,  
-0.24921574033555105,  
-1.9870969070050777,  
-1.0279498295884981,  
-0.7796802357622239,  
0.48428681889730063,  
0.7162815161060118,  
-0.15547297036103372,  
1.0522591887013215,  
1.772822944479854,  
-0.2654037211186137,  
-0.2720110866721671,  
-0.03929478442656517,  
0.34606077605631835,  
0.5533331494282367,  
1.0574846609095763,  
-0.5747611578732846,  
0.4916772893793279,  
0.9875709691916216,  
-0.17857479553023695,  
-1.147281220275154,  
0.37370382177065037,  
2.456815155407461,  
0.6567596591037266,  
0.9507316292553318,  
1.5113928877114242,  
1.8380989093110256,  
-0.1736919900840187,  
-1.2666253947041328,  
-0.554819304070435,  
1.1931643666366285,  
0.4614862178419797,  
1.2040726557184918,  
0.3083618234293392,  
-0.4066692475369416,  
0.3740368412278018,  
-1.684611974494111,  
-0.8650016725760176,  
-1.4838330341878547,  
-0.14344887350922086,

```

4.203596189627334,
1.1133202614474196,
1.391124117957397,
1.8627332105499828,
-0.28192336755973296,
-1.5416482647725873,
-1.9612892990030817,
0.8836928087418303,
0.300761821046295,
0.6785848024508535,
-0.5500277556546446,
0.5742776326882599,
-1.181756808209963]],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#5'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
'2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
'2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
'4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
'1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X '
'0 X 1 '
'+ 0.5 '
'Y 0 Y '
'1 + '
'0.5 Z '
'0 Z 1 '
'+ 0.5 '
'X 1 X '
'2 + '
'0.5 Y '
'1 Y 2 '

```

```

        '+ 0.5 '
        'Z 1 Z '
        '2 + '
        '0.5 X '
        '2 X 3 '
        '+ 0.5 '
        'Y 2 Y '
        '3 + '
        '0.5 Z '
        '2 Z 3 '
        '+ 0.5 '
        'X 3 X '
        '4 + '
        '0.5 Y '
        '3 Y 4 '
        '+ 0.5 '
        'Z 3 Z '
        '4 + '
        '0.5 X '
        '4 X 5 '
        '+ 0.5 '
        'Y 4 Y '
        '5 + '
        '0.5 Z '
        '4 Z 5 '
        '+ 0.5 '
        'X 5 X '
        '6 + '
        '0.5 Y '
        '5 Y 6 '
        '+ 0.5 '
        'Z 5 Z '
        '6']],
'output': { 'data_points': [ [4, 2, 0, 0, -5.814676484708359],
                             [12, 6, 0, 0, -4.248447309496402],
                             [ 20,
                              10,
                              0,
                              0,
                              -3.0694027528903187],
                             [ 28,
                              14,
                              0,
                              0,
                              -2.174125329701547]]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                     'identity_factors': [ 0,
                                           0,
                                           0,
                                           0],
                     'noise_level': [4, 2, 0, 0],
                     'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

'status':

True,

'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [ 1,
                       1,
                       0,
                       0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,

```

```

0],

True,

'depolarizing'},

'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

True,

'depolarizing'},

'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

True,

'depolarizing'},

'odd_wires': 4}},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [ 2,
                       2,
                       0,
                       0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {

'status':

'type':

'odd_wires': 4}},
{ 'gates_num': [28, 7, 1, 0],
  'identity_factors': [ 3,
                       3,
                       0,
                       0],
  'noise_level': [28, 14, 0, 0],
  'noise_profile': {

'status':

'type':

'odd_wires': 4}},
'run_time_sec': 10.139310121536255}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [

0.5,
0.5,
0.5,
0.5,
0.5,
0.5],

'r': 0},
'time': { 'max': 10.0,
          'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.43940602753254654,
                           0.4524980474487914,
                           0.6462847510297367,
                           0.6535145711164267,
                           0.7019965052930044,
                           1.0830061860275473,
                           1.4380021973026182,
                           2.1860837771467474,
                           2.1860837771467474,
                           2.1860837771467474,
                           2.4875804812430995,
                           2.911818356328843,

```

4.9134595358452735,  
5.043089843653786,  
5.994354774193697,  
6.658321281734746,  
6.666230857319696,  
8.458454027735183,  
8.458454027735183,  
8.458454027735183,  
8.938931772570164,  
8.938931772570164,  
9.876451730548837,  
9.876451730548837,  
10.140618079102744,  
10.453495471248813,  
10.878653713196195,  
11.282429749250388,  
11.726474998572407,  
11.93229290545428,  
2.9640535214497064,  
-0.6206168106317247,  
-0.4035747848788786,  
-2.067222048924027,  
2.0576259596946604,  
1.364315765000901,  
-0.1480698866383175,  
-1.95043906046908,  
0.7897528850889669,  
1.350582507885341,  
-0.3349044763190947,  
-2.3429833820345465,  
2.04351680973891,  
0.8083219796841106,  
-0.06520770630024467,  
-0.8776318722364843,  
2.4862506381076748,  
0.8345121096737285,  
-0.03071661620417745,  
-0.6225183255138825,  
0.7450777062518694,  
0.12619297185303674,  
0.15620862918286052,  
-0.47540100870445906,  
0.6345315438244892,  
1.451076347224231,  
0.10985833383721234,  
-1.6475696409761669,  
1.1918822544398533,  
1.3235539868194213,  
-0.24222060474147966,  
0.2418944215339802,  
1.0397651583041008,  
1.6773252160624976,  
0.16975786500059598,  
-0.9211027317156172,  
0.7590471244619662,  
1.76540125315151,  
2.43856734239768,  
-0.19488067618654012,  
0.8462629124439717,  
0.9979674075340036,  
2.5775834810620677,  
0.5650956422366618,  
-0.5475934153287456,  
-0.0253449469292375,  
1.2524069066350432,  
-0.605696708865831,  
0.7019502861337156,  
0.2803153244338447,  
-1.0831925759777479,  
1.0082140101851143,  
-0.3762046176346905,  
-0.9535933533256993,  
-1.0422804614435257,  
0.13948594332192887,  
0.5835070530053111,

```

0.16086524965091817,
0.06403444071667018,
-0.06194188553710435,
-0.4026223625881385,
0.2750028468648149,
0.6789909068622377,
0.05162849323802493,
-0.7735332926339995,
-0.14862918062202837,
0.7661757453229759,
-0.16119730427373616,
0.6482389226852195,
3.1459456036848104,
-0.4760920139337192,
1.6197254159790668,
-0.5506328506738539,
0.9968299487743895,
-0.3106735286083523,
-1.2388662013594425,
0.8898580979157581,
0.43256773745092003,
-0.7272220041247079,
0.8716071923554094,
1.5193589139179793,
0.9787540447681606,
-1.4044929205930872,
-0.1984876316951887,
-0.46744984056178585,
-0.7765225748074835,
0.04344696088727837,
0.32373965212791267,
0.9049555024172572,
0.7139278873651953,
-0.8122282267372439,
0.5323405298774778,
-0.08437719753251166,
-0.14277007957413837,
0.7912147308716768,
0.26055493673650715,
0.11357082745857092,
0.3153698930365579,
3.1981441448638614,
0.32109035951393206,
-0.23017443442945684,
0.0316864124540797,
0.20875812581978664,
0.5466872162452653,
1.2918521189433907,
-0.7312547980705957,
1.4958457475939604,
-0.053193686203739404,
-0.4437772137226961,
-0.5271126400646005,
2.5136810835026426,
0.6674244883024821,
-1.0140291771816496,
-1.177197116527103,
2.058315434744553,
0.050372102721390984,
-0.09022974351195023,
-2.296438941834702,
0.3261688389091777,
0.3072223897800251}],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,

```

```

1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#1'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
'2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
'2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
'4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
'1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X '
'0 X 1 '
'+ 0.5 '
'Y 0 Y '
'1 + '
'0.5 Z '
'0 Z 1 '
'+ 0.5 '
'X 1 X '
'2 + '
'0.5 Y '
'1 Y 2 '
'+ 0.5 '
'Z 1 Z '
'2 + '
'0.5 X '
'2 X 3 '
'+ 0.5 '
'Y 2 Y '
'3 + '
'0.5 Z '
'2 Z 3 '
'+ 0.5 '
'X 3 X '
'4 + '
'0.5 Y '
'3 Y 4 '
'+ 0.5 '
'Z 3 Z '
'4 + '
'0.5 X '
'4 X 5 '
'+ 0.5 '
'Y 4 Y '
'5 + '
'0.5 Z '
'4 Z 5 '

```

```

'+ 0.5 '
'X 5 X '
'6 + '
'0.5 Y '
'5 Y 6 '
'+ 0.5 '
'Z 5 Z '
'6']],
'output': { 'data_points': [ [4, 2, 0, 0, -5.966837375471956],
                              [12, 6, 0, 0, -4.6298501952375855],
                              [ 20,
                                10,
                                0,
                                0,
                                -3.5807206753108622],
                              [ 28,
                                14,
                                0,
                                0,
                                -2.750174370397261]],
  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                       'identity_factors': [ 0,
                                              0,
                                              0,
                                              0],
                       'noise_level': [4, 2, 0, 0],
                       'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                 0.001,
                 0,
                 0],

'status':

True,

'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [ 1,
                        1,
                        0,
                        0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'status':

True,

'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [ 2,
                        2,
                        0,
                        0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                 0.001,
                 0,
                 0],

'status':

True,

'type':

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],

```



```

'identity_factors': [ 3,
                      3,
                      0,
                      0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

True,

'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 10.158948183059692}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],

'r': 0},
'time': { 'max': 10.0,
          'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ -2.397634216504411e-17,
                            1.429450133825379e-17,
                            0.9192297980258759,
                            0.9192297980258759,
                            2.8984599305110854,
                            3.1993874679766523,
                            3.199387467976652,
                            3.715279848679994,
                            3.715919998165357,
                            5.126008182976459,
                            5.749875525815113,
                            5.785995839176617,
                            5.785995839176617,
                            5.785995839176617,
                            5.785995839176617,
                            6.315437962379428,
                            6.678845841951143,
                            7.3578167224936415,
                            7.415694801781823,
                            7.531263738212295,
                            7.949087697575632,
                            7.949087697575632,
                            8.111169110068786,
                            9.407094598577077,
                            9.495286031274873,
                            9.495286031274873,
                            10.993257661103009,
                            11.063439993331317,
                            11.639888600691357,
                            11.75175692668691,
                            2.1152038588685538,
                            -0.7839988468841306,
                            -1.0579861702584952,
                            -0.5122509123294313,
                            1.0012369417099964,
                            0.9275037440003397,
                            0.5343037326701707,

```

-0.014459274586663672,  
2.31692048955396,  
2.1400689678453872,  
-0.9468421716760329,  
1.3225342455296385,  
2.4229762260600483,  
1.4561600175543838,  
-0.4592924007287594,  
0.6389204073366491,  
0.5578650700802136,  
1.458345504678432,  
-0.11931303728638508,  
0.04406428844113783,  
-0.26144087074192934,  
0.6459890964472403,  
1.2243061606997268,  
0.09770103868863204,  
0.23645607828472368,  
0.3280111145811677,  
0.5390648705936556,  
-0.6034481934191781,  
-1.1942560416831098,  
0.3295059316644399,  
-0.0732996553139216,  
0.5043071925129845,  
0.7399437462813884,  
0.3595686242698361,  
1.4643835231854074,  
-0.1697776944282527,  
0.2588380732750666,  
0.44311592273109757,  
-0.6031987466514527,  
-0.06131410155451245,  
-0.3299395710828798,  
-0.45492250592824107,  
0.5555861976799495,  
1.1612177689175078,  
1.833550163228831,  
1.5629483318007886,  
-0.2455585474033218,  
-0.4534768786824923,  
-1.2225865843307935,  
0.20468879325769473,  
1.3398561861341207,  
-0.58709602862573,  
0.07181500566168061,  
0.17010271339345,  
0.36406988692952136,  
-1.689809967880289,  
-1.1677426672173294,  
-0.7977758879892671,  
0.531032719362766,  
-1.7722607960867016,  
0.6332033998224597,  
0.6669814362912183,  
0.218182728116887,  
1.0415656581640258,  
-1.4544893086294475,  
0.5175174925258392,  
-0.9742907090362619,  
-0.30648595673224416,  
1.2400541074634985,  
-0.30003161306087445,  
-0.14406503395842435,  
-0.43061285539013316,  
0.6914697219419143,  
-0.48545379734819916,  
-0.2166375004086177,  
1.2014709434123243,  
1.0734635496959384,  
0.43666289070672293,  
-0.9550440807047608,  
1.2817732673505913,  
0.6254203972471953,  
0.8730111716749767,

```

1.1814458389257443,
-0.5855214911540807,
0.33647224367417283,
0.914891547403245,
-0.10924028322724566,
0.6731472714644756,
-0.8672547313943412,
-1.1628903969680444,
1.2968110405185924,
-0.7478342770444015,
1.0157432273471354,
0.05866260951598884,
0.1549884083832883,
2.402954000164725,
-0.8510405490988947,
-0.13394876321797194,
0.35128800256256376,
0.03985349181110424,
1.0891408951797659,
0.49683980443602116,
1.3618410332836905,
0.31089249400158553,
0.007823999182329802,
-1.0325531315281817,
-0.13635517978577905,
-0.4783006843261583,
-0.9648987725589863,
-0.4094326055257113,
0.0620151507481985,
-0.3631850012398663,
-0.9119123598789223,
-0.3458539889181142,
0.8501459643039054,
1.6461875633189593,
0.08799287143090098,
-0.82318299513447,
1.17289644669955,
-0.9455811832961388]],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#4'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'status': False,
0},

```

```
'vqe': { 'iteration': 1,  
        'optimization': { 'algorithm': 'SLSQP',  
                           'constraint': True,  
                           'status': False}},  
  
    'zne': { 'data_points': None,  
            'degree': 0,  
            'method': 'richardson',  
            'sampling': 'default'}}},  
  
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '  
          '2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '  
          '2 + 1 X 3 X 4 + 1 Z 3 + 1 X '  
          '4 X 5 + 1 Z 4 + 1 X 5 X 6 + '  
          '1 Z 5 + 1 Z 6',  
  
    'time_evolution_gate_hamiltonian_string': [ '0.5 X '  
          '0 X 1 '  
          '+ 0.5 '  
          'Y 0 Y '  
          '1 + '  
          '0.5 Z '  
          '0 Z 1 '  
          '+ 0.5 '  
          'X 1 X '  
          '2 + '  
          '0.5 Y '  
          '1 Y 2 '  
          '+ 0.5 '  
          'Z 1 Z '  
          '2 + '  
          '0.5 X '  
          '2 X 3 '  
          '+ 0.5 '  
          'Y 2 Y '  
          '3 + '  
          '0.5 Z '  
          '2 Z 3 '  
          '+ 0.5 '  
          'X 3 X '  
          '4 + '  
          '0.5 Y '  
          '3 Y 4 '  
          '+ 0.5 '  
          'Z 3 Z '  
          '4 + '  
          '0.5 X '  
          '4 X 5 '  
          '+ 0.5 '  
          'Y 4 Y '  
          '5 + '  
          '0.5 Z '  
          '4 Z 5 '  
          '+ 0.5 '  
          'X 5 X '  
          '6 + '  
          '0.5 Y '  
          '5 Y 6 '  
          '+ 0.5 '  
          'Z 5 Z '  
          '6']},  
  
'output': { 'data_points': [ [4, 2, 0, 0, -6.241465922765086],  
                              [12, 6, 0, 0, -4.714681794898787],  
                              [ 20,  
                                10,  
                                0,  
                                0,  
                                -3.5395259571477817],  
                              [ 28,  
                                14,  
                                0,  
                                0,  
                                -2.627473806451929]],  
  
    'noise_details': [ { 'gates_num': [4, 1, 1, 0],  
                        'identity_factors': [ 0,  
                                              0,  
                                              0,  
                                              0]
```

[illegible]

0,  
0],

'cn': [

0.5,  
0.5,  
0.5,  
0.5,  
0.5,  
0.5],

'r': 0},  
'time': { 'max': 10.0,  
          'min': 0.0},  
          'type': 'heisenberg'}}},  
'init\_param': { 'value': [ 0.16477895719846114,  
                            0.16477895719846108,  
                            0.7183189156962347,  
                            1.8697093861419474,  
                            2.105082615571597,  
                            3.05308344502201,  
                            4.199393321043376,  
                            4.199393321043376,  
                            4.199393321043375,  
                            6.490210948425593,  
                            6.4902109484255925,  
                            6.490210948425593,  
                            6.4902109484255925,  
                            6.4902109484255925,  
                            6.490210948425593,  
                            6.882554174728105,  
                            6.882554174728105,  
                            6.882554174728105,  
                            6.882554174728104,  
                            6.8877583035732775,  
                            6.8877583035732775,  
                            6.8877583035732775,  
                            6.8877583035732775,  
                            8.21014824639056,  
                            8.21014824639056,  
                            9.071469420716642,  
                            9.120928605341893,  
                            9.714944098401723,  
                            11.474131735950095,  
                            11.474131735950095,  
                            11.794551582273902,  
                            1.341188628911811,  
                            1.6554894539990426,  
                            -2.1068974621953425,  
                            -1.4171475675653578,  
                            0.33211669069513333,  
                            0.11331792925356984,  
                            -1.3610911099963097,  
                            0.46439741779020816,  
                            0.9313501387866817,  
                            1.0938593094543279,  
                            -0.3591727738608774,  
                            -0.4732622270970327,  
                            1.6321598874818157,  
                            -0.2782091348514778,  
                            -1.0526781349295347,  
                            0.0708703831522549,  
                            2.6982701224663113,  
                            -0.038867313655444914,  
                            -0.10508583152652556,  
                            -0.40759365792756236,  
                            0.6284849004330764,  
                            0.5192751929971827,  
                            -1.6282040637266806,  
                            0.0014422433007245106,  
                            -1.8299719264591412,  
                            2.3182597876656823,  
                            0.8875167319646391,  
                            1.5664268415036142,  
                            1.5052778791259855,  
                            2.935955436800565,  
                            1.533101581959507,  
                            1.8091829332960188,

0.45080966818917967,  
0.1506883627647002,  
-0.6843548866459184,  
-0.5544883854492364,  
1.2466562002431278,  
-1.1866110136199353,  
1.4521358231995756,  
-1.125608676420736,  
-0.24054383618816966,  
-0.058272145415006006,  
0.410408128597049,  
-1.6441753460137252,  
0.4019816715685168,  
0.4588365987304068,  
1.354346078964423,  
-1.7153251360741875,  
-1.1039978646265602e-06,  
0.7940670488104785,  
0.17979772520560053,  
-0.24385394325110826,  
0.6367160741723578,  
0.8500459957371875,  
0.0559416907316065,  
0.32418668587130467,  
-1.4797636873635434,  
0.11902177942387202,  
0.5185165439317966,  
-0.08399222686641401,  
0.8650918037299421,  
1.4911587670088011,  
0.12792248933645675,  
0.3372262149750348,  
-0.6553154954729696,  
1.1995792367396254,  
0.5132294030998703,  
0.44835115860783636,  
-0.37116980512777586,  
0.7805194563374558,  
-0.854334789795377,  
0.5008527672922033,  
-0.2302685629030402,  
0.6145182391921147,  
-0.6575500079215796,  
0.8657035637529482,  
1.1874516653159721,  
-0.16284802367068918,  
-0.26462171656665856,  
-0.9815102056659819,  
0.23198397744948207,  
-1.087097195512072,  
0.6616385654966559,  
-0.2929637257774683,  
0.03471390505932934,  
0.2048751570049573,  
0.9170017118070749,  
0.39617956766989404,  
0.12006199846995962,  
0.1922705913940127,  
0.8784478594386566,  
0.055479957240883566,  
-0.6634105431569992,  
1.0742951419164057,  
-0.37818200958777604,  
0.28548758229245597,  
-0.6594827056613419,  
1.0235832498557866,  
-0.19428253177041227,  
-0.5531991468121416,  
-1.189626464718852,  
0.2519110119226656,  
-0.6708462316627377,  
2.7994352657547057,  
-3.8764436680175813,  
0.5152327138619494,  
-0.3749347648847944,

```

2.9042167722097862,
1.1265965037549552,
-1.850959186134046,
2.165374611027145,
0.8818414791702859,
1.5039524911129019,
0.06564767423285973,
0.6486215314149069,
-0.08854143781823305,
1.8396223528529987,
-0.00792246728000446,
2.8805879469479487,
3.6337353861266473]],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1}},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
'2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
'2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
'4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
'1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X '
'0 X 1 '
'+ 0.5 '
'Y 0 Y '
'1 + '
'0.5 Z '
'0 Z 1 '
'+ 0.5 '
'X 1 X '
'2 + '
'0.5 Y '
'1 Y 2 '

```



```

        '+ 0.5 '
        'Z 1 Z '
        '2 + '
        '0.5 X '
        '2 X 3 '
        '+ 0.5 '
        'Y 2 Y '
        '3 + '
        '0.5 Z '
        '2 Z 3 '
        '+ 0.5 '
        'X 3 X '
        '4 + '
        '0.5 Y '
        '3 Y 4 '
        '+ 0.5 '
        'Z 3 Z '
        '4 + '
        '0.5 X '
        '4 X 5 '
        '+ 0.5 '
        'Y 4 Y '
        '5 + '
        '0.5 Z '
        '4 Z 5 '
        '+ 0.5 '
        'X 5 X '
        '6 + '
        '0.5 Y '
        '5 Y 6 '
        '+ 0.5 '
        'Z 5 Z '
        '6']],
'output': { 'data_points': [ [4, 2, 0, 0, -5.966171999362981],
                             [12, 6, 0, 0, -4.491721403204036],
                             [ 20,
                              10,
                              0,
                              0,
                              -3.3646330706171934],
                             [ 28,
                              14,
                              0,
                              0,
                              -2.4951156781776946]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                     'identity_factors': [ 0,
                                           0,
                                           0,
                                           0],
                     'noise_level': [4, 2, 0, 0],
                     'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

'status':

True,

'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [ 1,
                       1,
                       0,
                       0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,

```

```

0],

True,

'depolarizing'},

'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

True,

'depolarizing'},

'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

True,

'depolarizing'},

'odd_wires': 4}},
{ 'config': { 'run_time_sec': 10.855527877807617}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': { 'max': 10.0,
          'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.4022850038273885,
                           0.4222288083135141,
                           0.7644599371513524,
                           0.7900179023917507,
                           1.1026508993249646,
                           1.1630326759467198,
                           1.1630326759467198,
                           1.2119340062926192,
                           1.9859325565890973,
                           1.985932556589097,
                           2.096166401632718,
                           3.378647998605865,

```

3.378647998605865,  
3.378647998605865,  
4.354848115861854,  
6.006218342726225,  
6.006218342726225,  
6.009974297352436,  
8.225327865566033,  
8.242093148909708,  
9.222354355246733,  
9.369468664000962,  
9.432712219232048,  
9.692289963799956,  
9.692829942577658,  
10.391360826688166,  
10.391360826688166,  
10.529867035412478,  
10.529867035412478,  
11.06290493838992,  
2.9062307172979733,  
-1.7788694936155562,  
-0.1145266982224492,  
-0.9311559923392093,  
0.9691998209476543,  
1.7463479137973288,  
-0.7663862807329105,  
-0.9694574896037749,  
2.8979112386638413,  
1.1400097878698292,  
0.8096361549155084,  
-1.5900494197653285,  
0.09829667109053167,  
0.31839493135320834,  
0.3886777840539921,  
0.12229184789371997,  
1.7250225844898464,  
1.0065795676456808,  
1.4535641205083867,  
-0.3486770669120958,  
0.2556790893233589,  
1.778531141883236,  
0.269972269049403,  
1.0155903957099945,  
0.8041163886037216,  
0.5381821926966456,  
-0.30108604163317454,  
0.6396533041678052,  
2.1819991440037696,  
1.4978086658278347,  
2.5181040929106753,  
0.4624415671193703,  
-0.17701736987873673,  
0.6910098122382194,  
2.947172461882987,  
-1.0727539032453073,  
0.4023854197196741,  
1.650490750838525,  
0.9313998963798695,  
-0.6769162055305248,  
-0.5620785927454173,  
-0.20885673940707247,  
2.5019757090972443,  
-0.37561416876024456,  
-0.9329392032282731,  
0.7818961506889994,  
0.44350434198669075,  
-0.10644929099379355,  
-2.498928032568615,  
-1.2046085786256906,  
-0.06365416567297402,  
0.17257236645054272,  
1.2516209341031546,  
-0.3591527663232026,  
0.46789807326225935,  
0.24374638092155315,  
0.02110383811013195,

```

0.12714835746845662,
-0.5505736947218767,
-0.03497727012222505,
-2.2168334497478877,
-0.21485512988314215,
1.7552902914988067,
0.6189795903733311,
0.3191491062237487,
0.522632432692797,
-1.1121089236913335,
1.1371618962620422,
-0.2410043783817164,
0.24168543661014927,
0.39418565996934685,
1.2107667809264395,
2.398781467533486,
0.6948257569073976,
0.6170229142231725,
0.7050419245924102,
1.768546262611762,
1.5562956304120967,
-0.4269237214365518,
0.6302835616447369,
1.7710848704009405,
1.2281100264507194,
1.5036530549577243,
-0.7435268012971183,
0.7613541379199313,
0.8523298100708424,
-0.6655959646469325,
1.1543911681084875,
2.2675628634479494,
1.0299985170060308,
1.400963430022522,
0.27759304330136975,
0.6960561589746208,
-0.4210335016880339,
0.0336463669485127,
-2.099660094290342,
0.6674819238895001,
0.5049668435179431,
0.48001405045948287,
1.3574871122533543,
-2.2986993170736225,
9.601426007351498e-05,
1.3312470798272018,
0.7582238004326416,
-0.35033967277151296,
-0.4108552112493075,
0.1982910129710702,
0.6700017270602091,
0.26559360983179486,
-0.14563210230012705,
-0.39610135234418875,
1.1727729846793147,
0.6713573564879365,
0.8527070052929181,
0.8268283343075853,
2.2918575835381745,
0.5082103460913493,
1.8600493489550152,
0.49576811175353974,
2.232387985311215]},
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,

```

```

1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
'2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
'2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
'4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
'1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X '
'0 X 1 '
'+ 0.5 '
'Y 0 Y '
'1 + '
'0.5 Z '
'0 Z 1 '
'+ 0.5 '
'X 1 X '
'2 + '
'0.5 Y '
'1 Y 2 '
'+ 0.5 '
'Z 1 Z '
'2 + '
'0.5 X '
'2 X 3 '
'+ 0.5 '
'Y 2 Y '
'3 + '
'0.5 Z '
'2 Z 3 '
'+ 0.5 '
'X 3 X '
'4 + '
'0.5 Y '
'3 Y 4 '
'+ 0.5 '
'Z 3 Z '
'4 + '
'0.5 X '
'4 X 5 '
'+ 0.5 '
'Y 4 Y '
'5 + '
'0.5 Z '
'4 Z 5 '

```

```

+ 0.5 '
X 5 X '
6 + '
0.5 Y '
5 Y 6 '
+ 0.5 '
Z 5 Z '
'6']],
'output': { 'data_points': [ [4, 2, 0, 0, -5.743389283741309],
[12, 6, 0, 0, -4.3560016590478785],
[ 20,
10,
0,
0,
-3.2776401801937793],
[28, 14, 0, 0, -2.43192951997479]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [ 0,
0,
0,
0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {

'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],

'status':

'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [ 1,
1,
0,
0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {

'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],

'status':

'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [ 2,
2,
0,
0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],

'status':

'type':

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
'identity_factors': [ 3,
3,
0,
0],

```

```

'noise_level': [28, 14, 0, 0],
'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],

True,

'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 10.1181058883667}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],

'init_param': { 'value': [ 0.11853625011402234,
                           0.11853625011402236,
                           1.1173235551611367,
                           1.7342580765110573,
                           1.7342580765110573,
                           2.108144483620023,
                           3.054129947242328,
                           3.054129947242328,
                           3.054129947242328,
                           3.056306360633301,
                           4.638414750363569,
                           5.0621851887275495,
                           5.7503913724004905,
                           5.774998407238176,
                           6.917933224474368,
                           6.917933224474368,
                           8.061549209526286,
                           8.061549209526286,
                           8.061549209526286,
                           8.591251503132888,
                           8.591251503132888,
                           9.051235537435975,
                           9.081856762230144,
                           9.467876152039107,
                           9.545932016874406,
                           9.591419209848118,
                           10.465616352275608,
                           10.465616352275608,
                           10.465735173309618,
                           10.980942228105905,
                           2.0734674059611633,
                           0.32892201175743896,
                           -0.007356440825095051,
                           0.7856576253246221,
                           2.089457548986907,
                           0.7744884921126718,
                           -0.35049309306395837,
                           -0.6556831494452968,
                           2.0369525201874903,
                           0.4739652080570001,
                           -0.8564345639983049,

```

1.25716179603495,  
1.7181260437331554,  
2.3978160665502384,  
1.1152024575020885,  
-1.3335737674295711,  
0.016650799076572978,  
1.6607129762234538,  
0.648059834763191,  
0.2438725527060928,  
-0.27307896000752346,  
1.4369017198677916,  
3.5672448343800007,  
-0.5379702113035718,  
-0.7420664562717484,  
-0.529699891930992,  
0.7301471483152846,  
0.781913925757813,  
0.6004078048346045,  
1.7324865479818374,  
0.4548236607944829,  
-1.4419813608219112,  
-0.684662976785234,  
0.8455512814500156,  
1.97751114408285,  
-0.833202517811791,  
1.110524460863052,  
2.6403320691876733,  
-0.3129427957408566,  
-0.06674204626492235,  
0.5842857778318762,  
-0.21132485649138796,  
-0.011842019288790376,  
-0.25743970610802486,  
0.7486616881233721,  
-0.1302029141156864,  
0.09497091477412227,  
-0.3715265429351211,  
0.39570077921274605,  
0.28643868832003017,  
0.7848413456471106,  
-0.7157146817058562,  
0.09411764456438232,  
-0.10910076647953601,  
1.1262761892344808,  
-0.27334997823872975,  
-0.44027652197942063,  
0.6740415100156434,  
-0.336256645457715,  
0.4268157265313067,  
-0.8611696251566416,  
-0.34560928156726306,  
0.5618074077714486,  
0.5866360379174992,  
1.8662876827821717,  
2.21592310898005,  
1.972223656383108,  
1.6141187926643297,  
0.856255815565121,  
-0.34275929095614754,  
-1.0642528745182613,  
-1.0618686751734654,  
0.2379582550153795,  
-0.6501770361983872,  
-0.19408645485522444,  
1.501330829125914,  
1.5726602727591479,  
0.7066066097903853,  
-1.4580936665368467,  
0.46940440748349077,  
-0.1287015677341077,  
-0.9805925033056946,  
-0.3754741669636888,  
-0.026817919501009202,  
1.1067346586651607,  
0.17547923725022047,



```

0.8902143171896091,
-0.22777698610446503,
0.8082253583749343,
-1.0674083601412958,
-0.022706971436593337,
0.34227899244110566,
1.3527736523760083,
2.0767841716125894,
0.5778568145668401,
-0.6555502504392442,
1.2670274746873995,
0.507694022232518,
-0.2629991187543805,
1.7048253080726326,
1.4088065522309612,
2.823918413203317,
1.2763232744235296,
-1.4348344213353486,
-0.605496445996402,
0.09645158262695042,
0.024639736182597342,
0.23997550724405606,
0.9979895378690888,
-0.40612123795993227,
1.826790650755685,
0.029599395583551916,
-0.4592861834683686,
0.0328358806035505,
1.3612120706287358,
0.8210402794880411,
0.05688164146575431,
0.03152531580318861,
2.0316547976974904,
2.795039607579165]],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#10'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'status': False,
0},

```

```

'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
                                   '2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
                                   '2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
                                   '4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
                                   '1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X '
                                                         '0 X 1 '
                                                         '+ 0.5 '
                                                         'Y 0 Y '
                                                         '1 + '
                                                         '0.5 Z '
                                                         '0 Z 1 '
                                                         '+ 0.5 '
                                                         'X 1 X '
                                                         '2 + '
                                                         '0.5 Y '
                                                         '1 Y 2 '
                                                         '+ 0.5 '
                                                         'Z 1 Z '
                                                         '2 + '
                                                         '0.5 X '
                                                         '2 X 3 '
                                                         '+ 0.5 '
                                                         'Y 2 Y '
                                                         '3 + '
                                                         '0.5 Z '
                                                         '2 Z 3 '
                                                         '+ 0.5 '
                                                         'X 3 X '
                                                         '4 + '
                                                         '0.5 Y '
                                                         '3 Y 4 '
                                                         '+ 0.5 '
                                                         'Z 3 Z '
                                                         '4 + '
                                                         '0.5 X '
                                                         '4 X 5 '
                                                         '+ 0.5 '
                                                         'Y 4 Y '
                                                         '5 + '
                                                         '0.5 Z '
                                                         '4 Z 5 '
                                                         '+ 0.5 '
                                                         'X 5 X '
                                                         '6 + '
                                                         '0.5 Y '
                                                         '5 Y 6 '
                                                         '+ 0.5 '
                                                         'Z 5 Z '
                                                         '6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.2813019572269795],
                              [12, 6, 0, 0, -4.778373581659957],
                              [ 20,
                                10,
                                0,
                                0,
                                -3.6190179833186162],
                              [ 28,
                                14,
                                0,
                                0,
                                -2.7162489715378166]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                  'identity_factors': [ 0,
                                                         0,
                                                         0,
                                                         0],
                                  'noise_level': [4, 2, 0, 0],
                                  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

```

[illegible]

0.5,  
0.5,  
0.5,  
0.5,  
0.5],

```
                                'r': 0},  
    'time': { 'max': 10.0,  
              'min': 0.0},  
    'type': 'heisenberg'}},  
    'init_param': { 'value': [ -1.8784742854218807e-17,  
                                -7.763750530158576e-17,  
                                0.3802827375258553,  
                                0.44096449652630626,  
                                0.8040692975576897,  
                                1.9224694434519336,  
                                1.9224694434519338,  
                                1.9224694434519336,  
                                1.9224694434519336,  
                                1.9224694434519336,  
                                1.9224694434519338,  
                                2.730288811725591,  
                                4.476350841356259,  
                                4.476350841356259,  
                                4.476350841356259,  
                                6.331658137341824,  
                                6.331658137341824,  
                                6.7621011201584285,  
                                6.77851096220289,  
                                7.490043179529316,  
                                7.490043179529316,  
                                7.490043179529316,  
                                7.490043179529316,  
                                7.511664240193972,  
                                8.302259372586072,  
                                8.36899822047307,  
                                8.607405767895836,  
                                9.631163052898822,  
                                9.874876363637043,  
                                10.225975825453373,  
                                2.711573403856553,  
                                0.20239905137011172,  
                                -0.4220883549830381,  
                                -0.8404830976891227,  
                                1.794332340210785,  
                                1.5095243517856047,  
                                0.22326098118939897,  
                                0.07733371735403745,  
                                1.280548885023134,  
                                1.4121496210624682,  
                                0.9815935680907694,  
                                -2.975348552150871,  
                                1.6316643284140941,  
                                0.8239502945369961,  
                                0.0314505340316768,  
                                -1.0892891749800817,  
                                1.720694113273713,  
                                0.6634696927679957,  
                                -0.836512780686814,  
                                -1.1286873737196692,  
                                -0.09500137106776224,  
                                1.0428135848317974,  
                                -0.4828772957450712,  
                                -1.129334172148368,  
                                0.7253737318795237,  
                                1.4108675361353635,  
                                0.7588540034470418,  
                                -0.5039485441412638,  
                                0.10346857579652805,  
                                1.2668095290766983,  
                                0.7994757345637048,  
                                -0.7393240316081237,  
                                -0.7818304990031031,  
                                0.25375980918776664,  
                                2.228975199542585,  
                                2.2487625387645873,
```

0.6384105819815235,  
0.39434544396871446,  
1.3679129840939837,  
-0.27336699910726836,  
1.3170761670781417,  
1.1159622861844822,  
1.176824183488981,  
0.40583799697229034,  
0.8786168217534174,  
0.2914083315983707,  
-0.8464697846173548,  
-0.032455291822620566,  
-2.0755386823554396,  
-0.11439663923099666,  
0.7312672791487281,  
0.4263196833485598,  
0.11802610051350722,  
1.0445881812565523,  
-1.9566462184988007,  
0.9492303984073598,  
-1.7129593951518396,  
-0.3230601534209437,  
0.3161713641922788,  
-0.4811213940350071,  
0.08327140785409295,  
0.37526634808329173,  
-1.9990814349080968,  
-0.15397700748904192,  
-0.9549084255901845,  
1.1120455683467105,  
-0.42952128451280097,  
0.17929609797141985,  
1.0446016069356951,  
0.846774755857218,  
-0.2784586201121851,  
0.23000407229986752,  
-0.9198047598183884,  
0.996529675185623,  
0.34608382599103005,  
0.5099375110708237,  
2.1948932092248885,  
1.3625694142279887,  
-0.9306056124011278,  
0.6012804875871011,  
-0.7788968212470156,  
-1.5884735532174328,  
1.0361309111992296,  
0.015937704739038126,  
1.4003797043998856,  
2.429422654005534,  
-0.27504014116509645,  
0.8256449732433587,  
1.2146087003914199,  
-0.6435553984602482,  
0.3046269503778821,  
1.0182549333954134,  
1.4202224852266074,  
1.3511302325707892,  
-0.7261672378416364,  
1.5992752660640235,  
-0.5764295578986515,  
-0.8318409785507642,  
1.1375736468462807,  
0.8529850561064739,  
0.9553972898831558,  
-0.09161160854677679,  
1.617622889574723,  
1.4551513261723394,  
-0.08817813881493969,  
0.8045852859105778,  
1.9892741470924016,  
1.8347816167556374,  
-0.8050652823779443,  
0.008511392950551585,  
2.1460096989270747,

```

0.49277581514942953,
-2.4311684786278165,
0.5134791015266132,
0.9751974520662461,
-0.38582649358518695,
0.7746227771853464,
1.7307944301597258,
2.1320333699599043,
1.1654652968447545}],
'noise_profile': { 'noise_on_init_param': {
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#7'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
'2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
'2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
'4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
'1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X '
'0 X 1 '
'+ 0.5 '
'Y 0 Y '
'1 + '
'0.5 Z '
'0 Z 1 '
'+ 0.5 '
'X 1 X '
'2 + '
'0.5 Y '
'1 Y 2 '
'+ 0.5 '
'Z 1 Z '
'2 + '
'0.5 X '

```

```

'2 X 3 '
'+ 0.5 '
'Y 2 Y '
'3 + '
'0.5 Z '
'2 Z 3 '
'+ 0.5 '
'X 3 X '
'4 + '
'0.5 Y '
'3 Y 4 '
'+ 0.5 '
'Z 3 Z '
'4 + '
'0.5 X '
'4 X 5 '
'+ 0.5 '
'Y 4 Y '
'5 + '
'0.5 Z '
'4 Z 5 '
'+ 0.5 '
'X 5 X '
'6 + '
'0.5 Y '
'5 Y 6 '
'+ 0.5 '
'Z 5 Z '
'6']],
'output': { 'data_points': [ [4, 2, 0, 0, -5.9667914171586585],
[12, 6, 0, 0, -4.541488857163632],
[ 20,
10,
0,
0,
-3.4337943886777844],
[ 28,
14,
0,
0,
-2.564526423455772]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [ 0,
0,
0,
0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status':
True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [ 1,
1,
0,
0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status':
True,
'type':
'depolarizing'},
'odd_wires': 4}

```

'depolarizing'},

'noise\_on\_init\_param': { 'status': False,  
                          'value': 0},  
'noise\_prob': [ 0.001,  
                0.001,  
                0,  
                0],

True,

'depolarizing'},

'noise\_on\_init\_param': { 'status': False,  
                          'value': 0},  
'noise\_prob': [ 0.001,  
                0.001,  
                0,  
                0],

True,

'depolarizing'},

0.5,  
0.5,  
0.5,  
0.5,  
0.5,  
0.5],

'odd\_wires': 4},  
{ 'gates\_num': [20, 5, 1, 0],  
  'identity\_factors': [ 2,  
                        2,  
                        0,  
                        0],  
  'noise\_level': [20, 10, 0, 0],  
  'noise\_profile': {

'status':

'type':

'odd\_wires': 4},  
{ 'gates\_num': [28, 7, 1, 0],  
  'identity\_factors': [ 3,  
                        3,  
                        0,  
                        0],  
  'noise\_level': [28, 14, 0, 0],  
  'noise\_profile': {

'status':

'type':

'odd\_wires': 4}},  
  'run\_time\_sec': 10.504075527191162}},  
{ 'config': { 'ansatz': { 'gateset': 1,  
                          'layer': 30,  
                          'ugate': { 'coefficients': { 'bn': [ 0,  
  0,  
  0,  
  0,  
  0,  
  0,  
  0],  
                                  'cn': [

'r': 0},  
  'time': { 'max': 10.0,  
            'min': 0.0},  
  'type': 'heisenberg'}}},  
'init\_param': { 'value': [ 0.38848003251483587,  
                            0.3884800325148359,  
                            1.2841735835398218,  
                            1.284173583539822,  
                            1.2841735835398218,  
                            1.818138220668234,  
                            1.818138220668234,  
                            2.7575469841005327,  
                            2.7575469841005327,  
                            2.7575469841005327,  
                            3.0053468968599275,  
                            3.0053468968599275,  
                            3.005346896859927,  
                            4.184079661691832,  
                            4.83635165164968,  
                            4.83635165164968,



5.97926077140412,  
6.458805266455043,  
6.513102391504654,  
6.513102391504654,  
7.122105903846713,  
7.2188422331450415,  
7.988590448127284,  
8.268095077127937,  
8.268095077127937,  
9.164456488648115,  
9.164456488648115,  
9.782953992889732,  
9.782953992889732,  
10.467486029517685,  
1.5496959718296535,  
-1.0300437645832343,  
0.425343365508412,  
-1.7136674729251273,  
0.33645197441382346,  
0.2288357961575219,  
0.10470230685228102,  
-0.6612661793744108,  
0.11823315872480306,  
0.48571962162230753,  
-1.3748501535311368,  
0.2563120795974374,  
-0.38871520150353267,  
-0.18786175076151226,  
1.0017996241286973,  
0.05598903629217323,  
1.501328526357405,  
-0.32299727271195017,  
0.5715295079657807,  
-0.12201961934486968,  
2.2747823054657927,  
0.16289086097520028,  
0.027619518366160244,  
-0.10165606616500937,  
-0.06321979816820887,  
-0.27543819802246033,  
-0.0048370064103128475,  
0.1330138167350915,  
-0.06428151371988705,  
0.21905201010909556,  
0.25697175483980955,  
-1.462905966720411,  
0.8014511304369155,  
3.456137165485204,  
-0.3560002683832885,  
-0.4886877133354182,  
0.32039145066707037,  
1.6153352350920127,  
0.5940099487759896,  
0.18140087044059483,  
0.27123106498617,  
0.7444341922951362,  
0.170480557625751,  
-0.4688462519246396,  
0.5235839184929864,  
-0.5470964469389679,  
-0.011921500492307424,  
1.4116230981753706,  
0.49972453659747124,  
-0.7800673920851233,  
0.4234227404504273,  
-0.2071635265929523,  
0.14064328933496192,  
-1.2007096247825992,  
0.12047098237640114,  
-0.4125103841815656,  
1.0447620953563077,  
0.0020814149928196773,  
0.4988991062112368,  
-0.34495773827123155,  
-0.12849063482979717,



```

1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#6'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
'2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
'2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
'4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
'1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X '
'0 X 1 '
'+ 0.5 '
'Y 0 Y '
'1 + '
'0.5 Z '
'0 Z 1 '
'+ 0.5 '
'X 1 X '
'2 + '
'0.5 Y '
'1 Y 2 '
'+ 0.5 '
'Z 1 Z '
'2 + '
'0.5 X '
'2 X 3 '
'+ 0.5 '
'Y 2 Y '
'3 + '
'0.5 Z '
'2 Z 3 '
'+ 0.5 '
'X 3 X '
'4 + '
'0.5 Y '
'3 Y 4 '
'+ 0.5 '
'Z 3 Z '
'4 + '
'0.5 X '
'4 X 5 '
'+ 0.5 '
'Y 4 Y '
'5 + '
'0.5 Z '
'4 Z 5 '
'+ 0.5 '
'X 5 X '
'6 + '
'0.5 Y '

```

```

'5 Y 6 '
'+ 0.5 '
'Z 5 Z '
'6']],
'output': { 'data_points': [ [4, 2, 0, 0, -6.144691518305653],
[12, 6, 0, 0, -4.667338994079639],
[20, 10, 0, 0, -3.522600808002957],
[ 28,
14,
0,
0,
-2.628229437680454]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [ 0,
0,
0,
0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status':
True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [ 1,
0,
0,
0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status':
True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [ 2,
2,
0,
0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status':
True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
'identity_factors': [ 3,
3,
0,
0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},

```

```

'noise_prob': [ 0.001,
0.001,
0,
0],

True,

'depolarizing'},

'odd_wires': 4]],
'run_time_sec': 10.210347890853882}}],
'vqe': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}}},
'init_param': {'value': 'random'},
'noise_profile': { 'noise_on_init_param': { 'status':
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': True,
'type': 'png'},
'file_name_prefix':
'heisenberg_noise_free_time_evo'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0]]},
'run': 'vqe',
'state': 'dmatrix',
'vqe': { 'iteration': 10,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': True}},
'zne': { 'data_points': None,
'degree': 1,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 '
'+ 0.5 Y 0 Y '
'1 + 0.5 Z 0

```

```
'optimized_parameters': [ [ 0.43940602753254654,  
0.4524980474487914,  
0.6462847510297367,  
0.6535145711164267,  
0.7019965052930044,  
1.0830061860275473,  
1.4380021973026182,  
2.1860837771467474,  
2.1860837771467474,  
2.1860837771467474,  
2.4875804812430995,  
2.911818356328843,  
4.9134595358452735,  
5.043089843653786,  
5.994354774193697,  
6.658321281734746,  
6.666230857319696,  
8.458454027735183,  
8.458454027735183,  
8.458454027735183,
```

8.938931772570164,  
8.938931772570164,  
9.876451730548837,  
9.876451730548837,  
10.140618079102744,  
10.453495471248813,  
10.878653713196195,  
11.282429749250388,  
11.726474998572407,  
11.93229290545428,  
2.9640535214497064,  
-0.6206168106317247,  
-0.4035747848788786,  
-2.067222048924027,  
2.0576259596946604,  
1.364315765000901,  
-0.1480698866383175,  
-1.95043906046908,  
0.7897528850889669,  
1.350582507885341,  
-0.3349044763190947,  
-2.3429833820345465,  
2.04351680973891,  
0.8083219796841106,  
-0.06520770630024467,  
-0.8776318722364843,  
2.4862506381076748,  
0.8345121096737285,  
-0.03071661620417745,  
-0.6225183255138825,  
0.7450777062518694,  
0.12619297185303674,  
0.15620862918286052,  
-0.47540100870445906,  
0.6345315438244892,  
1.451076347224231,  
0.10985833383721234,  
-1.6475696409761669,  
1.1918822544398533,  
1.3235539868194213,  
-0.24222060474147966,  
0.2418944215339802,  
1.0397651583041008,  
1.6773252160624976,  
0.16975786500059598,  
-0.9211027317156172,  
0.7590471244619662,  
1.76540125315151,  
2.43856734239768,  
-0.19488067618654012,  
0.8462629124439717,  
0.9979674075340036,  
2.5775834810620677,  
0.5650956422366618,  
-0.5475934153287456,  
-0.0253449469292375,  
1.2524069066350432,  
-0.605696708865831,  
0.7019502861337156,  
0.2803153244338447,  
-1.0831925759777479,  
1.0082140101851143,  
-0.3762046176346905,  
-0.9535933533256993,  
-1.0422804614435257,  
0.13948594332192887,  
0.5835070530053111,  
0.16086524965091817,  
0.06403444071667018,  
-0.06194188553710435,  
-0.4026223625881385,  
0.2750028468648149,  
0.6789909068622377,  
0.05162849323802493,  
-0.7735332926339995,

-0.14862918062202837,  
0.7661757453229759,  
-0.16119730427373616,  
0.6482389226852195,  
3.1459456036848104,  
-0.4760920139337192,  
1.6197254159790668,  
-0.5506328506738539,  
0.9968299487743895,  
-0.3106735286083523,  
-1.2388662013594425,  
0.8898580979157581,  
0.43256773745092003,  
-0.7272220041247079,  
0.8716071923554094,  
1.5193589139179793,  
0.9787540447681606,  
-1.4044929205930872,  
-0.1984876316951887,  
-0.46744984056178585,  
-0.7765225748074835,  
0.04344696088727837,  
0.32373965212791267,  
0.9049555024172572,  
0.7139278873651953,  
-0.8122282267372439,  
0.5323405298774778,  
-0.08437719753251166,  
-0.14277007957413837,  
0.7912147308716768,  
0.26055493673650715,  
0.11357082745857092,  
0.3153698930365579,  
3.1981441448638614,  
0.32109035951393206,  
-0.23017443442945684,  
0.0316864124540797,  
0.20875812581978664,  
0.5466872162452653,  
1.2918521189433907,  
-0.7312547980705957,  
1.4958457475939604,  
-0.053193686203739404,  
-0.4437772137226961,  
-0.5271126400646005,  
2.5136810835026426,  
0.6674244883024821,  
-1.0140291771816496,  
-1.177197116527103,  
2.058315434744553,  
0.050372102721390984,  
-0.09022974351195023,  
-2.296438941834702,  
0.3261688389091777,  
0.3072223897800251],  
[ 0.05238332857976487,  
0.05238332857976488,  
0.05238332857976461,  
0.5882470284735626,  
1.6186245942059996,  
2.2470777294271223,  
2.8315596913723913,  
2.8315596913723913,  
2.8333251330604914,  
3.7474015252366555,  
3.7474015252366555,  
3.7474015252366555,  
3.7474015252366555,  
4.452994588443841,  
4.625910007504636,  
4.625910007504636,  
5.314362007876739,  
7.185299991262795,  
7.185299991262795,  
8.165312898322489,



8.165312898322489,  
8.165312898322489,  
8.684979613482101,  
9.661121823219345,  
9.674169964387936,  
10.525655511340814,  
10.525655511340814,  
10.525655511340814,  
11.154963299169733,  
11.154963299169733,  
2.50282655917642,  
0.9490947670548783,  
0.70056532212722,  
-0.9370006834105179,  
2.127395945212884,  
1.5529950009292526,  
-0.5538339242405286,  
-0.45109357069990613,  
3.2608593101153462,  
2.1691098922881027,  
0.924351518772188,  
0.7799372105219657,  
2.588492585292434,  
1.4914484649202893,  
0.5111989894903198,  
-1.6854828839595362,  
0.709524102178921,  
-0.3201993643863164,  
0.37756499567776974,  
0.11160463007405702,  
1.4506751210554825,  
-0.1158349928449886,  
-0.4172082421780774,  
-0.47420587439641587,  
2.1318004152619214,  
1.5026342770773617,  
0.9629412747697549,  
-1.017935070811068,  
2.2274033566257083,  
0.9541631607884562,  
2.2865374842341715,  
-0.6901760390806929,  
1.4488496207691695,  
-0.15529093800821045,  
1.378510821815928,  
-0.1238908488185843,  
1.0420944500710088,  
1.8938950235205334,  
-0.40270933293735856,  
-0.4838468076888962,  
-0.7769068081513464,  
2.0570355933263196,  
0.33843722154840217,  
-0.21296684820549192,  
-0.3087457919151385,  
1.6713665097762895,  
0.7955513549984788,  
-0.5031484152839188,  
0.2783608989762586,  
1.4322280472670237,  
0.12038812465567636,  
0.8648150791824706,  
0.13552183280667268,  
0.07182610915111512,  
0.3477791234991623,  
-0.1584859230597403,  
0.5851519083687279,  
0.578565105996425,  
-1.7921034519484391,  
0.9189192684840749,  
-0.6139572052593133,  
-0.023527142002935514,  
-0.6495330854871428,  
0.7767670181361933,  
0.13616638059771954,

-0.22568119775616352,  
0.4192866974084779,  
0.1401009023541104,  
1.419355971488301,  
1.1103093112149183,  
-0.8728413553259085,  
1.014691351510677,  
2.35757700845783,  
1.131891326153365,  
-1.2979835358031357,  
0.42365777146015526,  
1.0982786992551208,  
1.698510255572029,  
1.2090506157632,  
-1.3597097700308411,  
-0.9049577551064396,  
1.0199036275847497,  
2.9541844671388584,  
-0.42829772740772204,  
0.6542829736223691,  
3.7916586259391143,  
-0.1983670801457003,  
0.7855289833525587,  
-0.1534574040841844,  
1.809122493112309,  
0.35293394466185096,  
1.0573849517470935,  
2.461665111905985,  
1.0784030177718114,  
-1.585709677044719,  
0.8985620342798133,  
2.2360691692951646,  
0.24022620726925167,  
2.6922129347449117,  
0.15599094623602128,  
2.799936411115923,  
0.9657316063780467,  
-0.2732772147086647,  
-1.448572189075712,  
-0.7280589250410919,  
0.057973620624421296,  
0.9321748335747359,  
-1.4338621772181848,  
1.3976338029473028,  
-0.25504403617708243,  
3.210257057781798,  
0.03448775329128267,  
0.05070056715723011,  
-1.3727823101385919,  
0.8243579770218447,  
0.13142013414460954,  
-0.4933237632531999,  
1.1105137227416793,  
0.7155364379215329,  
-0.21063252058278284],  
[ 0.6189603325174557,  
0.7142372255934472,  
0.818217611349809,  
1.1433975540074377,  
1.9121137997887092,  
1.912113799788709,  
1.9189666863881127,  
2.194219841514053,  
2.734492156740232,  
4.250258815642276,  
4.250258815642276,  
5.774076859791501,  
6.527612880112256,  
6.532834731882501,  
8.049613322901676,  
8.049613322901676,  
8.050730377555883,  
8.561643142317116,  
8.561643142317116,  
8.758357012835646,

8.758357012835646,  
8.78353884989931,  
9.477076383056275,  
9.536600626467342,  
9.536600626467342,  
9.536600626467342,  
10.241295505019522,  
10.318321333031077,  
10.579129354925781,  
10.82886994059623,  
3.662494394083504,  
0.08309129295248968,  
1.5295376506525808,  
-1.5964000102221196,  
1.8988970610647178,  
-0.07218621526676876,  
0.7238532160702689,  
-1.2917423920622229,  
1.8532222971765195,  
-0.40818119715800666,  
0.469598065996274,  
-1.2652675561295137,  
0.41465882817859046,  
0.48683539382624846,  
-0.15336518315146752,  
-1.6419783820068856,  
1.2136622236743368,  
0.5933123377118196,  
0.9666225223219593,  
0.9539776194708611,  
-0.3793986531891993,  
-0.2570964298405315,  
1.5884302353807402,  
0.19867970725527498,  
1.0036205245072367,  
-1.7266220384949087,  
0.6519864384701275,  
0.173373648086925,  
1.8697046853700252,  
0.5263944462203128,  
2.9785129063723943,  
-0.5937256494260224,  
0.22753174799850245,  
0.24918335157216837,  
1.5438671949833176,  
-0.2981477150404249,  
-0.0503664733834821,  
0.542442835193611,  
1.8096859498837612,  
-2.2260935596321993,  
0.28693396030012636,  
0.9986781622414097,  
-0.01940263773226835,  
-1.8805315707929653,  
-0.1513202473661221,  
0.1836836320118686,  
-0.5655439481125303,  
-0.30323205019871646,  
-0.4186198812206128,  
0.2357002564872809,  
2.8296979465953833,  
-1.0776781071762758,  
-0.08378558447273823,  
1.7446476514004516,  
-0.4606832586075214,  
-1.762173446350097,  
0.10241780783627007,  
1.6018254886002428,  
0.2621004786967086,  
1.349261138919249,  
0.14987623247602613,  
0.5068543254371847,  
-1.3474781551208477,  
1.0890436270679893,  
1.6662048029626129,

0.3608718991529565,  
-0.11137748070221386,  
0.5641204379289552,  
2.2546014997074266,  
1.8888740160956543,  
-0.23345107582518032,  
-1.5772444286238798,  
2.1408383357361265,  
-0.4968079560788485,  
0.1533667959779154,  
-0.40238715350257875,  
0.25591729793510365,  
2.947382531044255,  
-0.32162602471486745,  
-0.7587223675916386,  
-0.8983111566200868,  
0.006114119281372181,  
2.9372824954589514,  
0.48288231335139287,  
0.7939297064609614,  
1.9454360656955985,  
2.092519500518508,  
0.8995449331251366,  
0.10171517677156572,  
0.45235144869603666,  
1.02501950409702,  
0.24331156538914245,  
0.48973195386607005,  
2.672871435464254,  
1.313352678455905,  
2.010046934709317,  
-0.42153209835304317,  
-0.13436700176919486,  
-0.6950305532982513,  
0.6026553555930264,  
1.6681913778840949,  
0.4125109526933123,  
0.514533549588801,  
1.0794873063708696,  
-0.9571806916209341,  
0.27630815458061647,  
0.6001387806934945,  
0.5059087494947612,  
-0.5722342732268321,  
0.3986919058890637,  
1.0044202485382987,  
0.3352295947729849,  
1.3777059541173544,  
-2.835684252944388,  
0.6104690716589696,  
1.838086538234438,  
-0.3106134411398272,  
-2.2167272073692903,  
0.10706372359431235,  
-0.17469850626418476],  
[ -2.397634216504411e-17,  
1.429450133825379e-17,  
0.9192297980258759,  
0.9192297980258759,  
2.8984599305110854,  
3.1993874679766523,  
3.199387467976652,  
3.715279848679994,  
3.715919998165357,  
5.126008182976459,  
5.749875525815113,  
5.785995839176617,  
5.785995839176617,  
5.785995839176617,  
5.785995839176617,  
6.315437962379428,  
6.678845841951143,  
7.3578167224936415,  
7.415694801781823,  
7.531263738212295,

7.949087697575632,  
7.949087697575632,  
8.111169110068786,  
9.407094598577077,  
9.495286031274873,  
9.495286031274873,  
10.993257661103009,  
11.063439993331317,  
11.639888600691357,  
11.75175692668691,  
2.1152038588685538,  
-0.7839988468841306,  
-1.0579861702584952,  
-0.5122509123294313,  
1.0012369417099964,  
0.9275037440003397,  
0.5343037326701707,  
-0.014459274586663672,  
2.31692048955396,  
2.1400689678453872,  
-0.9468421716760329,  
1.3225342455296385,  
2.4229762260600483,  
1.4561600175543838,  
-0.4592924007287594,  
0.6389204073366491,  
0.5578650700802136,  
1.458345504678432,  
-0.11931303728638508,  
0.04406428844113783,  
-0.26144087074192934,  
0.6459890964472403,  
1.2243061606997268,  
0.09770103868863204,  
0.23645607828472368,  
0.3280111145811677,  
0.5390648705936556,  
-0.6034481934191781,  
-1.1942560416831098,  
0.3295059316644399,  
-0.0732996553139216,  
0.5043071925129845,  
0.7399437462813884,  
0.3595686242698361,  
1.4643835231854074,  
-0.1697776944282527,  
0.2588380732750666,  
0.44311592273109757,  
-0.6031987466514527,  
-0.06131410155451245,  
-0.3299395710828798,  
-0.45492250592824107,  
0.5555861976799495,  
1.1612177689175078,  
1.833550163228831,  
1.5629483318007886,  
-0.2455585474033218,  
-0.4534768786824923,  
-1.2225865843307935,  
0.20468879325769473,  
1.3398561861341207,  
-0.58709602862573,  
0.07181500566168061,  
0.17010271339345,  
0.36406988692952136,  
-1.689809967880289,  
-1.1677426672173294,  
-0.7977758879892671,  
0.531032719362766,  
-1.7722607960867016,  
0.6332033998224597,  
0.6669814362912183,  
0.218182728116887,  
1.0415656581640258,  
-1.4544893086294475,

0.5175174925258392,  
-0.9742907090362619,  
-0.30648595673224416,  
1.2400541074634985,  
-0.30003161306087445,  
-0.14406503395842435,  
-0.43061285539013316,  
0.6914697219419143,  
-0.48545379734819916,  
-0.2166375004086177,  
1.2014709434123243,  
1.0734635496959384,  
0.43666289070672293,  
-0.9550440807047608,  
1.2817732673505913,  
0.6254203972471953,  
0.8730111716749767,  
1.1814458389257443,  
-0.5855214911540807,  
0.33647224367417283,  
0.914891547403245,  
-0.10924028322724566,  
0.6731472714644756,  
-0.8672547313943412,  
-1.1628903969680444,  
1.2968110405185924,  
-0.7478342770444015,  
1.0157432273471354,  
0.05866260951598884,  
0.1549884083832883,  
2.402954000164725,  
-0.8510405490988947,  
-0.13394876321797194,  
0.35128800256256376,  
0.03985349181110424,  
1.0891408951797659,  
0.49683980443602116,  
1.3618410332836905,  
0.31089249400158553,  
0.007823999182329802,  
-1.0325531315281817,  
-0.13635517978577905,  
-0.4783006843261583,  
-0.9648987725589863,  
-0.4094326055257113,  
0.0620151507481985,  
-0.3631850012398663,  
-0.9119123598789223,  
-0.3458539889181142,  
0.8501459643039054,  
1.6461875633189593,  
0.08799287143090098,  
-0.82318299513447,  
1.17289644669955,  
-0.9455811832961388],  
[ 0.12420123662801165,  
0.138246244841176,  
0.34185010800102933,  
0.8771280515547424,  
0.8771280515547423,  
1.9326762312100456,  
1.9326762312100456,  
2.879806034127527,  
3.4467495190209787,  
3.460588109395402,  
3.4605881093954016,  
3.4605881093954016,  
3.911934955717517,  
3.9564836804547703,  
4.188240551814426,  
5.098640553346409,  
5.098640553346409,  
5.098640553346408,  
6.466332587579958,  
7.457565848827182,

7.712724508543908,  
7.890302861063261,  
7.898577524812402,  
8.020037295803547,  
8.020037295803547,  
9.289723192898348,  
9.68251578824504,  
9.68251578824504,  
10.66694519433398,  
11.464898013549973,  
1.8095532965205083,  
-1.6633278493215808,  
-1.2281091611401596,  
-0.40155726479865544,  
1.7903243850816337,  
0.18661159996017582,  
1.2217850039169107,  
-0.48128156078104645,  
1.438546033666569,  
-0.9466383819139143,  
-0.2179227006066069,  
-0.07921201994836616,  
0.6692914930417907,  
-0.16791294486623565,  
-0.3278463005181308,  
1.2883193159418245,  
1.9001761172388045,  
0.7646920019853412,  
-0.6325477821570596,  
-0.5987552945744136,  
0.5669730115381587,  
0.5983941343774113,  
-0.06179171362000896,  
-0.6867235859693906,  
0.5211737756628548,  
-0.19354588250953578,  
0.6072816218147872,  
0.3472677197742769,  
-0.08031734075212016,  
1.4024126217748347,  
-0.5867181790012919,  
0.809620813948269,  
0.35997425529443994,  
-0.8722967249300235,  
-0.5874818244923429,  
-0.5567926036837068,  
-0.6652314874983639,  
-0.6042054992483096,  
-0.13918430829641074,  
-0.08277488470584692,  
-0.4972293169762719,  
-0.4421668735352916,  
0.6160601456858428,  
-1.1972657609969646,  
-1.1558488364748807,  
-1.4501782622641872,  
0.03989088007781949,  
-0.8684923327267209,  
-0.5569704341339503,  
0.15823054121075,  
0.6345578215095505,  
0.3601853745371903,  
-0.42594808878819745,  
0.08979804115834313,  
-0.153043281560756,  
-0.603228229875778,  
-1.1264410002736531,  
0.6895580235946861,  
-0.11045941959152497,  
0.5174109375139814,  
1.3269460586908306,  
-0.3852298542423827,  
-2.4120095755015893,  
0.08807412161753436,  
0.1228551365077638,

-0.6982591234727157,  
-1.1618488040328845,  
2.5586909942385017,  
-0.24921574033555105,  
-1.9870969070050777,  
-1.0279498295884981,  
-0.7796802357622239,  
0.48428681889730063,  
0.7162815161060118,  
-0.15547297036103372,  
1.0522591887013215,  
1.772822944479854,  
-0.2654037211186137,  
-0.2720110866721671,  
-0.03929478442656517,  
0.34606077605631835,  
0.5533331494282367,  
1.0574846609095763,  
-0.5747611578732846,  
0.4916772893793279,  
0.9875709691916216,  
-0.17857479553023695,  
-1.147281220275154,  
0.37370382177065037,  
2.456815155407461,  
0.6567596591037266,  
0.9507316292553318,  
1.5113928877114242,  
1.8380989093110256,  
-0.1736919900840187,  
-1.2666253947041328,  
-0.554819304070435,  
1.1931643666366285,  
0.4614862178419797,  
1.2040726557184918,  
0.3083618234293392,  
-0.4066692475369416,  
0.3740368412278018,  
-1.684611974494111,  
-0.8650016725760176,  
-1.4838330341878547,  
-0.14344887350922086,  
4.203596189627334,  
1.1133202614474196,  
1.391124117957397,  
1.8627332105499828,  
-0.28192336755973296,  
-1.5416482647725873,  
-1.9612892990030817,  
0.8836928087418303,  
0.300761821046295,  
0.6785848024508535,  
-0.5500277556546446,  
0.5742776326882599,  
-1.181756808209963],  
[ 0.38848003251483587,  
0.3884800325148359,  
1.2841735835398218,  
1.284173583539822,  
1.2841735835398218,  
1.818138220668234,  
1.818138220668234,  
2.7575469841005327,  
2.7575469841005327,  
2.7575469841005327,  
3.0053468968599275,  
3.0053468968599275,  
3.005346896859927,  
4.184079661691832,  
4.83635165164968,  
4.83635165164968,  
5.97926077140412,  
6.458805266455043,  
6.513102391504654,  
6.513102391504654,



7.122105903846713,  
7.2188422331450415,  
7.988590448127284,  
8.268095077127937,  
8.268095077127937,  
9.164456488648115,  
9.164456488648115,  
9.782953992889732,  
9.782953992889732,  
10.467486029517685,  
1.5496959718296535,  
-1.0300437645832343,  
0.425343365508412,  
-1.7136674729251273,  
0.33645197441382346,  
0.2288357961575219,  
0.10470230685228102,  
-0.6612661793744108,  
0.11823315872480306,  
0.48571962162230753,  
-1.3748501535311368,  
0.2563120795974374,  
-0.38871520150353267,  
-0.18786175076151226,  
1.0017996241286973,  
0.05598903629217323,  
1.501328526357405,  
-0.32299727271195017,  
0.5715295079657807,  
-0.12201961934486968,  
2.2747823054657927,  
0.16289086097520028,  
0.027619518366160244,  
-0.10165606616500937,  
-0.06321979816820887,  
-0.27543819802246033,  
-0.0048370064103128475,  
0.1330138167350915,  
-0.06428151371988705,  
0.21905201010909556,  
0.25697175483980955,  
-1.462905966720411,  
0.8014511304369155,  
3.456137165485204,  
-0.3560002683832885,  
-0.4886877133354182,  
0.32039145066707037,  
1.6153352350920127,  
0.5940099487759896,  
0.18140087044059483,  
0.27123106498617,  
0.7444341922951362,  
0.170480557625751,  
-0.4688462519246396,  
0.5235839184929864,  
-0.5470964469389679,  
-0.011921500492307424,  
1.4116230981753706,  
0.49972453659747124,  
-0.7800673920851233,  
0.4234227404504273,  
-0.2071635265929523,  
0.14064328933496192,  
-1.2007096247825992,  
0.12047098237640114,  
-0.4125103841815656,  
1.0447620953563077,  
0.0020814149928196773,  
0.4988991062112368,  
-0.34495773827123155,  
-0.12849063482979717,  
0.4280934542561602,  
0.7138444629946918,  
-0.6497712710787925,  
-0.43652659674625793,

0.917432486791049,  
-0.8523477361785018,  
0.5648987974980545,  
0.3183226113969618,  
0.14295784675778261,  
0.9589824340171335,  
0.9194478619356266,  
1.1001359353915339,  
1.5417377267389083,  
-0.5376003771957187,  
-0.5404528215706331,  
0.21624687748210675,  
0.8814937279455825,  
-0.371639532103812,  
-0.2668100917972658,  
1.3133163210428074,  
0.44574090697479807,  
-1.0940261852319737,  
-0.313830643067749,  
-0.06100275437545863,  
-0.049560783686653447,  
-0.3025056724120473,  
-0.9891529613817422,  
-0.35099332176432035,  
0.5436069706516342,  
-0.722828417704955,  
1.6968661444846564,  
-2.4402971962208975,  
0.7865745542588627,  
1.3437881169309889,  
0.36108471326554326,  
-0.1749159211919777,  
-0.014334278530919132,  
0.02978377629472008,  
1.8533978555002608,  
-1.8470426695738211,  
0.6272356375919823,  
0.44775499409400255,  
1.3281153539688288,  
0.4583217606753929,  
0.6443670392327268,  
0.5254233581973354,  
2.3087652110195127,  
-0.7761319091913014,  
-0.7605421959233766,  
-0.6461580464596497,  
0.7075597766411752,  
0.985778508379752,  
-1.3130974173457381,  
2.8711331564400684,  
1.2993543284582694,  
1.9493614761217355,  
1.1647493000584068,  
-0.42731613935458074,  
2.7038346000669766],  
[-1.8784742854218807e-17,  
-7.763750530158576e-17,  
0.3802827375258553,  
0.44096449652630626,  
0.8040692975576897,  
1.9224694434519336,  
1.9224694434519338,  
1.9224694434519336,  
1.9224694434519336,  
1.9224694434519336,  
1.9224694434519338,  
2.730288811725591,  
4.476350841356259,  
4.476350841356259,  
4.476350841356259,  
6.331658137341824,  
6.331658137341824,  
6.7621011201584285,  
6.77851096220289,  
7.490043179529316,

7.490043179529316,  
7.490043179529316,  
7.490043179529316,  
7.511664240193972,  
8.302259372586072,  
8.36899822047307,  
8.607405767895836,  
9.631163052898822,  
9.874876363637043,  
10.225975825453373,  
2.711573403856553,  
0.20239905137011172,  
-0.4220883549830381,  
-0.8404830976891227,  
1.794332340210785,  
1.5095243517856047,  
0.22326098118939897,  
0.07733371735403745,  
1.280548885023134,  
1.4121496210624682,  
0.9815935680907694,  
-2.975348552150871,  
1.6316643284140941,  
0.8239502945369961,  
0.0314505340316768,  
-1.0892891749800817,  
1.720694113273713,  
0.6634696927679957,  
-0.836512780686814,  
-1.1286873737196692,  
-0.09500137106776224,  
1.0428135848317974,  
-0.4828772957450712,  
-1.129334172148368,  
0.7253737318795237,  
1.4108675361353635,  
0.7588540034470418,  
-0.5039485441412638,  
0.10346857579652805,  
1.2668095290766983,  
0.7994757345637048,  
-0.7393240316081237,  
-0.7818304990031031,  
0.25375980918776664,  
2.228975199542585,  
2.2487625387645873,  
0.6384105819815235,  
0.39434544396871446,  
1.3679129840939837,  
-0.27336699910726836,  
1.3170761670781417,  
1.1159622861844822,  
1.176824183488981,  
0.40583799697229034,  
0.8786168217534174,  
0.2914083315983707,  
-0.8464697846173548,  
-0.032455291822620566,  
-2.0755386823554396,  
-0.11439663923099666,  
0.7312672791487281,  
0.4263196833485598,  
0.11802610051350722,  
1.0445881812565523,  
-1.9566462184988007,  
0.9492303984073598,  
-1.7129593951518396,  
-0.3230601534209437,  
0.3161713641922788,  
-0.4811213940350071,  
0.08327140785409295,  
0.37526634808329173,  
-1.9990814349080968,  
-0.15397700748904192,  
-0.9549084255901845,

1.1120455683467105,  
-0.42952128451280097,  
0.17929609797141985,  
1.0446016069356951,  
0.846774755857218,  
-0.2784586201121851,  
0.23000407229986752,  
-0.9198047598183884,  
0.996529675185623,  
0.34608382599103005,  
0.5099375110708237,  
2.1948932092248885,  
1.3625694142279887,  
-0.9306056124011278,  
0.6012804875871011,  
-0.7788968212470156,  
-1.5884735532174328,  
1.0361309111992296,  
0.015937704739038126,  
1.4003797043998856,  
2.429422654005534,  
-0.27504014116509645,  
0.8256449732433587,  
1.2146087003914199,  
-0.6435553984602482,  
0.3046269503778821,  
1.0182549333954134,  
1.4202224852266074,  
1.3511302325707892,  
-0.7261672378416364,  
1.5992752660640235,  
-0.5764295578986515,  
-0.8318409785507642,  
1.1375736468462807,  
0.8529850561064739,  
0.9553972898831558,  
-0.09161160854677679,  
1.617622889574723,  
1.4551513261723394,  
-0.08817813881493969,  
0.8045852859105778,  
1.9892741470924016,  
1.8347816167556374,  
-0.8050652823779443,  
0.008511392950551585,  
2.1460096989270747,  
0.49277581514942953,  
-2.4311684786278165,  
0.5134791015266132,  
0.9751974520662461,  
-0.38582649358518695,  
0.7746227771853464,  
1.7307944301597258,  
2.1320333699599043,  
1.1654652968447545],  
[ 0.4022850038273885,  
0.4222288083135141,  
0.7644599371513524,  
0.7900179023917507,  
1.1026508993249646,  
1.1630326759467198,  
1.1630326759467198,  
1.2119340062926192,  
1.9859325565890973,  
1.985932556589097,  
2.096166401632718,  
3.378647998605865,  
3.378647998605865,  
3.378647998605865,  
4.354848115861854,  
6.006218342726225,  
6.006218342726225,  
6.009974297352436,  
8.225327865566033,  
8.242093148909708,

9.222354355246733,  
9.369468664000962,  
9.432712219232048,  
9.692289963799956,  
9.692829942577658,  
10.391360826688166,  
10.391360826688166,  
10.529867035412478,  
10.529867035412478,  
11.06290493838992,  
2.9062307172979733,  
-1.7788694936155562,  
-0.1145266982224492,  
-0.9311559923392093,  
0.9691998209476543,  
1.7463479137973288,  
-0.7663862807329105,  
-0.9694574896037749,  
2.8979112386638413,  
1.1400097878698292,  
0.8096361549155084,  
-1.5900494197653285,  
0.09829667109053167,  
0.31839493135320834,  
0.3886777840539921,  
0.12229184789371997,  
1.7250225844898464,  
1.0065795676456808,  
1.4535641205083867,  
-0.3486770669120958,  
0.2556790893233589,  
1.778531141883236,  
0.269972269049403,  
1.0155903957099945,  
0.8041163886037216,  
0.5381821926966456,  
-0.30108604163317454,  
0.6396533041678052,  
2.1819991440037696,  
1.4978086658278347,  
2.5181040929106753,  
0.4624415671193703,  
-0.17701736987873673,  
0.6910098122382194,  
2.947172461882987,  
-1.0727539032453073,  
0.4023854197196741,  
1.650490750838525,  
0.9313998963798695,  
-0.6769162055305248,  
-0.5620785927454173,  
-0.20885673940707247,  
2.5019757090972443,  
-0.37561416876024456,  
-0.9329392032282731,  
0.7818961506889994,  
0.44350434198669075,  
-0.10644929099379355,  
-2.498928032568615,  
-1.2046085786256906,  
-0.06365416567297402,  
0.17257236645054272,  
1.2516209341031546,  
-0.3591527663232026,  
0.46789807326225935,  
0.24374638092155315,  
0.02110383811013195,  
0.12714835746845662,  
-0.5505736947218767,  
-0.03497727012222505,  
-2.2168334497478877,  
-0.21485512988314215,  
1.7552902914988067,  
0.6189795903733311,  
0.3191491062237487,

0.522632432692797,  
-1.1121089236913335,  
1.1371618962620422,  
-0.2410043783817164,  
0.24168543661014927,  
0.39418565996934685,  
1.2107667809264395,  
2.398781467533486,  
0.6948257569073976,  
0.6170229142231725,  
0.7050419245924102,  
1.768546262611762,  
1.5562956304120967,  
-0.4269237214365518,  
0.6302835616447369,  
1.7710848704009405,  
1.2281100264507194,  
1.5036530549577243,  
-0.7435268012971183,  
0.7613541379199313,  
0.8523298100708424,  
-0.6655959646469325,  
1.1543911681084875,  
2.2675628634479494,  
1.0299985170060308,  
1.400963430022522,  
0.27759304330136975,  
0.6960561589746208,  
-0.4210335016880339,  
0.0336463669485127,  
-2.099660094290342,  
0.6674819238895001,  
0.5049668435179431,  
0.48001405045948287,  
1.3574871122533543,  
-2.2986993170736225,  
9.601426007351498e-05,  
1.3312470798272018,  
0.7582238004326416,  
-0.35033967277151296,  
-0.4108552112493075,  
0.1982910129710702,  
0.6700017270602091,  
0.26559360983179486,  
-0.14563210230012705,  
-0.39610135234418875,  
1.1727729846793147,  
0.6713573564879365,  
0.8527070052929181,  
0.8268283343075853,  
2.2918575835381745,  
0.5082103460913493,  
1.8600493489550152,  
0.49576811175353974,  
2.232387985311215],  
[ 0.16477895719846114,  
0.16477895719846108,  
0.7183189156962347,  
1.8697093861419474,  
2.105082615571597,  
3.05308344502201,  
4.199393321043376,  
4.199393321043376,  
4.199393321043375,  
6.490210948425593,  
6.4902109484255925,  
6.490210948425593,  
6.4902109484255925,  
6.4902109484255925,  
6.490210948425593,  
6.882554174728105,  
6.882554174728105,  
6.882554174728105,  
6.882554174728104,  
6.8877583035732775,

6.8877583035732775,  
6.8877583035732775,  
8.21014824639056,  
8.21014824639056,  
9.071469420716642,  
9.120928605341893,  
9.714944098401723,  
11.474131735950095,  
11.474131735950095,  
11.794551582273902,  
1.341188628911811,  
1.6554894539990426,  
-2.1068974621953425,  
-1.4171475675653578,  
0.33211669069513333,  
0.11331792925356984,  
-1.3610911099963097,  
0.46439741779020816,  
0.9313501387866817,  
1.0938593094543279,  
-0.3591727738608774,  
-0.4732622270970327,  
1.6321598874818157,  
-0.2782091348514778,  
-1.0526781349295347,  
0.0708703831522549,  
2.6982701224663113,  
-0.038867313655444914,  
-0.10508583152652556,  
-0.40759365792756236,  
0.6284849004330764,  
0.5192751929971827,  
-1.6282040637266806,  
0.0014422433007245106,  
-1.8299719264591412,  
2.3182597876656823,  
0.8875167319646391,  
1.5664268415036142,  
1.5052778791259855,  
2.935955436800565,  
1.533101581959507,  
1.8091829332960188,  
0.45080966818917967,  
0.1506883627647002,  
-0.6843548866459184,  
-0.5544883854492364,  
1.2466562002431278,  
-1.1866110136199353,  
1.4521358231995756,  
-1.125608676420736,  
-0.24054383618816966,  
-0.058272145415006006,  
0.410408128597049,  
-1.6441753460137252,  
0.4019816715685168,  
0.4588365987304068,  
1.354346078964423,  
-1.7153251360741875,  
-1.1039978646265602e-06,  
0.7940670488104785,  
0.17979772520560053,  
-0.24385394325110826,  
0.6367160741723578,  
0.8500459957371875,  
0.0559416907316065,  
0.32418668587130467,  
-1.4797636873635434,  
0.11902177942387202,  
0.5185165439317966,  
-0.08399222686641401,  
0.8650918037299421,  
1.4911587670088011,  
0.12792248933645675,  
0.3372262149750348,  
-0.6553154954729696,

1.1995792367396254,  
0.5132294030998703,  
0.44835115860783636,  
-0.37116980512777586,  
0.7805194563374558,  
-0.854334789795377,  
0.5008527672922033,  
-0.2302685629030402,  
0.6145182391921147,  
-0.6575500079215796,  
0.8657035637529482,  
1.1874516653159721,  
-0.16284802367068918,  
-0.26462171656665856,  
-0.9815102056659819,  
0.23198397744948207,  
-1.087097195512072,  
0.6616385654966559,  
-0.2929637257774683,  
0.03471390505932934,  
0.2048751570049573,  
0.9170017118070749,  
0.39617956766989404,  
0.12006199846995962,  
0.1922705913940127,  
0.8784478594386566,  
0.055479957240883566,  
-0.6634105431569992,  
1.0742951419164057,  
-0.37818200958777604,  
0.28548758229245597,  
-0.6594827056613419,  
1.0235832498557866,  
-0.19428253177041227,  
-0.5531991468121416,  
-1.189626464718852,  
0.2519110119226656,  
-0.6708462316627377,  
2.7994352657547057,  
-3.8764436680175813,  
0.5152327138619494,  
-0.3749347648847944,  
2.9042167722097862,  
1.1265965037549552,  
-1.850959186134046,  
2.165374611027145,  
0.8818414791702859,  
1.5039524911129019,  
0.06564767423285973,  
0.6486215314149069,  
-0.08854143781823305,  
1.8396223528529987,  
-0.00792246728000446,  
2.8805879469479487,  
3.6337353861266473],  
[ 0.11853625011402234,  
0.11853625011402236,  
1.1173235551611367,  
1.7342580765110573,  
1.7342580765110573,  
2.108144483620023,  
3.054129947242328,  
3.054129947242328,  
3.054129947242328,  
3.056306360633301,  
4.638414750363569,  
5.0621851887275495,  
5.7503913724004905,  
5.774998407238176,  
6.917933224474368,  
6.917933224474368,  
8.061549209526286,  
8.061549209526286,  
8.061549209526286,  
8.591251503132888,



8.591251503132888,  
9.051235537435975,  
9.081856762230144,  
9.467876152039107,  
9.545932016874406,  
9.591419209848118,  
10.465616352275608,  
10.465616352275608,  
10.465735173309618,  
10.980942228105905,  
2.0734674059611633,  
0.32892201175743896,  
-0.007356440825095051,  
0.7856576253246221,  
2.089457548986907,  
0.7744884921126718,  
-0.35049309306395837,  
-0.6556831494452968,  
2.0369525201874903,  
0.4739652080570001,  
-0.8564345639983049,  
1.25716179603495,  
1.7181260437331554,  
2.3978160665502384,  
1.1152024575020885,  
-1.3335737674295711,  
0.016650799076572978,  
1.6607129762234538,  
0.648059834763191,  
0.2438725527060928,  
-0.27307896000752346,  
1.4369017198677916,  
3.5672448343800007,  
-0.5379702113035718,  
-0.7420664562717484,  
-0.529699891930992,  
0.7301471483152846,  
0.781913925757813,  
0.6004078048346045,  
1.7324865479818374,  
0.4548236607944829,  
-1.4419813608219112,  
-0.684662976785234,  
0.8455512814500156,  
1.97751114408285,  
-0.833202517811791,  
1.110524460863052,  
2.6403320691876733,  
-0.3129427957408566,  
-0.06674204626492235,  
0.5842857778318762,  
-0.21132485649138796,  
-0.011842019288790376,  
-0.25743970610802486,  
0.7486616881233721,  
-0.1302029141156864,  
0.09497091477412227,  
-0.3715265429351211,  
0.39570077921274605,  
0.28643868832003017,  
0.7848413456471106,  
-0.7157146817058562,  
0.09411764456438232,  
-0.10910076647953601,  
1.1262761892344808,  
-0.27334997823872975,  
-0.44027652197942063,  
0.6740415100156434,  
-0.336256645457715,  
0.4268157265313067,  
-0.8611696251566416,  
-0.34560928156726306,  
0.5618074077714486,  
0.5866360379174992,  
1.8662876827821717,

```

2.21592310898005,
1.972223656383108,
1.6141187926643297,
0.856255815565121,
-0.34275929095614754,
-1.0642528745182613,
-1.0618686751734654,
0.2379582550153795,
-0.6501770361983872,
-0.19408645485522444,
1.501330829125914,
1.5726602727591479,
0.7066066097903853,
-1.4580936665368467,
0.46940440748349077,
-0.1287015677341077,
-0.9805925033056946,
-0.3754741669636888,
-0.026817919501009202,
1.1067346586651607,
0.17547923725022047,
0.8902143171896091,
-0.22777698610446503,
0.8082253583749343,
-1.0674083601412958,
-0.022706971436593337,
0.34227899244110566,
1.3527736523760083,
2.0767841716125894,
0.5778568145668401,
-0.6555502504392442,
1.2670274746873995,
0.507694022232518,
-0.26299991187543805,
1.7048253080726326,
1.4088065522309612,
2.823918413203317,
1.2763232744235296,
-1.4348344213353486,
-0.605496445996402,
0.09645158262695042,
0.024639736182597342,
0.23997550724405606,
0.9979895378690888,
-0.40612123795993227,
1.826790650755685,
0.029599395583551916,
-0.4592861834683686,
0.0328358806035505,
1.3612120706287358,
0.8210402794880411,
0.05688164146575431,
0.03152531580318861,
2.0316547976974904,
2.795039607579165]],
'run_time_sec': 69142.54766130447}}],
'zne': [ { 'config': { 'ansatz': { 'gateset': 1,
                                  'layer': 30,
                                  'ugate': { 'coefficients': { 'bn': [ 0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0],
                                                                      'cn': [ 0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5],
                                                                      'r': 0},
                                  'time': {'max': 10.0, 'min': 0.0},
                                  'type': 'heisenberg'}}},
          'init_param': { 'value': [ 0.6189603325174557,

```

0.7142372255934472,  
0.818217611349809,  
1.1433975540074377,  
1.9121137997887092,  
1.912113799788709,  
1.9189666863881127,  
2.194219841514053,  
2.734492156740232,  
4.250258815642276,  
4.250258815642276,  
5.774076859791501,  
6.527612880112256,  
6.532834731882501,  
8.049613322901676,  
8.049613322901676,  
8.050730377555883,  
8.561643142317116,  
8.561643142317116,  
8.758357012835646,  
8.758357012835646,  
8.78353884989931,  
9.477076383056275,  
9.536600626467342,  
9.536600626467342,  
9.536600626467342,  
10.241295505019522,  
10.318321333031077,  
10.579129354925781,  
10.82886994059623,  
3.662494394083504,  
0.08309129295248968,  
1.5295376506525808,  
-1.5964000102221196,  
1.8988970610647178,  
-0.07218621526676876,  
0.7238532160702689,  
-1.2917423920622229,  
1.8532222971765195,  
-0.40818119715800666,  
0.469598065996274,  
-1.2652675561295137,  
0.41465882817859046,  
0.48683539382624846,  
-0.15336518315146752,  
-1.6419783820068856,  
1.2136622236743368,  
0.5933123377118196,  
0.9666225223219593,  
0.9539776194708611,  
-0.3793986531891993,  
-0.2570964298405315,  
1.5884302353807402,  
0.19867970725527498,  
1.0036205245072367,  
-1.7266220384949087,  
0.6519864384701275,  
0.173373648086925,  
1.8697046853700252,  
0.5263944462203128,  
2.9785129063723943,  
-0.5937256494260224,  
0.22753174799850245,  
0.24918335157216837,  
1.5438671949833176,  
-0.2981477150404249,  
-0.0503664733834821,  
0.542442835193611,  
1.8096859498837612,  
-2.2260935596321993,  
0.28693396030012636,  
0.9986781622414097,  
-0.01940263773226835,  
-1.8805315707929653,  
-0.1513202473661221,  
0.1836836320118686,

-0.5655439481125303,  
-0.30323205019871646,  
-0.4186198812206128,  
0.2357002564872809,  
2.8296979465953833,  
-1.0776781071762758,  
-0.08378558447273823,  
1.7446476514004516,  
-0.4606832586075214,  
-1.762173446350097,  
0.10241780783627007,  
1.6018254886002428,  
0.2621004786967086,  
1.349261138919249,  
0.14987623247602613,  
0.5068543254371847,  
-1.3474781551208477,  
1.0890436270679893,  
1.6662048029626129,  
0.3608718991529565,  
-0.11137748070221386,  
0.5641204379289552,  
2.2546014997074266,  
1.8888740160956543,  
-0.23345107582518032,  
-1.5772444286238798,  
2.1408383357361265,  
-0.4968079560788485,  
0.1533667959779154,  
-0.40238715350257875,  
0.25591729793510365,  
2.947382531044255,  
-0.32162602471486745,  
-0.7587223675916386,  
-0.8983111566200868,  
0.006114119281372181,  
2.9372824954589514,  
0.48288231335139287,  
0.7939297064609614,  
1.9454360656955985,  
2.092519500518508,  
0.8995449331251366,  
0.10171517677156572,  
0.45235144869603666,  
1.02501950409702,  
0.24331156538914245,  
0.48973195386607005,  
2.672871435464254,  
1.313352678455905,  
2.010046934709317,  
-0.42153209835304317,  
-0.13436700176919486,  
-0.6950305532982513,  
0.6026553555930264,  
1.6681913778840949,  
0.4125109526933123,  
0.514533549588801,  
1.0794873063708696,  
-0.9571806916209341,  
0.27630815458061647,  
0.6001387806934945,  
0.5059087494947612,  
-0.5722342732268321,  
0.3986919058890637,  
1.0044202485382987,  
0.3352295947729849,  
1.3777059541173544,  
-2.835684252944388,  
0.6104690716589696,  
1.838086538234438,  
-0.3106134411398272,  
-2.2167272073692903,  
0.10706372359431235,  
-0.17469850626418476]],

'noise\_profile': { 'noise\_on\_init\_param': { 'status':

```

False,
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#3'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [ 4,
2,
0,
0,
-6.218690041461777],
[ 12,
6,
0,
0,
-4.805156509769758],
[ 20,
10,
0,
0,
-3.7079207759854302],
[ 28,
14,
0,
0,
-2.8469331605050203]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.838539123535156e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -7.0690840063993505,
'others': { 'beta_coefficients': [
2.1875,
-2.1875,
1.3125,
-0.3125],
'cost_richardson_zne':
'sorted_expectation_vals': [
-6.218690041461777,
-4.805156509769758,
-3.7079207759854302,
-2.8469331605050203],

```

```

'sorted_noise': [ 6,
                  18,
                  30,
                  42]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -6.218690041461777],
                  [ 12,
                    6,
                    0,
                    0,
                    -4.805156509769758],
                  [ 20,
                    10,
                    0,
                    0,
                    -3.7079207759854302],
                  [ 28,
                    14,
                    0,
                    0,
                    -2.8469331605050203]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'heisenberg'}}},
  'init_param': { 'value': [ 0.11853625011402234,
                              0.11853625011402236,
                              1.117323551611367,
                              1.7342580765110573,
                              1.7342580765110573,
                              2.108144483620023,
                              3.054129947242328,
                              3.054129947242328,
                              3.054129947242328,
                              3.056306360633301,
                              4.638414750363569,
                              5.0621851887275495,
                              5.7503913724004905,
                              5.774998407238176,
                              6.917933224474368,
                              6.917933224474368,
                              8.061549209526286,
                              8.061549209526286,
                              8.061549209526286,
                              8.591251503132888,
                              8.591251503132888,
                              9.051235537435975,
                              9.081856762230144,
                              9.467876152039107,
                              9.545932016874406,
                              9.591419209848118,
                              10.465616352275608,
                              10.465616352275608,
                              10.465735173309618,
                              10.980942228105905,
                              2.0734674059611633,
                              0.32892201175743896,

```

-0.007356440825095051,  
0.7856576253246221,  
2.089457548986907,  
0.7744884921126718,  
-0.35049309306395837,  
-0.6556831494452968,  
2.0369525201874903,  
0.4739652080570001,  
-0.8564345639983049,  
1.25716179603495,  
1.7181260437331554,  
2.3978160665502384,  
1.1152024575020885,  
-1.3335737674295711,  
0.016650799076572978,  
1.6607129762234538,  
0.648059834763191,  
0.2438725527060928,  
-0.27307896000752346,  
1.4369017198677916,  
3.5672448343800007,  
-0.5379702113035718,  
-0.7420664562717484,  
-0.529699891930992,  
0.7301471483152846,  
0.781913925757813,  
0.6004078048346045,  
1.7324865479818374,  
0.4548236607944829,  
-1.4419813608219112,  
-0.684662976785234,  
0.8455512814500156,  
1.97751114408285,  
-0.833202517811791,  
1.110524460863052,  
2.6403320691876733,  
-0.3129427957408566,  
-0.06674204626492235,  
0.5842857778318762,  
-0.21132485649138796,  
-0.011842019288790376,  
-0.25743970610802486,  
0.7486616881233721,  
-0.1302029141156864,  
0.09497091477412227,  
-0.3715265429351211,  
0.39570077921274605,  
0.28643868832003017,  
0.7848413456471106,  
-0.7157146817058562,  
0.09411764456438232,  
-0.10910076647953601,  
1.1262761892344808,  
-0.27334997823872975,  
-0.44027652197942063,  
0.6740415100156434,  
-0.336256645457715,  
0.4268157265313067,  
-0.8611696251566416,  
-0.34560928156726306,  
0.5618074077714486,  
0.5866360379174992,  
1.8662876827821717,  
2.21592310898005,  
1.972223656383108,  
1.6141187926643297,  
0.856255815565121,  
-0.34275929095614754,  
-1.0642528745182613,  
-1.0618686751734654,  
0.2379582550153795,  
-0.6501770361983872,  
-0.19408645485522444,  
1.501330829125914,  
1.5726602727591479,

```

0.7066066097903853,
-1.4580936665368467,
0.46940440748349077,
-0.1287015677341077,
-0.9805925033056946,
-0.3754741669636888,
-0.026817919501009202,
1.1067346586651607,
0.17547923725022047,
0.8902143171896091,
-0.22777698610446503,
0.8082253583749343,
-1.0674083601412958,
-0.022706971436593337,
0.34227899244110566,
1.3527736523760083,
2.0767841716125894,
0.5778568145668401,
-0.6555502504392442,
1.2670274746873995,
0.507694022232518,
-0.2629991187543805,
1.7048253080726326,
1.4088065522309612,
2.823918413203317,
1.2763232744235296,
-1.4348344213353486,
-0.605496445996402,
0.09645158262695042,
0.024639736182597342,
0.23997550724405606,
0.9979895378690888,
-0.40612123795993227,
1.826790650755685,
0.029599395583551916,
-0.4592861834683686,
0.0328358806035505,
1.3612120706287358,
0.8210402794880411,
0.05688164146575431,
0.03152531580318861,
2.0316547976974904,
2.795039607579165]],
'noise_profile': { 'noise_on_init_param': { 'status':
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#10'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'zne',
False,

```





```
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}},
'init_param': { 'value': [ -1.8784742854218807e-17,
-7.763750530158576e-17,
0.3802827375258553,
0.44096449652630626,
0.8040692975576897,
1.9224694434519336,
1.9224694434519338,
1.9224694434519336,
1.9224694434519336,
1.9224694434519336,
1.9224694434519338,
2.730288811725591,
4.476350841356259,
4.476350841356259,
4.476350841356259,
6.331658137341824,
6.331658137341824,
6.7621011201584285,
6.77851096220289,
7.490043179529316,
7.490043179529316,
7.490043179529316,
7.490043179529316,
7.511664240193972,
8.302259372586072,
8.36899822047307,
8.607405767895836,
9.631163052898822,
9.874876363637043,
10.225975825453373,
2.711573403856553,
0.20239905137011172,
-0.4220883549830381,
-0.8404830976891227,
1.794332340210785,
1.5095243517856047,
0.22326098118939897,
0.07733371735403745,
1.280548885023134,
1.4121496210624682,
0.9815935680907694,
-2.975348552150871,
1.6316643284140941,
0.8239502945369961,
0.0314505340316768,
-1.0892891749800817,
1.720694113273713,
0.6634696927679957,
-0.836512780686814,
-1.1286873737196692,
-0.09500137106776224,
1.0428135848317974,
-0.4828772957450712,
-1.129334172148368,
0.7253737318795237,
1.4108675361353635,
0.7588540034470418,
-0.5039485441412638,
0.10346857579652805,
1.2668095290766983,
0.7994757345637048,
-0.7393240316081237,
-0.7818304990031031,
```

0.25375980918776664,  
2.228975199542585,  
2.2487625387645873,  
0.6384105819815235,  
0.39434544396871446,  
1.3679129840939837,  
-0.27336699910726836,  
1.3170761670781417,  
1.1159622861844822,  
1.176824183488981,  
0.40583799697229034,  
0.8786168217534174,  
0.2914083315983707,  
-0.8464697846173548,  
-0.032455291822620566,  
-2.0755386823554396,  
-0.11439663923099666,  
0.7312672791487281,  
0.4263196833485598,  
0.11802610051350722,  
1.0445881812565523,  
-1.9566462184988007,  
0.9492303984073598,  
-1.7129593951518396,  
-0.3230601534209437,  
0.3161713641922788,  
-0.4811213940350071,  
0.08327140785409295,  
0.37526634808329173,  
-1.9990814349080968,  
-0.15397700748904192,  
-0.9549084255901845,  
1.1120455683467105,  
-0.42952128451280097,  
0.17929609797141985,  
1.0446016069356951,  
0.846774755857218,  
-0.2784586201121851,  
0.23000407229986752,  
-0.9198047598183884,  
0.996529675185623,  
0.34608382599103005,  
0.5099375110708237,  
2.1948932092248885,  
1.3625694142279887,  
-0.9306056124011278,  
0.6012804875871011,  
-0.7788968212470156,  
-1.5884735532174328,  
1.0361309111992296,  
0.015937704739038126,  
1.4003797043998856,  
2.429422654005534,  
-0.27504014116509645,  
0.8256449732433587,  
1.2146087003914199,  
-0.6435553984602482,  
0.3046269503778821,  
1.0182549333954134,  
1.4202224852266074,  
1.3511302325707892,  
-0.7261672378416364,  
1.5992752660640235,  
-0.5764295578986515,  
-0.8318409785507642,  
1.1375736468462807,  
0.8529850561064739,  
0.9553972898831558,  
-0.09161160854677679,  
1.617622889574723,  
1.4551513261723394,  
-0.08817813881493969,  
0.8045852859105778,  
1.9892741470924016,  
1.8347816167556374,

False,

```
-0.8050652823779443,
0.008511392950551585,
2.1460096989270747,
0.49277581514942953,
-2.4311684786278165,
0.5134791015266132,
0.9751974520662461,
-0.38582649358518695,
0.7746227771853464,
1.7307944301597258,
2.1320333699599043,
1.1654652968447545]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#7'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [ 4,
                           2,
                           0,
                           0,
                           -5.9667914171586585],
                          [ 12,
                           6,
                           0,
                           0,
                           -4.541488857163632],
                          [ 20,
                           10,
                           0,
                           0,
                           -3.4337943886777844],
                          [ 28,
                           14,
                           0,
                           0,
                           -2.564526423455772]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 5.555152893066406e-05,
            'zne_values': { 'degree': 0,
```

```
2.1875,  
-2.1875,  
1.3125,  
-0.3125],  
  
11.390625,  
  
-5.9667914171586585,  
-4.541488857163632,  
-3.4337943886777844,  
-2.564526423455772],
```

```
'extrapolated_value': -6.823289977798783,  
'others': { 'beta_coefficients': [
```

```
        'cost_richardson_zne':  
        'sorted_expectation_vals': [
```

```
        'sorted_noise': [ 6,  
                           18,  
                           30,  
                           42]],
```

```
'sampled data': [ [ 4,  
                    2,  
                    0,  
                    0,  
                    -5.9667914171586585],  
                  [ 12,  
                    6,  
                    0,  
                    0,  
                    -4.541488857163632],  
                  [ 20,  
                    10,  
                    0,  
                    0,  
                    -3.4337943886777844],  
                  [ 28,  
                    14,  
                    0,  
                    0,  
                    -2.564526423455772]],
```

```
        'sampling': 'default']]],  
{ 'config': { 'ansatz': { 'gateset': 1,  
                           'layer': 30,  
                           'ugate': { 'coefficients': { 'bn': [ 0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0],  
                                                                'cn': [ 0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5],  
                                                                'r': 0},  
                           'time': {'max': 10.0, 'min': 0.0},  
                           'type': 'heisenberg'}},  
  'init_param': { 'value': [ 0.12420123662801165,  
                              0.138246244841176,  
                              0.34185010800102933,  
                              0.8771280515547424,  
                              0.8771280515547423,  
                              1.9326762312100456,  
                              1.9326762312100456,  
                              2.879806034127527,  
                              3.4467495190209787,  
                              3.460588109395402,  
                              3.4605881093954016,  
                              3.4605881093954016,  
                              3.911934955717517,  
                              3.9564836804547703,  
                              4.188240551814426,  
                              5.098640553346409,  
                              5.098640553346409,  
                              5.098640553346408,  
                              6.466332587579958,
```

7.457565848827182,  
7.712724508543908,  
7.890302861063261,  
7.898577524812402,  
8.020037295803547,  
8.020037295803547,  
9.289723192898348,  
9.68251578824504,  
9.68251578824504,  
10.66694519433398,  
11.464898013549973,  
1.8095532965205083,  
-1.6633278493215808,  
-1.2281091611401596,  
-0.40155726479865544,  
1.7903243850816337,  
0.18661159996017582,  
1.2217850039169107,  
-0.48128156078104645,  
1.438546033666569,  
-0.9466383819139143,  
-0.2179227006066069,  
-0.07921201994836616,  
0.6692914930417907,  
-0.16791294486623565,  
-0.3278463005181308,  
1.2883193159418245,  
1.9001761172388045,  
0.7646920019853412,  
-0.6325477821570596,  
-0.5987552945744136,  
0.5669730115381587,  
0.5983941343774113,  
-0.06179171362000896,  
-0.6867235859693906,  
0.5211737756628548,  
-0.19354588250953578,  
0.6072816218147872,  
0.3472677197742769,  
-0.08031734075212016,  
1.4024126217748347,  
-0.5867181790012919,  
0.809620813948269,  
0.35997425529443994,  
-0.8722967249300235,  
-0.5874818244923429,  
-0.5567926036837068,  
-0.6652314874983639,  
-0.6042054992483096,  
-0.13918430829641074,  
-0.08277488470584692,  
-0.4972293169762719,  
-0.4421668735352916,  
0.6160601456858428,  
-1.1972657609969646,  
-1.1558488364748807,  
-1.4501782622641872,  
0.03989088007781949,  
-0.8684923327267209,  
-0.5569704341339503,  
0.15823054121075,  
0.6345578215095505,  
0.3601853745371903,  
-0.42594808878819745,  
0.08979804115834313,  
-0.153043281560756,  
-0.603228229875778,  
-1.1264410002736531,  
0.6895580235946861,  
-0.11045941959152497,  
0.5174109375139814,  
1.3269460586908306,  
-0.3852298542423827,  
-2.4120095755015893,  
0.08807412161753436,

```

0.1228551365077638,
-0.6982591234727157,
-1.1618488040328845,
2.5586909942385017,
-0.24921574033555105,
-1.9870969070050777,
-1.0279498295884981,
-0.7796802357622239,
0.48428681889730063,
0.7162815161060118,
-0.15547297036103372,
1.0522591887013215,
1.772822944479854,
-0.2654037211186137,
-0.2720110866721671,
-0.03929478442656517,
0.34606077605631835,
0.5533331494282367,
1.0574846609095763,
-0.5747611578732846,
0.4916772893793279,
0.9875709691916216,
-0.17857479553023695,
-1.147281220275154,
0.37370382177065037,
2.456815155407461,
0.6567596591037266,
0.9507316292553318,
1.5113928877114242,
1.8380989093110256,
-0.1736919900840187,
-1.2666253947041328,
-0.554819304070435,
1.1931643666366285,
0.4614862178419797,
1.2040726557184918,
0.3083618234293392,
-0.4066692475369416,
0.3740368412278018,
-1.684611974494111,
-0.8650016725760176,
-1.4838330341878547,
-0.14344887350922086,
4.203596189627334,
1.1133202614474196,
1.391124117957397,
1.8627332105499828,
-0.28192336755973296,
-1.5416482647725873,
-1.9612892990030817,
0.8836928087418303,
0.300761821046295,
0.6785848024508535,
-0.5500277556546446,
0.5742776326882599,
-1.181756808209963]],
'noise_profile': { 'noise_on_init_param': { 'status':
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,

```

False,

```

0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#5'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [ 4,
                           2,
                           0,
                           0,
                           -5.814676484708359],
                          [ 12,
                           6,
                           0,
                           0,
                           -4.248447309496402],
                          [ 20,
                           10,
                           0,
                           0,
                           -3.0694027528903187],
                          [ 28,
                           14,
                           0,
                           0,
                           -2.174125329701547]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 5.316734313964844e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -6.775303268412966,
                           'others': { 'beta_coefficients': [
2.1875,
-2.1875,
1.3125,
-0.3125],
'cost_richardson_zne':
'sorted_expectation_vals': [
-5.814676484708359,
-4.248447309496402,
-3.0694027528903187,
-2.174125329701547],
'sorted_noise': [ 6,
                  18,
                  30,
                  42]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -5.814676484708359],
                   [ 12,
                    6,
                    0,
                    0,
                    -4.248447309496402],
                   [ 20,
                    10,
                    0,
                    0,

```



```

-3.0694027528903187]],
[ 28,
 14,
 0,
 0,
-2.174125329701547]],
'sampling': 'default']}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.05238332857976487,
0.05238332857976488,
0.05238332857976461,
0.5882470284735626,
1.6186245942059996,
2.2470777294271223,
2.8315596913723913,
2.8315596913723913,
2.8333251330604914,
3.7474015252366555,
3.7474015252366555,
3.7474015252366555,
3.7474015252366555,
4.452994588443841,
4.625910007504636,
4.625910007504636,
5.314362007876739,
7.185299991262795,
7.185299991262795,
8.165312898322489,
8.165312898322489,
8.165312898322489,
8.684979613482101,
9.661121823219345,
9.674169964387936,
10.525655511340814,
10.525655511340814,
10.525655511340814,
11.154963299169733,
11.154963299169733,
2.50282655917642,
0.9490947670548783,
0.70056532212722,
-0.9370006834105179,
2.127395945212884,
1.5529950009292526,
-0.5538339242405286,
-0.45109357069990613,
3.2608593101153462,
2.1691098922881027,
0.924351518772188,
0.7799372105219657,
2.588492585292434,
1.4914484649202893,
0.5111989894903198,
-1.6854828839595362,
0.709524102178921,
-0.3201993643863164,
0.37756499567776974,
0.11160463007405702,

```

1.4506751210554825,  
-0.1158349928449886,  
-0.4172082421780774,  
-0.47420587439641587,  
2.1318004152619214,  
1.5026342770773617,  
0.9629412747697549,  
-1.017935070811068,  
2.2274033566257083,  
0.9541631607884562,  
2.2865374842341715,  
-0.6901760390806929,  
1.4488496207691695,  
-0.15529093800821045,  
1.378510821815928,  
-0.1238908488185843,  
1.0420944500710088,  
1.8938950235205334,  
-0.40270933293735856,  
-0.4838468076888962,  
-0.7769068081513464,  
2.0570355933263196,  
0.33843722154840217,  
-0.21296684820549192,  
-0.3087457919151385,  
1.6713665097762895,  
0.7955513549984788,  
-0.5031484152839188,  
0.2783608989762586,  
1.4322280472670237,  
0.12038812465567636,  
0.8648150791824706,  
0.13552183280667268,  
0.07182610915111512,  
0.3477791234991623,  
-0.1584859230597403,  
0.5851519083687279,  
0.578565105996425,  
-1.7921034519484391,  
0.9189192684840749,  
-0.6139572052593133,  
-0.023527142002935514,  
-0.6495330854871428,  
0.7767670181361933,  
0.13616638059771954,  
-0.22568119775616352,  
0.4192866974084779,  
0.1401009023541104,  
1.419355971488301,  
1.1103093112149183,  
-0.8728413553259085,  
1.014691351510677,  
2.35757700845783,  
1.131891326153365,  
-1.2979835358031357,  
0.42365777146015526,  
1.0982786992551208,  
1.698510255572029,  
1.2090506157632,  
-1.3597097700308411,  
-0.9049577551064396,  
1.0199036275847497,  
2.9541844671388584,  
-0.42829772740772204,  
0.6542829736223691,  
3.7916586259391143,  
-0.1983670801457003,  
0.7855289833525587,  
-0.1534574040841844,  
1.809122493112309,  
0.35293394466185096,  
1.0573849517470935,  
2.461665111905985,  
1.0784030177718114,  
-1.585709677044719,

```

0.8985620342798133,
2.2360691692951646,
0.24022620726925167,
2.6922129347449117,
0.15599094623602128,
2.799936411115923,
0.9657316063780467,
-0.2732772147086647,
-1.448572189075712,
-0.7280589250410919,
0.057973620624421296,
0.9321748335747359,
-1.4338621772181848,
1.3976338029473028,
-0.25504403617708243,
3.210257057781798,
0.03448775329128267,
0.05070056715723011,
-1.3727823101385919,
0.8243579770218447,
0.13142013414460954,
-0.4933237632531999,
1.1105137227416793,
0.7155364379215329,
-0.21063252058278284]],
'noise_profile': { 'noise_on_init_param': { 'status':
False,
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#2'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]],
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [ 4,
2,
0,
0,
-6.220556999324399],
[ 12,
6,
0,
0,
-4.682225394272194],
[ 20,
10,
0,
0,

```

```
2.1875,  
-2.1875,  
1.3125,  
-0.3125],  
  
11.390625,  
  
-6.220556999324399,  
-4.682225394272194,  
-3.495398379301583,  
-2.571924591189056],
```

```
0,  
-3.495398379301583],  
[ 28,  
14,  
0,  
0,  
-2.571924591189056]],  
  
    'degree': 0,  
    'method': 'richardson',  
    'sampling': 'default'}},  
'output': { 'exact_sol': -8.566772233505624,  
    'run_time_sec': 4.124641418457031e-05,  
    'zne_values': { 'degree': 0,  
        'extrapolated_value': -7.149084324138446,  
        'others': { 'beta_coefficients': [  
  
            'cost_richardson_zne':  
  
            'sorted_expectation_vals': [  
  
                'sorted_noise': [ 6,  
                                18,  
                                30,  
                                42]}},  
  
        'sampled data': [ [ 4,  
                            2,  
                            0,  
                            0,  
                            -6.220556999324399],  
                          [ 12,  
                            6,  
                            0,  
                            0,  
                            -4.682225394272194],  
                          [ 20,  
                            10,  
                            0,  
                            0,  
                            -3.495398379301583],  
                          [ 28,  
                            14,  
                            0,  
                            0,  
                            -2.571924591189056]],  
        'sampling': 'default'}}},  
{ 'config': { 'ansatz': { 'gateset': 1,  
    'layer': 30,  
    'ugate': { 'coefficients': { 'bn': [ 0,  
                                        0,  
                                        0,  
                                        0,  
                                        0,  
                                        0],  
    'cn': [ 0.5,  
            0.5,  
            0.5,  
            0.5,  
            0.5,  
            0.5],  
    'r': 0},  
    'time': {'max': 10.0, 'min': 0.0},  
    'type': 'heisenberg'}}},  
    'init_param': { 'value': [ 0.43940602753254654,  
    0.4524980474487914,  
    0.6462847510297367,  
    0.6535145711164267,  
    0.7019965052930044,  
    1.0830061860275473,
```

1.4380021973026182,  
2.1860837771467474,  
2.1860837771467474,  
2.1860837771467474,  
2.4875804812430995,  
2.911818356328843,  
4.9134595358452735,  
5.043089843653786,  
5.994354774193697,  
6.658321281734746,  
6.666230857319696,  
8.458454027735183,  
8.458454027735183,  
8.458454027735183,  
8.938931772570164,  
8.938931772570164,  
9.876451730548837,  
9.876451730548837,  
10.140618079102744,  
10.453495471248813,  
10.878653713196195,  
11.282429749250388,  
11.726474998572407,  
11.93229290545428,  
2.9640535214497064,  
-0.6206168106317247,  
-0.4035747848788786,  
-2.067222048924027,  
2.0576259596946604,  
1.364315765000901,  
-0.1480698866383175,  
-1.95043906046908,  
0.7897528850889669,  
1.350582507885341,  
-0.3349044763190947,  
-2.3429833820345465,  
2.04351680973891,  
0.8083219796841106,  
-0.06520770630024467,  
-0.8776318722364843,  
2.4862506381076748,  
0.8345121096737285,  
-0.03071661620417745,  
-0.6225183255138825,  
0.7450777062518694,  
0.12619297185303674,  
0.15620862918286052,  
-0.47540100870445906,  
0.6345315438244892,  
1.451076347224231,  
0.10985833383721234,  
-1.6475696409761669,  
1.1918822544398533,  
1.3235539868194213,  
-0.24222060474147966,  
0.2418944215339802,  
1.0397651583041008,  
1.6773252160624976,  
0.16975786500059598,  
-0.9211027317156172,  
0.7590471244619662,  
1.76540125315151,  
2.43856734239768,  
-0.19488067618654012,  
0.8462629124439717,  
0.9979674075340036,  
2.5775834810620677,  
0.5650956422366618,  
-0.5475934153287456,  
-0.0253449469292375,  
1.2524069066350432,  
-0.605696708865831,  
0.7019502861337156,  
0.2803153244338447,  
-1.0831925759777479,

1.0082140101851143,  
-0.3762046176346905,  
-0.9535933533256993,  
-1.0422804614435257,  
0.13948594332192887,  
0.5835070530053111,  
0.16086524965091817,  
0.06403444071667018,  
-0.06194188553710435,  
-0.4026223625881385,  
0.2750028468648149,  
0.6789909068622377,  
0.05162849323802493,  
-0.7735332926339995,  
-0.14862918062202837,  
0.7661757453229759,  
-0.16119730427373616,  
0.6482389226852195,  
3.1459456036848104,  
-0.4760920139337192,  
1.6197254159790668,  
-0.5506328506738539,  
0.9968299487743895,  
-0.3106735286083523,  
-1.2388662013594425,  
0.8898580979157581,  
0.43256773745092003,  
-0.7272220041247079,  
0.8716071923554094,  
1.5193589139179793,  
0.9787540447681606,  
-1.4044929205930872,  
-0.1984876316951887,  
-0.46744984056178585,  
-0.7765225748074835,  
0.04344696088727837,  
0.32373965212791267,  
0.9049555024172572,  
0.7139278873651953,  
-0.8122282267372439,  
0.5323405298774778,  
-0.08437719753251166,  
-0.14277007957413837,  
0.7912147308716768,  
0.26055493673650715,  
0.11357082745857092,  
0.3153698930365579,  
3.1981441448638614,  
0.32109035951393206,  
-0.23017443442945684,  
0.0316864124540797,  
0.20875812581978664,  
0.5466872162452653,  
1.2918521189433907,  
-0.7312547980705957,  
1.4958457475939604,  
-0.053193686203739404,  
-0.4437772137226961,  
-0.5271126400646005,  
2.5136810835026426,  
0.6674244883024821,  
-1.0140291771816496,  
-1.177197116527103,  
2.058315434744553,  
0.050372102721390984,  
-0.09022974351195023,  
-2.296438941834702,  
0.3261688389091777,  
0.3072223897800251]],

'noise\_profile': { 'noise\_on\_init\_param': { 'status':

'value': 0}},

'noise\_prob': [0.001, 0.001, 0, 0],

'status': True,

'type': 'depolarizing'},

False,

```

'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [ 0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5],
                                'r': 1}},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':

'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#1'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},

'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [ 4,
                           2,
                           0,
                           0,
                           -5.966837375471956],
                          [ 12,
                           6,
                           0,
                           0,
                           -4.6298501952375855],
                          [ 20,
                           10,
                           0,
                           0,
                           -3.5807206753108622],
                          [ 28,
                           14,
                           0,
                           0,
                           -2.750174370397261]],

         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.838539123535156e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -6.764925852359047,
                           'others': { 'beta_coefficients': [

2.1875,
-2.1875,
1.3125,
-0.3125],

11.390625,

-5.966837375471956,
-4.6298501952375855,
-3.5807206753108622,
-2.750174370397261],

'cost_richardson_zne':

'sorted_expectation_vals': [

'sorted_noise': [ 6,
                  18,
                  30,
                  42]},

'sampled data': [ [ 4,

```

```

2,
0,
0,
-5.966837375471956],
[ 12,
6,
0,
0,
-4.6298501952375855],
[ 20,
10,
0,
0,
-3.5807206753108622],
[ 28,
14,
0,
0,
-2.750174370397261]],
'sampling': 'default']]],
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}},
'init_param': { 'value': [ -2.397634216504411e-17,
1.429450133825379e-17,
0.9192297980258759,
0.9192297980258759,
2.8984599305110854,
3.1993874679766523,
3.199387467976652,
3.7152798486799994,
3.715919998165357,
5.126008182976459,
5.749875525815113,
5.785995839176617,
5.785995839176617,
5.785995839176617,
5.785995839176617,
6.315437962379428,
6.678845841951143,
7.3578167224936415,
7.415694801781823,
7.531263738212295,
7.949087697575632,
7.949087697575632,
8.111169110068786,
9.407094598577077,
9.495286031274873,
9.495286031274873,
10.993257661103009,
11.063439993331317,
11.639888600691357,
11.75175692668691,
2.1152038588685538,
-0.7839988468841306,
-1.0579861702584952,
-0.5122509123294313,
1.0012369417099964,
0.9275037440003397,
0.5343037326701707,

```



-0.014459274586663672,  
2.31692048955396,  
2.1400689678453872,  
-0.9468421716760329,  
1.3225342455296385,  
2.4229762260600483,  
1.4561600175543838,  
-0.4592924007287594,  
0.6389204073366491,  
0.5578650700802136,  
1.458345504678432,  
-0.11931303728638508,  
0.04406428844113783,  
-0.26144087074192934,  
0.6459890964472403,  
1.2243061606997268,  
0.09770103868863204,  
0.23645607828472368,  
0.3280111145811677,  
0.5390648705936556,  
-0.6034481934191781,  
-1.1942560416831098,  
0.3295059316644399,  
-0.0732996553139216,  
0.5043071925129845,  
0.7399437462813884,  
0.3595686242698361,  
1.4643835231854074,  
-0.1697776944282527,  
0.2588380732750666,  
0.44311592273109757,  
-0.6031987466514527,  
-0.06131410155451245,  
-0.3299395710828798,  
-0.45492250592824107,  
0.5555861976799495,  
1.1612177689175078,  
1.833550163228831,  
1.5629483318007886,  
-0.2455585474033218,  
-0.4534768786824923,  
-1.2225865843307935,  
0.20468879325769473,  
1.3398561861341207,  
-0.58709602862573,  
0.07181500566168061,  
0.17010271339345,  
0.36406988692952136,  
-1.689809967880289,  
-1.1677426672173294,  
-0.7977758879892671,  
0.531032719362766,  
-1.7722607960867016,  
0.6332033998224597,  
0.6669814362912183,  
0.218182728116887,  
1.0415656581640258,  
-1.4544893086294475,  
0.5175174925258392,  
-0.9742907090362619,  
-0.30648595673224416,  
1.2400541074634985,  
-0.30003161306087445,  
-0.14406503395842435,  
-0.43061285539013316,  
0.6914697219419143,  
-0.48545379734819916,  
-0.2166375004086177,  
1.2014709434123243,  
1.0734635496959384,  
0.43666289070672293,  
-0.9550440807047608,  
1.2817732673505913,  
0.6254203972471953,  
0.8730111716749767,

```

1.1814458389257443,
-0.5855214911540807,
0.33647224367417283,
0.914891547403245,
-0.10924028322724566,
0.6731472714644756,
-0.8672547313943412,
-1.1628903969680444,
1.2968110405185924,
-0.7478342770444015,
1.0157432273471354,
0.05866260951598884,
0.1549884083832883,
2.402954000164725,
-0.8510405490988947,
-0.13394876321797194,
0.35128800256256376,
0.03985349181110424,
1.0891408951797659,
0.49683980443602116,
1.3618410332836905,
0.31089249400158553,
0.007823999182329802,
-1.0325531315281817,
-0.13635517978577905,
-0.4783006843261583,
-0.9648987725589863,
-0.4094326055257113,
0.0620151507481985,
-0.3631850012398663,
-0.9119123598789223,
-0.3458539889181142,
0.8501459643039054,
1.6461875633189593,
0.08799287143090098,
-0.82318299513447,
1.17289644669955,
-0.9455811832961388]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_heisenberg_noiseefree_time_evo_ric4_unifrom_scaling_sample#4'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
False,

```

[illegible]

```
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}},
'init_param': { 'value': [ 0.16477895719846114,
0.16477895719846108,
0.7183189156962347,
1.8697093861419474,
2.105082615571597,
3.05308344502201,
4.199393321043376,
4.199393321043376,
4.199393321043375,
6.490210948425593,
6.4902109484255925,
6.490210948425593,
6.4902109484255925,
6.490210948425593,
6.882554174728105,
6.882554174728105,
6.882554174728104,
6.8877583035732775,
6.8877583035732775,
6.8877583035732775,
6.8877583035732775,
8.21014824639056,
8.21014824639056,
9.071469420716642,
9.120928605341893,
9.714944098401723,
11.474131735950095,
11.474131735950095,
11.794551582273902,
1.341188628911811,
1.6554894539990426,
-2.1068974621953425,
-1.4171475675653578,
0.33211669069513333,
0.11331792925356984,
-1.3610911099963097,
0.46439741779020816,
0.9313501387866817,
1.0938593094543279,
-0.3591727738608774,
-0.4732622270970327,
1.6321598874818157,
-0.2782091348514778,
-1.0526781349295347,
0.0708703831522549,
2.6982701224663113,
-0.038867313655444914,
-0.10508583152652556,
-0.40759365792756236,
0.6284849004330764,
0.5192751929971827,
-1.6282040637266806,
0.0014422433007245106,
-1.8299719264591412,
2.3182597876656823,
0.8875167319646391,
1.5664268415036142,
1.5052778791259855,
2.935955436800565,
1.533101581959507,
1.8091829332960188,
0.45080966818917967,
0.1506883627647002,
-0.6843548866459184,
-0.5544883854492364,
1.2466562002431278,
-1.1866110136199353,
```

1.4521358231995756,  
-1.125608676420736,  
-0.24054383618816966,  
-0.058272145415006006,  
0.410408128597049,  
-1.6441753460137252,  
0.4019816715685168,  
0.4588365987304068,  
1.354346078964423,  
-1.7153251360741875,  
-1.1039978646265602e-06,  
0.7940670488104785,  
0.17979772520560053,  
-0.24385394325110826,  
0.6367160741723578,  
0.8500459957371875,  
0.0559416907316065,  
0.32418668587130467,  
-1.4797636873635434,  
0.11902177942387202,  
0.5185165439317966,  
-0.08399222686641401,  
0.8650918037299421,  
1.4911587670088011,  
0.12792248933645675,  
0.3372262149750348,  
-0.6553154954729696,  
1.1995792367396254,  
0.5132294030998703,  
0.44835115860783636,  
-0.37116980512777586,  
0.7805194563374558,  
-0.854334789795377,  
0.5008527672922033,  
-0.2302685629030402,  
0.6145182391921147,  
-0.6575500079215796,  
0.8657035637529482,  
1.1874516653159721,  
-0.16284802367068918,  
-0.26462171656665856,  
-0.9815102056659819,  
0.23198397744948207,  
-1.087097195512072,  
0.6616385654966559,  
-0.2929637257774683,  
0.03471390505932934,  
0.2048751570049573,  
0.9170017118070749,  
0.39617956766989404,  
0.12006199846995962,  
0.1922705913940127,  
0.8784478594386566,  
0.055479957240883566,  
-0.6634105431569992,  
1.0742951419164057,  
-0.37818200958777604,  
0.28548758229245597,  
-0.6594827056613419,  
1.0235832498557866,  
-0.19428253177041227,  
-0.5531991468121416,  
-1.189626464718852,  
0.2519110119226656,  
-0.6708462316627377,  
2.7994352657547057,  
-3.8764436680175813,  
0.5152327138619494,  
-0.3749347648847944,  
2.9042167722097862,  
1.1265965037549552,  
-1.850959186134046,  
2.165374611027145,  
0.8818414791702859,  
1.5039524911129019,

False,

```
0.06564767423285973,
0.6486215314149069,
-0.08854143781823305,
1.8396223528529987,
-0.00792246728000446,
2.8805879469479487,
3.6337353861266473]],
'noise_profile': { 'noise_on_init_param': { 'status':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1}},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]],
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [ 4,
2,
0,
0,
-5.966171999362981],
[ 12,
6,
0,
0,
-4.491721403204036],
[ 20,
10,
0,
0,
-3.3646330706171934],
[ 28,
14,
0,
0,
-2.4951156781776946]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 4.506111145019531e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -6.861717934852231,
'others': { 'beta_coefficients': [
```

2.1875,  
-2.1875,  
1.3125,

-0.3125],

11.390625,

-5.966171999362981,

-4.491721403204036,

-3.3646330706171934,

-2.4951156781776946],

'cost\_richardson\_zne':

'sorted\_expectation\_vals': [

'sorted\_noise': [ 6,  
18,  
30,  
42]],

'sampled data': [ [ 4,  
2,  
0,  
0,  
-5.966171999362981],  
[ 12,  
6,  
0,  
0,  
-4.491721403204036],  
[ 20,  
10,  
0,  
0,  
-3.3646330706171934],  
[ 28,  
14,  
0,  
0,  
-2.4951156781776946]],

'sampling': 'default']]],

{ 'config': { 'ansatz': { 'gateset': 1,  
'layer': 30,

'ugate': { 'coefficients': { 'bn': [ 0,  
0,  
0,  
0,  
0,  
0,  
0],  
'cn': [ 0.5,  
0.5,  
0.5,  
0.5,  
0.5,  
0.5],  
'r': 0},

'time': {'max': 10.0, 'min': 0.0},  
'type': 'heisenberg']]],

'init\_param': { 'value': [ 0.38848003251483587,  
0.3884800325148359,  
1.2841735835398218,  
1.284173583539822,  
1.2841735835398218,  
1.818138220668234,  
1.818138220668234,  
2.7575469841005327,  
2.7575469841005327,  
2.7575469841005327,  
3.0053468968599275,  
3.0053468968599275,  
3.005346896859927,  
4.184079661691832,  
4.83635165164968,  
4.83635165164968,  
5.97926077140412,  
6.458805266455043,  
6.513102391504654,  
6.513102391504654,  
7.122105903846713,  
7.2188422331450415,  
7.988590448127284,  
8.268095077127937,

8.268095077127937,  
9.164456488648115,  
9.164456488648115,  
9.782953992889732,  
9.782953992889732,  
10.467486029517685,  
1.5496959718296535,  
-1.0300437645832343,  
0.425343365508412,  
-1.7136674729251273,  
0.33645197441382346,  
0.2288357961575219,  
0.10470230685228102,  
-0.6612661793744108,  
0.11823315872480306,  
0.48571962162230753,  
-1.3748501535311368,  
0.2563120795974374,  
-0.38871520150353267,  
-0.18786175076151226,  
1.0017996241286973,  
0.05598903629217323,  
1.501328526357405,  
-0.32299727271195017,  
0.5715295079657807,  
-0.12201961934486968,  
2.2747823054657927,  
0.16289086097520028,  
0.027619518366160244,  
-0.10165606616500937,  
-0.06321979816820887,  
-0.27543819802246033,  
-0.0048370064103128475,  
0.1330138167350915,  
-0.06428151371988705,  
0.21905201010909556,  
0.25697175483980955,  
-1.462905966720411,  
0.8014511304369155,  
3.456137165485204,  
-0.3560002683832885,  
-0.4886877133354182,  
0.32039145066707037,  
1.6153352350920127,  
0.5940099487759896,  
0.18140087044059483,  
0.27123106498617,  
0.7444341922951362,  
0.170480557625751,  
-0.4688462519246396,  
0.5235839184929864,  
-0.5470964469389679,  
-0.011921500492307424,  
1.4116230981753706,  
0.49972453659747124,  
-0.7800673920851233,  
0.4234227404504273,  
-0.2071635265929523,  
0.14064328933496192,  
-1.2007096247825992,  
0.12047098237640114,  
-0.4125103841815656,  
1.0447620953563077,  
0.0020814149928196773,  
0.4988991062112368,  
-0.34495773827123155,  
-0.12849063482979717,  
0.4280934542561602,  
0.7138444629946918,  
-0.6497712710787925,  
-0.43652659674625793,  
0.917432486791049,  
-0.8523477361785018,  
0.5648987974980545,  
0.3183226113969618,



```

0.14295784675778261,
0.9589824340171335,
0.9194478619356266,
1.1001359353915339,
1.5417377267389083,
-0.5376003771957187,
-0.5404528215706331,
0.21624687748210675,
0.8814937279455825,
-0.371639532103812,
-0.2668100917972658,
1.3133163210428074,
0.44574090697479807,
-1.0940261852319737,
-0.313830643067749,
-0.06100275437545863,
-0.049560783686653447,
-0.3025056724120473,
-0.9891529613817422,
-0.35099332176432035,
0.5436069706516342,
-0.722828417704955,
1.6968661444846564,
-2.4402971962208975,
0.7865745542588627,
1.3437881169309889,
0.36108471326554326,
-0.1749159211919777,
-0.014334278530919132,
0.02978377629472008,
1.8533978555002608,
-1.8470426695738211,
0.6272356375919823,
0.44775499409400255,
1.3281153539688288,
0.4583217606753929,
0.6443670392327268,
0.5254233581973354,
2.3087652110195127,
-0.7761319091913014,
-0.7605421959233766,
-0.6461580464596497,
0.7075597766411752,
0.985778508379752,
-1.3130974173457381,
2.8711331564400684,
1.2993543284582694,
1.9493614761217355,
1.1647493000584068,
-0.42731613935458074,
2.7038346000669766]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,

```

False,

```

        'type': 'png'},
        'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#6'},
        'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                [1, 1, 0, 0],
                                                [2, 2, 0, 0],
                                                [3, 3, 0, 0]]},

        'run': 'zne',
        'state': 'dmatrix',
        'vqe': { 'iteration': 1,
                  'optimization': { 'algorithm': 'SLSQP',
                                     'constraint': True,
                                     'status': False}},
        'zne': { 'data_points': [ [ 4,
                                     2,
                                     0,
                                     0,
                                     -6.144691518305653],
                                   [ 12,
                                     6,
                                     0,
                                     0,
                                     -4.667338994079639],
                                   [ 20,
                                     10,
                                     0,
                                     0,
                                     -3.522600808002957],
                                   [ 28,
                                     14,
                                     0,
                                     0,
                                     -2.628229437680454]],

                  'degree': 0,
                  'method': 'richardson',
                  'sampling': 'default'}}},
        'output': { 'exact_sol': -8.566772233505624,
                    'run_time_sec': 4.38690185546875e-05,
                    'zne_values': { 'degree': 0,
                                    'extrapolated_value': -7.033800507973144,
                                    'others': { 'beta_coefficients': [
2.1875,
-2.1875,
1.3125,
-0.3125],

11.390625,

-6.144691518305653,
-4.667338994079639,
-3.522600808002957,
-2.628229437680454],

'cost_richardson_zne':

'sorted_expectation_vals': [

'sorted_noise': [ 6,
                  18,
                  30,
                  42]},

'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -6.144691518305653],
                  [ 12,
                    6,
                    0,
                    0,
                    -4.667338994079639],
                  [ 20,
                    10,
                    0,
                    0,
                    -3.522600808002957],
                  [ 28,
                    14,
                    0,
                    0,

```

```

-2.628229437680454]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'heisenberg'}}},
'init_param': { 'value': [ 0.4022850038273885,
0.4222288083135141,
0.7644599371513524,
0.7900179023917507,
1.1026508993249646,
1.1630326759467198,
1.1630326759467198,
1.2119340062926192,
1.9859325565890973,
1.985932556589097,
2.096166401632718,
3.378647998605865,
3.378647998605865,
3.378647998605865,
4.354848115861854,
6.006218342726225,
6.006218342726225,
6.009974297352436,
8.225327865566033,
8.242093148909708,
9.222354355246733,
9.369468664000962,
9.432712219232048,
9.692289963799956,
9.692829942577658,
10.391360826688166,
10.391360826688166,
10.529867035412478,
10.529867035412478,
11.06290493838992,
2.9062307172979733,
-1.7788694936155562,
-0.1145266982224492,
-0.9311559923392093,
0.9691998209476543,
1.7463479137973288,
-0.7663862807329105,
-0.9694574896037749,
2.8979112386638413,
1.1400097878698292,
0.8096361549155084,
-1.5900494197653285,
0.09829667109053167,
0.31839493135320834,
0.3886777840539921,
0.12229184789371997,
1.7250225844898464,
1.0065795676456808,
1.4535641205083867,
-0.3486770669120958,
0.2556790893233589,
1.778531141883236,
0.269972269049403,
1.0155903957099945,
0.8041163886037216,

```

0.5381821926966456,  
-0.30108604163317454,  
0.6396533041678052,  
2.1819991440037696,  
1.4978086658278347,  
2.5181040929106753,  
0.4624415671193703,  
-0.17701736987873673,  
0.6910098122382194,  
2.947172461882987,  
-1.0727539032453073,  
0.4023854197196741,  
1.650490750838525,  
0.9313998963798695,  
-0.6769162055305248,  
-0.5620785927454173,  
-0.20885673940707247,  
2.5019757090972443,  
-0.37561416876024456,  
-0.9329392032282731,  
0.7818961506889994,  
0.44350434198669075,  
-0.10644929099379355,  
-2.498928032568615,  
-1.2046085786256906,  
-0.06365416567297402,  
0.17257236645054272,  
1.2516209341031546,  
-0.3591527663232026,  
0.46789807326225935,  
0.24374638092155315,  
0.02110383811013195,  
0.12714835746845662,  
-0.5505736947218767,  
-0.03497727012222505,  
-2.2168334497478877,  
-0.21485512988314215,  
1.7552902914988067,  
0.6189795903733311,  
0.3191491062237487,  
0.522632432692797,  
-1.1121089236913335,  
1.1371618962620422,  
-0.2410043783817164,  
0.24168543661014927,  
0.39418565996934685,  
1.2107667809264395,  
2.398781467533486,  
0.6948257569073976,  
0.6170229142231725,  
0.7050419245924102,  
1.768546262611762,  
1.5562956304120967,  
-0.4269237214365518,  
0.6302835616447369,  
1.7710848704009405,  
1.2281100264507194,  
1.5036530549577243,  
-0.7435268012971183,  
0.7613541379199313,  
0.8523298100708424,  
-0.6655959646469325,  
1.1543911681084875,  
2.2675628634479494,  
1.0299985170060308,  
1.400963430022522,  
0.27759304330136975,  
0.6960561589746208,  
-0.4210335016880339,  
0.0336463669485127,  
-2.099660094290342,  
0.6674819238895001,  
0.5049668435179431,  
0.48001405045948287,  
1.3574871122533543,

```

-2.2986993170736225,
9.601426007351498e-05,
1.3312470798272018,
0.7582238004326416,
-0.35033967277151296,
-0.4108552112493075,
0.1982910129710702,
0.6700017270602091,
0.26559360983179486,
-0.14563210230012705,
-0.39610135234418875,
1.1727729846793147,
0.6713573564879365,
0.8527070052929181,
0.8268283343075853,
2.2918575835381745,
0.5082103460913493,
1.8600493489550152,
0.49576811175353974,
2.232387985311215}],
'noise_profile': { 'noise_on_init_param': { 'status':
False,
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_heisenberg_noise_free_time_evo_ric4_unifrom_scaling_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [ 4,
2,
0,
0,
-5.743389283741309],
[ 12,
6,
0,
0,
-4.3560016590478785],
[ 20,
10,
0,
0,
-3.2776401801937793],
[ 28,
14,
0,
0,
-2.2986993170736225],
[ 36,
18,
0,
0,
-1.6461035917954255],
[ 44,
22,
0,
0,
-1.2357143692168146],
[ 52,
26,
0,
0,
-0.9688034452147998],
[ 60,
30,
0,
0,
-0.7794480273922508],
[ 68,
34,
0,
0,
-0.6375984291925761],
[ 76,
38,
0,
0,
-0.5271438464929141],
[ 84,
42,
0,
0,
-0.4371438464929141],
[ 92,
46,
0,
0,
-0.36000000000000006],
[ 100,
50,
0,
0,
-0.29375000000000004],
[ 108,
54,
0,
0,
-0.23750000000000003],
[ 116,
58,
0,
0,
-0.18958333333333334],
[ 124,
62,
0,
0,
-0.14791666666666666],
[ 132,
66,
0,
0,
-0.11166666666666667],
[ 140,
70,
0,
0,
-0.08000000000000001],
[ 148,
74,
0,
0,
-0.05333333333333333],
[ 156,
78,
0,
0,
-0.03166666666666667],
[ 164,
82,
0,
0,
-0.015000000000000001],
[ 172,
86,
0,
0,
0],
[ 180,
90,
0,
0,
0],
[ 188,
94,
0,
0,
0],
[ 196,
98,
0,
0,
0],
[ 204,
102,
0,
0,
0],
[ 212,
106,
0,
0,
0],
[ 220,
110,
0,
0,
0],
[ 228,
114,
0,
0,
0],
[ 236,
118,
0,
0,
0],
[ 244,
122,
0,
0,
0],
[ 252,
126,
0,
0,
0],
[ 260,
130,
0,
0,
0],
[ 268,
134,
0,
0,
0],
[ 276,
138,
0,
0,
0],
[ 284,
142,
0,
0,
0],
[ 292,
146,
0,
0,
0],
[ 300,
150,
0,
0,
0],
[ 308,
154,
0,
0,
0],
[ 316,
158,
0,
0,
0],
[ 324,
162,
0,
0,
0],
[ 332,
166,
0,
0,
0],
[ 340,
170,
0,
0,
0],
[ 348,
174,
0,
0,
0],
[ 356,
178,
0,
0,
0],
[ 364,
182,
0,
0,
0],
[ 372,
186,
0,
0,
0],
[ 380,
190,
0,
0,
0],
[ 388,
194,
0,
0,
0],
[ 396,
198,
0,
0,
0],
[ 404,
202,
0,
0,
0],
[ 412,
206,
0,
0,
0],
[ 420,
210,
0,
0,
0],
[ 428,
214,
0,
0,
0],
[ 436,
218,
0,
0,
0],
[ 444,
222,
0,
0,
0],
[ 452,
226,
0,
0,
0],
[ 460,
230,
0,
0,
0],
[ 468,
234,
0,
0,
0],
[ 476,
238,
0,
0,
0],
[ 484,
242,
0,
0,
0],
[ 492,
246,
0,
0,
0],
[ 500,
250,
0,
0,
0],
[ 508,
254,
0,
0,
0],
[ 516,
258,
0,
0,
0],
[ 524,
262,
0,
0,
0],
[ 532,
266,
0,
0,
0],
[ 540,
270,
0,
0,
0],
[ 548,
274,
0,
0,
0],
[ 556,
278,
0,
0,
0],
[ 564,
282,
0,
0,
0],
[ 572,
286,
0,
0,
0],
[ 580,
290,
0,
0,
0],
[ 588,
294,
0,
0,
0],
[ 596,
298,
0,
0,
0],
[ 604,
302,
0,
0,
0],
[ 612,
306,
0,
0,
0],
[ 620,
310,
0,
0,
0],
[ 628,
314,
0,
0,
0],
[ 636,
318,
0,
0,
0],
[ 644,
322,
0,
0,
0],
[ 652,
326,
0,
0,
0],
[ 660,
330,
0,
0,
0],
[ 668,
334,
0,
0,
0],
[ 676,
338,
0,
0,
0],
[ 684,
342,
0,
0,
0],
[ 692,
346,
0,
0,
0],
[ 700,
350,
0,
0,
0],
[ 708,
354,
0,
0,
0],
[ 716,
358,
0,
0,
0],
[ 724,
362,
0,
0,
0],
[ 732,
366,
0,
0,
0],
[ 740,
370,
0,
0,
0],
[ 748,
374,
0,
0,
0],
[ 756,
378,
0,
0,
0],
[ 764,
382,
0,
0,
0],
[ 772,
386,
0,
0,
0],
[ 780,
390,
0,
0,
0],
[ 788,
394,
0,
0,
0],
[ 796,
398,
0,
0,
0],
[ 804,
402,
0,
0,
0],
[ 812,
406,
0,
0,
0],
[ 820,
410,
0,
0,
0],
[ 828,
414,
0,
0,
0],
[ 836,
418,
0,
0,
0],
[ 844,
422,
0,
0,
0],
[ 852,
426,
0,
0,
0],
[ 860,
430,
0,
0,
0],
[ 868,
434,
0,
0,
0],
[ 876,
438,
0,
0,
0],
[ 884,
442,
0,
0,
0],
[ 892,
446,
0,
0,
0],
[ 900,
450,
0,
0,
0],
[ 908,
454,
0,
0,
0],
[ 916,
458,
0,
0,
0],
[ 924,
462,
0,
0,
0],
[ 932,
466,
0,
0,
0],
[ 940,
470,
0,
0,
0],
[ 948,
474,
0,
0,
0],
[ 956,
478,
0,
0,
0],
[ 964,
482,
0,
0,
0],
[ 972,
486,
0,
0,
0],
[ 980,
490,
0,
0,
0],
[ 988,
494,
0,
0,
0],
[ 996,
498,
0,
0,
0],
[ 1000,
500,
0,
0,
0]

```

```

0,
-2.43192951997479]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.528594970703125e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -6.576835190529094,
'others': { 'beta_coeffieicients': [
2.1875,
-2.1875,
1.3125,
-0.3125],
'cost_richardson_zne':
'sorted_expectation_vals': [
-5.743389283741309,
-4.3560016590478785,
-3.2776401801937793,
-2.43192951997479],
'sorted_noise': [ 6,
18,
30,
42]},
'sampled data': [ [ 4,
2,
0,
0,
-5.743389283741309],
[ 12,
6,
0,
0,
-4.3560016590478785],
[ 20,
10,
0,
0,
-3.2776401801937793],
[ 28,
14,
0,
0,
-2.43192951997479]],
'sampling': 'default'}}]]},
'ising-ric2': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': {'value': 'random'},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0.001, 0.001],
'status': False,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': True, 'type': 'png'},

```

```

        'file_name_prefix': 'ising_noise_off'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'vqe',
'state': 'dmatrix',
'vqe': { 'iteration': 10,
        'optimization': { 'algorithm': 'SLSQP',
                          'constraint': True,
                          'status': True}},
'zne': { 'data_points': None,
        'degree': 1,
        'method': 'richardson',
        'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 '
        '+ 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + '
        '1 X 5 X 6 + 1 Z 5 + 1 Z 6',
        'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z 0 + 1 X 1 X '
        '2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
        '2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
        '4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
        '1 Z 5 + 1 Z 6']},
'output': { 'exact_sol': -8.56677223350563,
        'initial_cost_history': [ 3.7901552515724086,
        3.396779462430669,
        3.6416626483897634,
        5.191980344851134,
        3.300383519902229,
        4.2302694452267025,
        5.5832854157035126,
        3.424340408479732,
        4.575860085354091,
        3.843028199719871],
        'noise_details': { 'gates_num': [4, 1, 1, 0],
        'identity_factors': [0, 0, 0, 0],
        'noise_level': [0, 0, 0, 0],
        'noise_profile': { 'noise_on_init_param': { 'status':
        'value':
        'noise_prob': [ 0.001,
        0.001,
        0.001,
        0.001],
        'status': False,
        'type': 'depolarizing'}},
        'odd_wires': 4},
'optimized_minimum_cost': [ -7.3566708947935595,
        -7.585318923493526,
        -7.222021821934782,
        -7.637732542535524,
        -6.9717347656162385,
        -7.183899566070664,
        -7.312238847468353,
        -7.55546648538883,
        -6.871387778407254,
        -7.103750879845002],
'optimized_parameters': [ [ -8.981486547411966e-18,
        0.2355269100006643,
        0.6734351680867104,
        0.7281872519006076,
        0.8287057436356319,
        0.9968962697957876,
        0.9968962697957877,
        0.9968962697957875,
        0.9968962697957875,
        1.6732799868313266,
        1.9939389913716405,
        1.9939389913716405,
        1.9939389913716405,
        2.7786795690350794,
        2.7786795690350794,
        4.834741825646661,
        4.843194997300159,
        5.442664851556481,
        6.006041306704694,
        6.006041306704694,

```

False,

0},

6.42159854018659,  
6.42159854018659,  
7.172079495244572,  
7.835006027334925,  
7.835006027334925,  
7.835006027334926,  
9.27390458565848,  
10.142272229921797,  
10.547148172870333,  
11.945646083493756,  
0.30631338507375855,  
0.950240081652421,  
0.3197394260348401,  
-0.8989315334324052,  
-0.19972246213391193,  
1.1515465399564957,  
0.5794269610995502,  
0.029234461946744308,  
-0.3033609133811924,  
-0.5068802243159589,  
0.41891242044729254,  
1.2272962791271989,  
0.3217023759538914,  
-0.0389595358377685,  
-0.2818159573379153,  
0.40344301100056285,  
0.012601476380185236,  
-0.7249227034698249,  
-0.28859136632269766,  
0.9177183017829931,  
0.3192674751581855,  
-0.6960323093564068,  
0.9954617266198262,  
-0.0960673339612117,  
0.30357952531427623,  
0.9148253966896076,  
-0.41157308092318357,  
-0.2244725515886058,  
0.900815469140735,  
-0.8704821270800919,  
-0.2201886465573435,  
-0.058451834208670006,  
-0.5564504264806815,  
1.0028418241392123,  
0.6862825176439941,  
-0.07515432929364027,  
-0.132716959754057,  
0.3156193912732197,  
-0.5571752224261073,  
-1.1266280252389607,  
-0.2496012410462972,  
0.4568813812573679,  
0.5040642955504137,  
-0.27382094178370653,  
0.738802930675346,  
-2.1017467172452315,  
1.7134969759675782,  
0.19045289169065632,  
0.4959480509883087,  
0.2725041426894662,  
-0.020113534287112555,  
-0.27730132318570966,  
0.9121222342974794,  
0.7771919661145833,  
1.2410984938270941,  
0.698373852916785,  
0.049079898076347495,  
0.4715079446630061,  
-0.0012225173391828686,  
1.2380103358912495,  
0.18126256323161893,  
0.02822806167971892,  
0.9624172506978782,  
-0.1017646649934255,  
0.10712069411267353,



0.11059700546555196,  
0.1764728469149672,  
1.0536625920020957,  
-0.43614672067179516,  
1.1290800077402758,  
-0.7544321351970764,  
0.20178203991689547,  
0.545960403958859,  
-1.271331788368515,  
0.3827893670869708,  
0.514944994226915,  
0.9987612988518954,  
0.9130737051848579,  
-0.33354580533033523,  
0.4110572637290035,  
-1.0065548546569214,  
0.05504586363332423,  
-0.8123464439408392,  
0.9622209015425294,  
-1.7981345279534349,  
0.8489846299822246,  
1.9191971402543575,  
-2.019266402915899,  
-1.6151954323496909,  
1.693158829823371,  
0.8368996699819713,  
-0.7925788637806501,  
-1.416264150106769,  
-0.7484853165625206,  
-1.026066230288144,  
0.2591646216069995,  
0.9485984853376032,  
1.624644962520762,  
0.1389264160191751,  
1.7901079295930897,  
0.28173803525757823,  
-0.06727915670909099,  
-0.39998196135024877,  
-0.911581975644718,  
-0.8802717995009537,  
-0.6496644186002655,  
0.9474433579476823,  
0.5810351318438188,  
-0.5928504020318089,  
0.40429180463166087,  
0.19955746243713188,  
0.14940534343654552,  
1.148493268597809,  
-0.6171972430901704,  
2.358530954611547,  
1.6132804954395525,  
1.5230819806307347,  
0.07100911239249047,  
-0.9821849785093056,  
-1.2186503325370892],  
[ 0.43242608326371745,  
0.47036005705701023,  
0.6035896599876003,  
0.6406575109863006,  
1.589410377648682,  
1.589410377648682,  
1.589410377648682,  
1.9902163938334159,  
1.9902163938334156,  
2.6096176446013035,  
2.6096176446013035,  
3.039961339509649,  
3.039961339509649,  
3.0408788822093955,  
3.0408788822093955,  
4.1325863285768,  
4.1325863285768,  
4.801738885893826,  
5.558430388585627,  
5.558430388585628,

6.48703427557745,  
6.599293033589678,  
7.119130597501129,  
7.119130597501129,  
8.096879981584715,  
8.096879981584715,  
11.989689272176165,  
12.289334556064002,  
12.289334556064002,  
12.695171119049377,  
-2.1320303145314323,  
1.164574641976517,  
0.2281426394568994,  
0.5098216286601104,  
-0.15959745874570574,  
-0.06246168319786304,  
-1.335183444898994,  
1.1253611654826523,  
-2.453373641849758,  
1.542670605477509,  
-0.23459513075014657,  
0.7629240608803527,  
0.7066862387679962,  
0.023354672976759586,  
-0.26545157517882206,  
0.8070755399487665,  
0.621829996842247,  
-0.8206657495436546,  
-0.6456938685697818,  
-0.8432536462697657,  
1.5481421634749726,  
0.030458967225015475,  
-0.6362611752642527,  
-0.5779049484598997,  
0.15136987691256515,  
0.37940285865801,  
-0.13025289482332936,  
-0.6088352960517447,  
1.0137338691570092,  
0.9312563664781934,  
-0.06260332826127091,  
0.16422266217724538,  
-0.44919022316429513,  
0.7120810093352475,  
-0.045811140982536094,  
1.4693096124875311,  
1.3068674578470139,  
0.3099696428239748,  
0.05726716998373588,  
1.4138231816748696,  
1.3251150202531472,  
2.4661338582136705,  
-1.9221360663147242,  
1.6309773912120944,  
1.012572768899168,  
1.1304323717308846,  
-0.10014704960087417,  
1.2138621646932324,  
0.9150507542177275,  
-0.1931179153053463,  
-0.19983886142442753,  
-0.37113288193216537,  
1.0783926703777422,  
0.7626802083907843,  
-0.5396621733108105,  
-1.0558614970998554,  
-0.5031372556139323,  
-0.1733591918410679,  
-0.05810492443974475,  
0.15252588011535415,  
-1.3613790038949474,  
0.14268023162896296,  
2.1247307661901087,  
-0.2996908036461345,  
0.2682896527620792,

-0.6487468384363545,  
0.0174900962257196,  
0.7865320417875226,  
-0.4365770411878935,  
0.12280152026315115,  
0.2668485276831852,  
1.0055493052017264,  
-0.13783144983938653,  
0.16428177903351826,  
-0.4107244428852575,  
-0.5006989958309392,  
0.4728442136126457,  
-0.5756228808846314,  
-0.2555605201147205,  
-0.6655897533222209,  
0.27354627255859315,  
1.056546145946755,  
-1.0108463744632321,  
0.8570822622523233,  
1.1003650202540056,  
-0.13364446072464353,  
0.19686136380997882,  
-2.015333107317771,  
-0.3474605408709381,  
0.5127772990877489,  
0.8873132714146144,  
-0.1538651896386833,  
-0.49691154598038334,  
2.4337764506921564,  
0.11687121421819974,  
0.2637773919076603,  
1.1119719051108947,  
-1.1407171454187541,  
0.293218856784229,  
0.9089141681578352,  
1.0587297353590328,  
0.41354403585027527,  
0.26331197174432663,  
0.04763876798960274,  
2.8376965303594455,  
0.038400591301352385,  
0.732378529151854,  
1.259237861002353,  
-0.09371603030550141,  
-2.6524545055620123,  
0.166545686266708,  
0.8383948517861464,  
0.5625425863873136,  
0.6352389159281269,  
-0.3793199251622615,  
1.4353166704457385,  
-0.06088962240819872,  
0.5575840323453971,  
-0.4370866693930651,  
-1.3477496560670819],  
[ 0.5485274765250757,  
0.6924497584354614,  
0.77926902254116,  
1.4968846113254817,  
1.4968846113254817,  
1.617988193716464,  
1.617988193716464,  
2.3157329555892914,  
2.3157329555892914,  
2.3157329555892914,  
2.6599448622122046,  
2.6599448622122046,  
3.198693955827293,  
3.198693955827293,  
4.93646112072991,  
5.0183990860356085,  
5.166530398168251,  
5.732062846348599,  
6.452081956191476,  
6.950653712152026,

6.950653712152026,  
7.527182443059662,  
8.141470761550243,  
8.141470761550243,  
8.23161566953153,  
8.23161566953153,  
8.263835107953264,  
9.693553204732913,  
9.696078071259171,  
10.987802073160276,  
0.31236348113638823,  
-1.370738548013981,  
-0.19640846640845944,  
-1.409184053738275,  
-0.00366718677866519,  
0.6361615892126344,  
-0.6796219270984741,  
-1.7803162192131878,  
-1.2406782697025376,  
-0.17521451360574944,  
-0.2890470362486656,  
-0.7870591534070972,  
0.6214527622340972,  
-0.5055171901576345,  
0.3099897895999387,  
0.6495941239175653,  
0.4137491249725721,  
0.292781258130194,  
-0.18467758047440086,  
-0.2764099099100952,  
-0.12795113266111025,  
0.14328500307003156,  
0.1623766240720685,  
0.09884205682735484,  
0.07093196196575538,  
0.17766773916349385,  
0.1810420204025737,  
-0.037056767883675096,  
-0.38325428434024456,  
-1.808138895166064,  
-1.2174086587283277,  
0.2723541238647832,  
0.0911451526301191,  
0.829454165789877,  
-0.7076888645983359,  
-1.1582847892183987,  
-0.2789235155040628,  
-0.1868914176693055,  
-0.03618003850886602,  
1.0797789643516258,  
0.010710633626313776,  
0.3041103423483441,  
0.027606917069623423,  
0.09715752300035431,  
-0.025081467189021912,  
0.7307804473426243,  
-0.028312324696826655,  
-0.5439567135695698,  
1.0353579775860826,  
0.03274794094556986,  
0.338229999884877,  
0.003923288912346083,  
0.011059712392702849,  
-0.24419721784886275,  
0.0538500196620971,  
-0.29704802197132957,  
-0.9714959737951582,  
-1.3776571886055275,  
-0.4387141762272093,  
-0.9013896619503009,  
-0.2890811474761574,  
-0.5664350037938545,  
-1.265940570830118,  
-0.36500389888052437,  
-0.11634811830012508,

-1.0092353619257808,  
-0.6849489189933503,  
0.9856942680495377,  
0.8277230147066852,  
0.2903619348614201,  
-0.3836733140597432,  
-0.530059482018533,  
0.8169168177018395,  
0.5323656053240163,  
0.649672850550592,  
-0.3032256260984974,  
-0.8829469814645045,  
-0.00635052379210004,  
0.35535568318583244,  
-0.06185634463022188,  
0.10533559478429602,  
1.2902435643868964,  
0.8825397316379378,  
0.3070411861797082,  
-0.07934132673084492,  
0.09844318572655962,  
0.7695889603351249,  
0.14399374014816757,  
1.8827194490661865,  
0.013305728022345127,  
1.2201617371808122,  
0.13458781619262966,  
-0.42760236848753097,  
1.3132997483594182,  
0.29586095969137777,  
0.14782133458354627,  
1.1539512755729704,  
0.8255769419022573,  
2.1284509830181357,  
1.5067425074661367,  
1.2286171121451426,  
0.8625402575232176,  
0.5254367589291086,  
0.8683165111711829,  
0.35804094605055825,  
-1.3678290318224675,  
-0.3952095755717416,  
2.8373763512718595,  
-1.2381307915304474,  
0.21836664096244152,  
-1.0373469190584237,  
0.35616351546904684,  
-0.48865262743063154,  
0.5395297676370602,  
-0.0068350558769426075,  
-1.6240423184716037,  
-1.005087252746991,  
-0.324331708942255,  
1.56936745287968,  
1.3955283874562228],  
[ 0.3026146462879133,  
0.3869510743764029,  
0.3869510743764029,  
0.5382374643481795,  
0.7459322218289088,  
0.7459322218289088,  
0.8083924716224152,  
0.8083924716224152,  
3.219627607910341,  
3.2253302931763046,  
3.9244184219369176,  
4.114742178023509,  
4.115220647252454,  
4.115220647252454,  
4.115220647252454,  
4.65196408394345,  
5.196968879903224,  
5.736027504566688,  
5.736027504566688,  
6.321573696596394,

6.7009287553652,  
6.7009287553652,  
6.7009287553652,  
8.383675014305652,  
8.383675014305652,  
8.383675014305652,  
8.383675014305652,  
9.235844817182018,  
9.235844817182018,  
12.415877726713473,  
1.4636821166030158,  
0.8436356038076634,  
-0.6467230542935267,  
0.2472607630354758,  
0.028721536942984512,  
0.5720112007049558,  
-0.179388461505878,  
0.6605644899444229,  
-0.2997484495809327,  
-0.5848737649454969,  
0.7567373384637915,  
-0.3113371232415861,  
1.5925608798994126,  
0.15551153490893768,  
1.144256524486279,  
-1.0086304067563407,  
0.4692085043130235,  
-0.5289416707772752,  
0.6895537558918402,  
-0.9023920029674053,  
0.6687255575647186,  
1.3626463195064957,  
0.18435277462186048,  
0.04101567185284027,  
1.2334404589145347,  
-0.8099334611041354,  
0.47217953762833137,  
-0.19021445340255347,  
-0.47126223762254077,  
0.21535783789089086,  
-0.13160146544027274,  
-0.14745399432080403,  
-0.2131109368071074,  
0.6116235033000932,  
0.7187755412423116,  
-0.7690585507561546,  
0.333613273647484,  
0.29688326543860977,  
0.022443242058892903,  
-0.12904022561026712,  
1.1137507228270036,  
-0.1754869613868649,  
0.6791619259450926,  
0.2688019369707634,  
-0.33561997076117317,  
-0.4910450017308718,  
-0.2921449581476723,  
0.07017675650466139,  
-0.5628878746231101,  
0.23633646017547374,  
-0.4408658192483561,  
0.6337746650828207,  
-0.5275874765915898,  
-0.11397090424872018,  
0.7713694979315344,  
-0.24077591679338844,  
0.7998056369050096,  
0.5449521212196076,  
0.6440774810386566,  
0.0012540722532346088,  
0.4406697804838639,  
-0.4697708168210915,  
-0.38183296272166767,  
0.4926783027265995,  
0.012102728676941394,

0.9995268367701109,  
-0.489600116502774,  
-0.9378926015671718,  
0.7538025600192173,  
-0.9270581698564858,  
0.23395173940139535,  
-1.5047568644302813,  
-0.6335501933328295,  
-0.1851947866597326,  
-0.18416301345971506,  
-0.15010118329037675,  
-0.30085163208099847,  
-0.030658108221894752,  
0.48141025496380413,  
1.2807653372993688,  
-0.27688172784497056,  
-0.9404124429777033,  
0.07772158149530461,  
1.2206520244647234,  
0.07167829739929571,  
1.5514296753518346,  
-0.22739832257997444,  
-0.5457307695824859,  
-0.05085143495318925,  
1.4086504148457157,  
-0.02595768387677813,  
1.2057536466860386,  
-0.5009834455732999,  
1.0234750156328314,  
-0.34572346527257924,  
1.4975050133157242,  
0.6424858734227697,  
-0.5412025600486546,  
-0.965195784498948,  
0.8078930733387817,  
-0.8747920106317195,  
1.6444412493640082,  
-1.3120143788008718,  
0.7469227938848356,  
0.7428309989793587,  
0.25043937013438866,  
-0.7176977899841391,  
1.6961228018637329,  
0.8286720852002186,  
-0.08923208660690117,  
-0.4564959840968765,  
-0.10389957398275913,  
-0.04652285532782134,  
0.6308845069083873,  
-0.025008046054888575,  
-1.0109619026173717,  
0.31698532529812806,  
-0.07816069204265776,  
2.517427548138029,  
1.300984357739734],  
[ 0.48696254731677435,  
0.9433356258260287,  
1.8515151481415904,  
3.298386332934612,  
3.298386332934612,  
3.298386332934612,  
3.298386332934612,  
3.298386332934612,  
3.374346159341203,  
3.374346159341203,  
5.043620376468771,  
5.043620376468771,  
5.218159502227583,  
5.683079438253876,  
5.683079438253876,  
5.902572186502105,  
5.902572186502105,  
5.902572186502105,  
6.17408053545979,  
6.17408053545979,

6.17408053545979,  
6.17408053545979,  
8.600010985810668,  
8.600010985810668,  
9.424738936566825,  
9.424738936566825,  
9.43568443936613,  
10.707654072137746,  
10.707654072137748,  
11.243950101093004,  
0.30560526927017156,  
-0.6023681078531374,  
-0.5052271452160477,  
-1.0944465846035194,  
0.24881605409968105,  
1.5229622975948298,  
1.730509331816328,  
-1.3834281548913137,  
-0.8373914729231547,  
-1.186133470726964,  
-0.983750614650609,  
1.3432121337567746,  
1.6569377678026054,  
0.14131844528439758,  
2.9464329846729154,  
1.3448953312948555,  
0.7896925151532842,  
-0.22765810177877452,  
-1.6238177025568765,  
1.1679097532601286,  
1.5429785141845107,  
0.44641536771583223,  
-0.4990561654458825,  
0.2890079097559007,  
0.07664205286689205,  
1.0463374337388847,  
1.0582154531020835,  
-0.7032713068941808,  
-0.5914102053027229,  
0.4481794192989112,  
-0.597054072340342,  
0.6503285491619032,  
-1.3548677382206493,  
0.3073247134537545,  
-0.42900928099090013,  
0.8290869769130189,  
0.25661934620723303,  
-0.41883276922189405,  
-0.25409113110415216,  
-0.2750324278847333,  
1.8535327289298686,  
0.7375047938415388,  
0.21982546706442144,  
0.3355829615333414,  
-0.18885187042138774,  
-0.09263125664317409,  
0.8768150768205386,  
-0.31105067773622297,  
0.11882768143806702,  
0.007542537022557154,  
0.6689687664434811,  
0.7431113887615772,  
0.9447406593038509,  
1.0052341467989638,  
1.4439497926806117,  
0.4202121214316228,  
0.3604666875525164,  
-1.6888556500060994,  
0.1396130584965534,  
0.10094819946612499,  
0.5021137054548022,  
0.3961649599525077,  
0.4932381662816783,  
1.3418440833635417,  
0.09854079710503719,



-0.9989986964474209,  
1.2672439763832217,  
-0.07601477770236317,  
0.46767000685442095,  
0.3227070865546575,  
-0.7175096141500144,  
0.2758047915288214,  
-0.24095833900456404,  
0.058134638501602325,  
0.6051082814423787,  
0.5442716652871094,  
0.3025208071236723,  
-0.6679934596266708,  
0.8499265434495678,  
0.1803663678751026,  
-0.3707988225819567,  
0.6812577092957876,  
1.2284831501706344,  
0.20883808756632122,  
0.03358446867125293,  
0.026609877934757803,  
-0.40919242519291843,  
-0.07640273708110212,  
-1.1643751408115468,  
-0.16769301556045021,  
-1.2911947285322207,  
0.037223344859154565,  
-0.05786091979914895,  
-1.8047938425602224,  
0.014158596153457605,  
0.534864509903787,  
0.006329420481561668,  
1.239578876475735,  
0.2639865904342132,  
1.2160651224901187,  
-0.2035728984920286,  
0.6511657116444571,  
0.3064364057804899,  
2.45196454382623,  
0.8340823063941794,  
1.113505687918428,  
0.049528306503774544,  
0.12947314602533921,  
-0.5399313265794791,  
-1.2647403981540062,  
-0.3482737106911781,  
0.09697429466359891,  
2.20804968215061,  
-0.15489516431237316,  
0.1250815357650574,  
-0.13157603031624435,  
-1.2324441762654297,  
-0.4179909399666764,  
0.3779753490492196,  
1.6472121643813018],  
[-1.1990978117137884e-16,  
0.0939706539344674,  
0.583570497583306,  
0.583570497583306,  
1.7474308983833136,  
1.7474308983833136,  
2.435631059267761,  
2.4356310592677604,  
2.435631059267761,  
2.4356310592677612,  
2.9757043839921162,  
2.975704383992116,  
4.1141402268542535,  
4.1141402268542535,  
4.889622687428616,  
5.08553065152385,  
5.14502423979873,  
6.38608549233117,  
6.405094454380333,  
6.807050165246778,

6.807050165246778,  
6.997225211250308,  
7.82493752524197,  
8.419597935808826,  
8.419597935808826,  
8.756502393683652,  
9.514795580339912,  
10.006329694888725,  
10.008671195739254,  
10.582332645019955,  
-0.18325409339400697,  
-1.8356335907661927,  
-0.6014425812689169,  
1.272854521157504,  
0.38561099010389943,  
-1.3354103698578268,  
1.2089446007576305,  
-0.16684037696101606,  
1.5272415494549387,  
-0.21803857489548387,  
0.659293576456549,  
-0.7629850988015884,  
-2.0880787600158244,  
-0.2200967935369742,  
-0.21257917133409554,  
0.05335328813343252,  
0.740881120097457,  
0.002552459203101907,  
2.0381278489789163,  
0.07009602349011958,  
-0.027486349535234322,  
-0.5162309983105858,  
-0.018107734929441965,  
0.3459554204227654,  
1.1337361200247116,  
0.6158218713410994,  
-0.5251391279578093,  
0.2758552924607382,  
1.227089028823027,  
-0.16405595633516176,  
0.7587337472599636,  
-1.1046949665522132,  
0.7157795020690486,  
-0.9666557350608269,  
0.5941166908158014,  
-0.3035426485157296,  
-1.1713314559961463,  
-0.3285214016177699,  
0.15201600725182188,  
1.158582769628082,  
-0.2335509332665805,  
0.021624313631101504,  
-0.7981749327134954,  
0.12400359670343174,  
-0.00041124409742626503,  
0.10665347356443583,  
-0.030437347790731137,  
-0.22360998336164295,  
0.21313944649575595,  
0.08788738041696632,  
-1.2878790640853577,  
-0.028446563531964782,  
-0.12898316604526575,  
-0.29469285393680966,  
-0.07114900510733681,  
-0.8104482788171727,  
0.6394923422746198,  
0.6811407094584414,  
0.15127654478155184,  
0.5799864823630293,  
-0.55116978803857,  
-0.5805840448115108,  
0.9630930231089359,  
0.9222833564508055,  
-0.28733988453131243,

2.645322235680672,  
0.02138581028992107,  
-0.12421624460779133,  
-1.4608772192659922,  
-1.289711141721096,  
-1.433469567857053,  
-0.01041716118532159,  
0.3377052351749707,  
-1.74263853738129,  
-0.6445874089376945,  
0.6790378089998735,  
0.0019732068694448615,  
0.6260241949545162,  
-1.3812938119718974,  
0.06110738334511842,  
0.919936405723882,  
-2.761538990972181,  
0.01773377957551518,  
0.6041489324828,  
-0.281847147959406,  
0.36931104439326196,  
0.14008962906529285,  
1.0402771661903438,  
0.40062198057764514,  
-0.03775531840468896,  
-0.4974133017905023,  
0.5298490799692606,  
-1.7184458207495306,  
-0.7561470763062167,  
-0.5888363413103725,  
-0.9669502040570058,  
1.3911426640670486,  
-1.922807929753264,  
-0.7347523142785206,  
-0.6976214468215837,  
-0.9022103009000106,  
-0.17554401086360705,  
-0.7004215075729389,  
-1.1648825394224225,  
-1.1285064327861984,  
1.3794410327712907,  
0.7524041737227146,  
-0.600926776988818,  
0.724704963452131,  
0.24574404734520428,  
1.3856850730269805,  
0.505698953761027,  
-0.030535393994814766,  
-0.4836980977841504,  
0.6166564120021005,  
2.4235804988343936,  
0.6827837636480912,  
0.3673788389460804,  
0.11748797515103059,  
1.4924513209248702],  
[ 1.112287766890805e-16,  
0.11579095179987547,  
1.7588846075757274,  
1.7588846075757274,  
1.998030831219005,  
3.2454648629288743,  
3.248106797240174,  
3.248106797240174,  
4.259596531772135,  
4.958175754196259,  
5.7210454174100525,  
5.861260496697951,  
5.861260496697951,  
6.7588095170100075,  
6.7588095170100075,  
6.758809517010007,  
7.044198424034494,  
7.044198424034494,  
7.044198424034494,  
7.044198424034494,

8.232813771743604,  
8.791432218349115,  
8.791432218349115,  
8.791432218349115,  
9.616347292478379,  
9.616347292478379,  
9.869492613451865,  
9.869492613451865,  
10.182429226961672,  
13.25758469112181,  
0.5705572906646224,  
0.09014038635403764,  
0.1263845657016112,  
1.0203985977202104,  
-1.095649826264738,  
0.019398597884167954,  
-1.3544747652103108,  
0.8866931148929111,  
-0.18940184666069662,  
1.0130589658671383,  
0.15424354259331335,  
-0.8117851912876255,  
0.28413415623416743,  
1.542699745821886,  
1.836477396464815,  
0.7160099188075301,  
-0.9589348876176362,  
0.00854407549207699,  
0.36750908199249616,  
0.7288091138524155,  
0.9748756553152056,  
0.7257579234395075,  
-1.9128288506616224,  
0.515489770530508,  
-0.8485176532957428,  
0.21376115901922352,  
1.0834633235702664,  
0.404913552038143,  
-0.12863840971929708,  
0.8333794222571905,  
2.496813054711946,  
-0.7354302042700512,  
0.27199375272502646,  
-1.0107781002238316,  
-1.201703662816619,  
-0.3331724830549245,  
1.3030593505928814,  
-0.8138384777541797,  
1.9586180892259586,  
1.1713603302631173,  
1.0819642334098143,  
-1.1784039537689197,  
-0.12146178641002908,  
-0.1717950232658355,  
0.13833462928205204,  
-0.8697724612180706,  
0.7515471411202548,  
1.166125613326729,  
0.37941686042382794,  
0.17074885851048915,  
-0.33600856179263133,  
-0.13669943521352546,  
0.548834657399268,  
-0.2522233718783481,  
0.009665778262181637,  
-0.5020120590858954,  
0.16617168999240312,  
-0.46390045473242114,  
-0.05573261329441784,  
1.1182956755615927,  
0.0937037366596967,  
-0.4441962997721035,  
-0.21050297984767188,  
-1.0381458298882043,  
0.830180513233935,

-0.8157309834659043,  
-0.5833742339287631,  
-1.5354704640903527,  
0.44493118131447734,  
0.13057382050598434,  
-0.7034976447329113,  
0.6218444459919024,  
-0.2420386731361673,  
-0.7867967091164098,  
-0.168935029173583,  
-1.6928247400206122,  
0.22571922404505704,  
0.1126763335131705,  
-0.22160264498444046,  
2.299575126838168,  
2.5415010654218975,  
-0.5449604787415219,  
-1.005432959888493,  
-1.722931012111005,  
-0.6732620373630841,  
-0.0004890899721480893,  
1.492586488782192,  
-0.9055437852306896,  
1.1298576359465664,  
-0.5182549439372126,  
0.6586606791613716,  
0.7929632788713356,  
0.08462141435268096,  
0.5066414628201175,  
0.6503902510816232,  
0.06456835392989443,  
-1.687283870544211,  
-0.2816102525113523,  
0.9601910446201565,  
-1.0364808528540121,  
0.32603884641661884,  
-0.37671408634672476,  
-0.16068551007585027,  
0.6157148912247653,  
2.0105220675930333,  
1.7580796652062145,  
1.7229426093703843,  
-0.5199627188331776,  
-1.3760925920420213,  
0.8290526991464299,  
-0.08765267414283408,  
-0.456659399307068,  
1.4313668535261046,  
0.635052489001378,  
2.136142869643981,  
-1.5755126698917075,  
-0.40116032394931217,  
-0.004321541181387126,  
3.301925406547275,  
0.7673504276272846],  
[ 0.49826187507447023,  
0.6110785201427625,  
0.6558173388435118,  
1.2433731466916595,  
1.2468055416987345,  
1.9464512542038723,  
2.109950686395802,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
5.054414830549875,  
5.106961698737131,  
5.488040579082762,  
5.488040579082762,  
6.832391146999917,  
6.967864562238176,  
6.967864562238176,

7.490508971727458,  
8.20118277218113,  
8.612503180124596,  
9.093659709060372,  
9.807153774862888,  
10.372385504551621,  
10.372385504551621,  
11.272736556325881,  
11.767303580595307,  
11.767303580595307,  
0.035679258194077725,  
-0.8723307875716305,  
-1.7560663493087938,  
1.9629136553479551,  
1.9120807210302333,  
-0.39357388790453784,  
0.036182026687196715,  
-0.21816401975370772,  
0.8090968256508778,  
0.22775227657680963,  
-0.9402388060640036,  
1.9199330583190146,  
-0.6293921442826633,  
-0.37521158500092616,  
-2.4122776248196542,  
0.47614923103710605,  
-0.2356719275662886,  
0.5930119757607211,  
-0.08067436637158562,  
-0.6975308853470512,  
-0.1533962892581602,  
0.6838091266999453,  
0.243129377869582,  
0.5896632240559074,  
0.12048284254834898,  
1.186903891075025,  
0.22948374273850122,  
-0.9592798973456383,  
1.431786126792839,  
1.099938502501145,  
-0.6421065764259075,  
-0.4570128400176702,  
-0.40361390122591434,  
-0.030699975686000303,  
0.5709596867047622,  
0.8129177753256275,  
0.0978347154858261,  
-0.1791413540365364,  
1.316347643480991,  
1.0669242344323897,  
0.9542637314281797,  
0.2732710750226029,  
-0.24925074976969727,  
0.14351675204102743,  
-2.058043419369877,  
-0.5772495977232713,  
0.4759355346590471,  
-0.3040209890415461,  
0.07360159687611288,  
0.11769956200453384,  
0.01709491725825118,  
1.1325236656251834,  
0.008658928128351846,  
-0.21852721169551936,  
-0.1826844911726131,  
0.39535377862993026,  
0.035729500082236576,  
-1.0747644579938396,  
-0.15992271631488378,  
0.8234408989300128,  
2.679077704708449,  
0.2559692131167249,  
1.5592174030452497,  
0.3453465662341248,  
-0.24046357809578378,

-0.6876498012434461,  
-0.01750342347144341,  
0.34704200676536884,  
0.2033679229118891,  
-1.5920113668255755,  
-0.5283783493172445,  
0.4351355192977228,  
-0.8281455342425702,  
0.2974457926897622,  
-1.336557258227178,  
0.2885982325597283,  
-1.2111847441179915,  
0.698629224522434,  
-1.072563817644129,  
-1.2092878769637225,  
-0.33153669598628793,  
-0.2558676939050336,  
-0.039300685015777354,  
0.5730206646846686,  
0.6772024906875076,  
-0.5431857921175166,  
-0.32242263836861185,  
-1.2435651530921474,  
0.6447338068594848,  
-1.1796614873773261,  
-0.5517178991847818,  
-0.9950127711245446,  
-0.750107619545704,  
1.546476758712725,  
0.7798072495873917,  
-1.3969546244577882,  
-1.3869625997614359,  
-0.5499269608373658,  
-2.0698482195340895,  
-0.31472418351029113,  
1.3858906356684872,  
-2.3234389152233144,  
0.8580050890595776,  
0.5574876161662472,  
0.12663545081840322,  
0.0024286165622580055,  
1.4351555562364873,  
-0.018100010671135307,  
-1.4466701603237728,  
1.0091335554802272,  
-0.25739419705547106,  
0.8584486110461004,  
-1.6353613496727522,  
1.3481381905015994,  
1.664215570319441,  
-1.4688501218242656,  
0.6630999772073086,  
-1.3598408860414706,  
-0.9086993193406631,  
-0.7720609621308895],  
[ 0.03916643192220903,  
0.09260151508853934,  
0.5125042140553085,  
0.5342494495137248,  
1.4070055183169814,  
1.4076098722130033,  
1.4080234932826805,  
1.9886432369288551,  
1.988643236970097,  
2.4501760969485846,  
2.4501760969572235,  
2.6141080657383133,  
2.614108094671839,  
2.6141080978874367,  
2.614108199851818,  
2.614108200075538,  
2.6141082008692407,  
4.121207830152765,  
4.126135109264967,  
4.126137501750553,

4.129417665319773,  
4.731890053629371,  
4.734221022017094,  
4.783748744413943,  
6.888546551790504,  
7.435120796142169,  
9.27338967383107,  
9.884598996480708,  
9.884598996488108,  
10.57466535326793,  
0.042050619766987055,  
1.2200437115279086,  
-0.1897539908832087,  
0.3883222993215419,  
-0.3953259161886337,  
0.9433481261689909,  
0.03976732857871137,  
0.380475950476648,  
-1.6480061036631655,  
0.19200671798130073,  
1.8964236385178486,  
0.5825466621902844,  
-0.7017933974726621,  
0.46167134168781887,  
1.3455780978346443,  
1.000341055668334,  
0.3220859397336833,  
0.4901021103591929,  
1.7507755726531005,  
0.22815940378303187,  
-0.27415827045663116,  
-0.06669089502017891,  
-1.2681856141960832,  
-1.4186851222947996,  
-0.7484212831710693,  
-0.2624358161393499,  
0.22137315279362701,  
0.8266616228870926,  
-0.28382763940078026,  
0.4526868734709094,  
-0.03876262869445461,  
0.028933904781200354,  
0.2124235174903725,  
0.5275601102845284,  
-0.035224229477880745,  
-0.11459385773709553,  
0.4537223625267385,  
1.3135706165796082,  
-0.4103066311241145,  
-0.06740865621875465,  
0.07865262902016133,  
-0.8220672300227196,  
0.05131914396597353,  
-0.012779296277522511,  
1.6650491211728184,  
-0.5271258879235212,  
-0.2286028431320702,  
0.9810985313826684,  
0.5796827949136435,  
-1.4216581678953852,  
0.908254540613963,  
0.7809397666182989,  
0.23060365236949015,  
-1.629683736567043,  
0.08687379015275534,  
0.5302421766128769,  
0.858319872120405,  
-1.2816124200556078,  
0.08255098737682609,  
0.49190330494839835,  
1.2241314669476433,  
-1.6043734869556,  
0.35480117328822147,  
-1.3692690448046365,  
0.08801115679730828,



-0.3416815622800032,  
0.5349891528238044,  
0.23599371094677032,  
-0.2955967206364773,  
0.7351110566185237,  
-0.1358629473726594,  
-0.2538927978152746,  
-0.18822579896800806,  
0.023625415865148318,  
-0.47104955898400697,  
0.3192033261234258,  
1.3512870657881308,  
-0.7816632422470443,  
-1.6469850516046918,  
0.27638573599623373,  
-0.3090269715855155,  
-0.4193062343229584,  
-0.1377874030219536,  
0.0004776579492072504,  
0.08325659247733753,  
1.4611032338266408,  
0.021431340914286272,  
0.20066912699708425,  
0.29328305426482204,  
2.42997753887945,  
-0.5690256391604135,  
-1.480840559800266,  
-0.1363946771767577,  
-1.376439435407693,  
0.06387998538825271,  
-1.110029094439266,  
0.9868538484965683,  
0.962243917255456,  
-0.41126656322102295,  
-0.657103189069447,  
1.1434637843768656,  
-0.9757973897576084,  
1.448315222432508,  
1.3110742046722172,  
2.3333185683193554,  
0.7520157773640208,  
-0.20203562372486106,  
0.34414613752805073,  
0.5926366260275047,  
-1.985044802604821,  
2.6078832019778186,  
-1.6883872397325923,  
-1.6784323905215754,  
-0.4297482144956373,  
0.6572781395405978,  
0.02277885553642172,  
1.3256214503718338,  
0.25673693454286806,  
-0.6358308725577859,  
-1.6133180674191239],  
[ 0.4366123913610663,  
0.4768198412180804,  
0.9843286193666714,  
1.2674678431689148,  
1.5775702096396949,  
1.5775702096396946,  
2.2591837513222837,  
2.2591837513222837,  
3.168921311818864,  
3.1689213118188637,  
3.1689213118188637,  
3.2207076420855234,  
3.220707642085524,  
4.00024951310582,  
4.479169433031019,  
5.572620903211533,  
5.572620903211533,  
7.169574827830268,  
7.200887753316444,  
7.200887753316444,

7.4320670533634186,  
7.4320670533634186,  
7.668889448658714,  
7.668889448658714,  
8.088052955990618,  
8.127936129548912,  
8.127936129548912,  
8.129700499301142,  
8.129700499301142,  
13.234708916500516,  
-0.8409114197195183,  
0.13809956722013594,  
-1.3698910408430074,  
-0.1271619514190957,  
-1.0028759735951214,  
-0.7519751568518348,  
-1.7027753599694198,  
-0.5003000098057334,  
1.7803062126367422,  
-0.6956057702973542,  
-0.5292841478808504,  
1.3371604427134443,  
-0.6271315116651272,  
-0.9849660401714492,  
-1.0245042646602094,  
1.7746289077120558,  
0.789646250683077,  
2.3274439120303834,  
1.0250145144124314,  
0.236963759763461,  
0.6449585291401012,  
0.5302895792637682,  
-0.17332551626046228,  
0.13296008629005646,  
1.3001365941190501,  
-0.5491163203391332,  
0.8939708861040915,  
-0.1183728413911535,  
-0.27672563627574315,  
1.7953720191393387,  
-0.00825054985875676,  
-0.6170579146731886,  
1.801545679753067,  
-0.6786704865717594,  
-0.5702663839537956,  
-1.2235657195316856,  
0.059502931568887765,  
0.15944146767128192,  
-0.5445588526685949,  
1.0645821939979259,  
-0.3246614360002631,  
1.6342475668463907,  
-0.6365693512803821,  
-0.25644806680599874,  
0.9153791587574333,  
-1.5555971818784813,  
1.7626038696684259,  
0.29250830199243494,  
0.4597874603079029,  
-0.4983420660721544,  
0.22206047990995867,  
0.11089125969329257,  
1.9712857917750568,  
-0.8482820514299444,  
1.7711968287204813,  
-0.3356021753581158,  
-2.239225908466879,  
-0.021402454584719684,  
1.6641712424719513,  
0.5059308187330879,  
1.9296669762106724,  
0.7155610478862724,  
1.024294278133781,  
0.2881031759975837,  
0.06318491357276658,

```
0.8308741396333285,  
0.16800005476886462,  
-0.26845892946467115,  
-0.378371667085078,  
-2.374474400887392,  
-0.26943703763693594,  
-0.698442208248677,  
1.5029972614102114,  
0.7682274655447995,  
1.7790823677975025,  
1.1233449399645796,  
-0.1962677980677998,  
-0.6013220679983903,  
1.243366811759978,  
0.23851493156650586,  
-1.3516830763738037,  
0.4546075088056473,  
0.45461165179145885,  
0.29299766155391044,  
0.9768506591689141,  
-1.3614782254940123,  
-0.1864841683590143,  
0.03417328589702677,  
-0.12392810093414776,  
1.4042342901901068,  
0.4181387945528863,  
0.6171624447156228,  
0.5887687464980093,  
0.07995045192475739,  
0.12406497411608935,  
-0.1304256749231809,  
0.5172871404602656,  
1.1235454838537668,  
1.5976273357881063,  
-0.7195312648953682,  
-0.7697726746437508,  
-0.1718403740134208,  
0.48757574872507614,  
0.7291603816887677,  
1.3754811895843486,  
0.06384938170591244,  
0.9009847125572167,  
1.0744001081352503,  
1.7305303874736466,  
0.491454536253661,  
0.11643540469065636,  
0.5925455840333324,  
-1.2877724397991297,  
0.052924560657905566,  
-0.8760423919600488,  
0.6313576901954856,  
2.736167065037608,  
0.029295634649204143,  
2.1044233481865446,  
0.6660786050345296]],  
    'run_time_sec': 43335.76831364632}}],  
'redundant': [ { 'config': { 'ansatz': { 'gateset': 1,  
                                          'layer': 30,  
                                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],  
                                                                    'cn': [ 0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5],  
                                                                    'r': 0},  
time': {'max': 10.0, 'min': 0.0},  
type': 'ising'}}},  
    'init_param': { 'value': [ 0.27654223573266234,  
                                0.27654223573266246,  
                                0.27654223573266246,  
                                0.4643738922966213,  
                                0.6582164862517121,  
                                0.6582164862517121,  
                                0.6582164862517121,
```

1.3424523496852623,  
1.47635793598756,  
1.47635793598756,  
3.385550316280557,  
3.385550316280557,  
3.385550316280557,  
4.494062371253785,  
4.494062371253785,  
5.0204758683966135,  
5.023404188660082,  
7.05704094573064,  
7.087391629397132,  
7.533802135057517,  
8.245970909352765,  
8.390887842007308,  
8.390887842007308,  
8.703391612007538,  
8.703391612007538,  
9.485545381639698,  
9.485545381639698,  
9.849437794456351,  
9.849437794456351,  
10.799155842585746,  
-0.12708089143278917,  
1.4168148977025445,  
-0.13519536748631492,  
-0.32308714516775877,  
0.06981336221044306,  
-0.034321895006426455,  
-0.18209443759399158,  
-0.024858958594746107,  
0.664488174834645,  
0.6897317665852637,  
-0.008774731192519907,  
0.625642551337688,  
0.6862410821653743,  
-0.7670419540542446,  
-0.48055390132433673,  
1.573964677292243,  
-1.0555745677813198,  
1.3159721165631335,  
-0.9138502497993347,  
-0.4641566084568084,  
-0.06966564000847691,  
0.039012746519005555,  
1.0827641697579717,  
1.2190093772283843,  
1.5391150382377632,  
-0.6675581491933664,  
0.09104662559232415,  
0.5283818781579022,  
0.04478118244404365,  
1.5836075485651113,  
0.251932560991488,  
-0.3949560381811925,  
0.8854639388207172,  
-0.8611267164776638,  
1.566928747241295,  
-0.15445151319573347,  
-0.01396050433941564,  
0.8172620115356718,  
-0.014658132241289147,  
-0.6623010385304499,  
0.6299284572753584,  
-0.15026947869759505,  
-1.2293112897827836,  
-0.5768656731979434,  
1.231557922062332,  
-1.447872926116422,  
1.4918722706131171,  
0.31945486783385635,  
0.43870804207253483,  
1.3582636256308331,  
-0.8478398442626237,  
0.799518029891469,

```

0.5539369896048497,
0.13453197415145846,
0.7167498104862234,
-0.06589109804263343,
0.041038724923082276,
1.151975756926885,
-0.052026838729968425,
0.3952978000808587,
-1.1754748970457833,
-0.01965607042871015,
-0.2456324144680547,
-0.01136184217607491,
0.022503168314325715,
1.1777923723104653,
0.14554117253938412,
-1.2287946167385297,
-0.9683737383161766,
1.073329622962756,
-0.7143583802799215,
-0.3545002682598469,
-0.31906110571926777,
-0.9597094503848127,
0.8825903987559673,
-0.08273415521500459,
0.2895039435279609,
-0.3388594197258312,
0.2406459434933063,
0.3824128671502841,
-0.5390555829405563,
0.3757684495816124,
-0.5015719636333678,
0.3958257688275076,
-0.6428354095046468,
-0.9178624992467067,
0.29327306512581747,
-0.09193285724698198,
0.1770091195095364,
0.6803523512851801,
1.05525770275555,
-0.4646437845139076,
2.2560908642344026,
-0.7500939262299234,
1.92959092052175,
-0.36895777993274226,
-0.04538283416771957,
1.2529586558275392,
-0.57805717638909,
0.3080585810325818,
0.031910210614104206,
0.18519950010488512,
1.3888566879174211,
1.087260914864616,
0.15259355623633358,
-0.08810167996863522,
0.07467874103808375,
1.4444893382870363,
-1.446220680213735,
0.8215180856176293,
2.0151723649306295,
0.13454991965456886,
0.21923381008732426,
0.31112145477192793,
-0.8977876743954992,
0.10239876571985529,
-1.0132922278363503,
-0.3794863035801566,
0.8437803973608401,
1.111671691788496]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,

```

```

1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
    'def': 'ising'},
    'output': { 'draw': { 'fig_dpi': 100, 'status': False, 'type': 'png'},
                'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#2'},
    'redundant': { 'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]],
    'run': 'redundant',
    'state': 'dmatrix',
    'vqe': { 'iteration': 1,
              'optimization': { 'algorithm': 'SLSQP',
                                'constraint': True,
                                'status': False}},
    'zne': { 'data_points': None,
              'degree': 0,
              'method': 'richardson',
              'sampling': 'default'}},
    'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 '
                                     '+ 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + '
                                     '1 X 5 X 6 + 1 Z 5 + 1 Z 6',
    'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z 0 + 1 X 1 '
                                                'X 2 + 1 Z 1 + 1 X 2 X 3 + '
                                                '1 Z 2 + 1 X 3 X 4 + 1 Z 3 '
                                                '+ 1 X 4 X 5 + 1 Z 4 + 1 X '
                                                '5 X 6 + 1 Z 5 + 1 Z 6']},
    'output': { 'data_points': [ [4, 2, 0, 0, -6.51493088468928],
                                  [12, 6, 0, 0, -5.310706408751286]],
    'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                          'identity_factors': [0, 0, 0, 0],
                          'noise_level': [4, 2, 0, 0],
                          'noise_profile': { 'noise_on_init_param': {
'status': False,
0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'status': False,
0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}],
'run_time_sec': 4.555899143218994}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': { 'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.48023040681030116,
0.7029544315470944,

```

0.722671987246733,  
0.9307929858945541,  
0.9307929858945543,  
2.546598088688794,  
2.546598088688794,  
2.546598088688794,  
2.546598088688794,  
5.184334435330857,  
5.195111458618343,  
5.47436411399969,  
5.47436411399969,  
5.47436411399969,  
5.47436411399969,  
5.47436411399969,  
6.068336244524409,  
6.068336244524409,  
7.838605251840715,  
7.912250316107233,  
7.912250316107233,  
8.562517202814183,  
9.063385768597811,  
9.216218862905647,  
9.216218862905647,  
10.84047371877396,  
10.84047371877396,  
11.044358714867027,  
11.375406566932424,  
11.375406566932424,  
0.18886549713610382,  
0.6040291443391601,  
-0.9727809979878402,  
3.008209947509642,  
0.3239743149147096,  
-0.643987619924633,  
1.0739882269552894,  
0.4935103262912805,  
-1.1713673989643745,  
0.32339055167680386,  
-0.8254170399860232,  
3.387204293956005,  
0.5437302598099015,  
-0.6585961721148387,  
1.0903163929414719,  
-1.5261906384818182,  
1.102349928722959,  
-0.7373436929054379,  
0.1712635196093208,  
1.2086697581514199,  
-0.4977298668106944,  
-0.8828019932256734,  
-0.13051782426094366,  
0.048744185631251574,  
-1.0535030780910155,  
0.5224555306604155,  
-0.9502111367985572,  
-0.2573420205933925,  
1.5833039752620888,  
1.3806480812363842,  
0.3864833677006273,  
-0.0006284730712113316,  
0.6487740408134013,  
1.697829570896293,  
-0.20023867528920775,  
-0.32438662287273723,  
1.3674639807988553,  
-1.5592347723565667,  
-0.6294582959326964,  
1.111157394071659,  
1.4895912958038178,  
-0.7203901402661329,  
-0.027076706863032294,  
0.009574786781832467,  
1.1437695218822916,  
0.11720143179507149,  
1.0973549625545624,





[illegible]

```
        'r': 0},
        'time': {'max': 10.0, 'min': 0.0},
        'type': 'ising'}},
'init_param': { 'value': [ 0.5118290521669792,
                           0.9034573591840084,
                           1.0514460879099101,
                           1.1283814725964603,
                           1.1293980629167455,
                           1.6874068541059999,
                           1.8362001710030256,
                           2.594529848453243,
                           2.5949023258749775,
                           4.384420392533986,
                           4.804388533064279,
                           4.8044974726668155,
                           4.925049921883437,
                           4.925049921883437,
                           6.055903002618935,
                           6.0650337145794,
                           6.06510024924717,
                           6.06510024924717,
                           7.719643893437192,
                           7.719643893437192,
                           8.110116534451196,
                           8.374448879129652,
                           8.374448879129652,
                           9.29045698473019,
                           9.2929923765699,
                           9.977025927736127,
                           9.977025927736127,
                           9.977438303479875,
                           11.277250876863835,
                           11.588901828478656,
                           -0.5970483257864091,
                           1.048395642841534,
                           0.3563299433581316,
                           2.04182497417867,
                           -1.0659189653240388,
                           -1.5711224255679066,
                           -0.6854026923334804,
                           1.3002799990574343,
                           0.334979527312172,
                           -0.41771661057992626,
                           -0.5255960701407614,
                           0.9200835209290303,
                           0.5840294212204432,
                           0.4309612994747514,
                           0.010788324288593443,
                           0.8398650983618882,
                           0.35555521736822654,
                           0.33383672576306345,
                           -0.03972798241435421,
                           -0.5808926346218187,
                           -0.6217506829607715,
                           -0.022449055124049946,
                           -0.4671428723737863,
                           1.3840583406465645,
                           3.321823997583478,
                           1.9516123562000514,
                           2.109430068020724,
                           0.17138900458361278,
                           1.0734765554988877,
                           1.1591682463434823,
                           -1.5085197494005436,
                           0.3709514368460093,
                           -0.08354812013321816,
                           -0.6849414455501801,
                           -1.1807064172516142,
                           0.1889544406654655,
                           0.45125852432694835,
                           0.40946867023093825,
                           0.9591749175330944,
                           0.862406962512403,
                           -0.47565451021668054,
                           0.14791469386649075,
```

0.012323642821740255,  
-0.3613715829994197,  
-0.6520104899254531,  
1.1500641632479522,  
0.11480411675389499,  
0.37929728325133344,  
-0.12818017639377846,  
1.5548403554359806,  
-0.08803696907532751,  
0.16058007713541472,  
-0.2835300528775952,  
1.4317946638041426,  
0.04218231832431045,  
0.6164913379423986,  
-0.5546192578057587,  
-0.0016176435191898148,  
0.3455446109244303,  
-0.7983090776945799,  
0.06548494602750325,  
0.09601011255154575,  
-1.274882751616874,  
-0.6639296860891427,  
0.08468574728059233,  
0.09178155492125434,  
-1.9746588496307496,  
1.363083624655819,  
-0.11754172722968637,  
-1.7454296260872237,  
0.689437867548643,  
0.09536601432398076,  
2.1875690275532618,  
1.9737367040865754,  
0.19623670188051764,  
1.3618525198389628,  
-1.6551377680800423,  
-1.2796187335858575,  
-0.02979150349567955,  
0.3655877448114123,  
-1.339933806945279,  
-1.6131280858420662,  
1.1268021774842836,  
0.7853899025443938,  
-1.214954346638235,  
1.881374469676006,  
-2.2108375055617597,  
0.38299461206746305,  
-0.062378913993248956,  
-1.0812916442950207,  
0.19113842494911862,  
0.43947065709017896,  
1.4340329690981122,  
-2.1914706359927933,  
1.683520172253517,  
-0.4151753501170658,  
0.2652280013518245,  
-0.09829123134965576,  
-0.4033858255054015,  
-0.09488290407421365,  
1.1087820722198931,  
1.3758250784849964,  
0.3693308876448478,  
-1.4774754586810708,  
0.45790576106810227,  
-1.318961759734687,  
1.2898775251023542,  
0.5291693857421421,  
-0.7225860054677886,  
-0.6024865845145562,  
1.1258609582335735,  
1.4545810101615688,  
0.4988359655120556,  
0.39968483637691726,  
1.4778005154845164,  
1.6358502222921723,  
0.07081811420225437,

```

1.5336807499569445,
-0.7595143926860392,
0.07947795439670366]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noise_free_time_evo_ric2_sample#10'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 '
'+ 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + '
'1 X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z 0 + 1 X 1 '
'X 2 + 1 Z 1 + 1 X 2 X 3 + '
'1 Z 2 + 1 X 3 X 4 + 1 Z 3 '
'+ 1 X 4 X 5 + 1 Z 4 + 1 X '
'5 X 6 + 1 Z 5 + 1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.406033238196167],
[12, 6, 0, 0, -5.147683680770249]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'status': False,
'value':
0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'status': False,
'value':
0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}],
'run_time_sec': 4.950466632843018}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [ 0.5,

```

```
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.23818326834520384,
0.242015507589488,
0.5292100600091615,
0.5598196968290768,
0.5598196968290768,
2.3451854381830244,
2.3451854381830244,
3.8453025861748578,
3.8453025861748578,
4.395137112369032,
4.408833101975425,
4.829585475162733,
4.867115107997544,
5.058958687371625,
5.058958687371625,
5.058958687371625,
5.581243202757385,
6.011433944644334,
6.011433944644334,
8.358003932454157,
8.358003932454157,
8.358003932454157,
8.371420896509267,
8.783744346022278,
8.783744346022278,
9.34189587380724,
9.34189587380724,
9.39608576624051,
9.726727464435275,
10.95102910414735,
0.14721560345391302,
1.0205767628001141,
0.40564926087548847,
-1.9238321605823567,
-0.04729505851188324,
0.482541600628026,
0.1152155677775581,
0.8524320040134185,
0.42380767990264745,
-0.6219665889019169,
-0.05759638705357143,
0.8161328242190486,
0.7425402472775383,
0.7535392998290764,
1.8314745216576223,
1.3334023135030668,
0.05552193989453376,
0.9691374289368472,
-0.07338372949421543,
-0.6690664310785921,
1.168533104165511,
-0.01962836639606316,
0.6576122461884292,
-0.037637936325233226,
-0.0009647519828692927,
0.4524839512418326,
-0.013115244288784337,
1.6270372625341938,
1.182284078721198,
0.9533845712158122,
1.0956662941001023,
-0.9647918240366662,
0.1897778948773928,
-0.04047520420354409,
0.5790278460715794,
0.631719469583885,
-0.3335418357294817,
```

1.0603186443819097,  
-0.7449471003423949,  
0.1630231005006795,  
-0.07563007210422526,  
-1.1009042311153838,  
-0.34587951137957407,  
-0.22408475871037167,  
-0.6364303490666092,  
-0.5245531829065874,  
-0.7807390048523051,  
-0.7767575864285188,  
-0.9679768325508518,  
-1.8691843526791756,  
0.4783530568164554,  
0.6133546874260105,  
-0.20020986269221935,  
-0.41532071148562183,  
-0.8557118152516873,  
-0.16985308585729458,  
0.8428338023785568,  
0.6750667051632169,  
1.2795031602880573,  
-0.41384224674171627,  
0.3213362409234008,  
1.2340309605381181,  
1.0506369357289735,  
-0.6415500741723684,  
-0.9628453188140567,  
1.935214357876566,  
1.4159154638103797,  
-2.0864443113151867,  
-0.07426020994129089,  
-1.0538315394110076,  
0.2589745455351295,  
-0.2955978932252484,  
-0.030644528099012087,  
-0.8602288471584197,  
-0.09490606960216369,  
0.4190622694749842,  
-1.5667390101922392,  
-0.7804920738383083,  
0.1255849265457167,  
0.5884338319364165,  
-0.46028089859616994,  
0.2488277677353687,  
-0.7513271615815256,  
-1.0561258734551267,  
0.3697237180501531,  
-0.7108432439071602,  
0.5137418203820399,  
0.946767478727941,  
1.619957961978311,  
1.2944079622561346,  
0.21625880379379211,  
0.007168703139473973,  
-0.334764182643075,  
-0.9086121674985949,  
-0.8247776105092918,  
-0.5734460393428641,  
-0.4381826298821608,  
-0.44306191141826123,  
-0.23860269421390362,  
-0.03343496826073402,  
-0.008972211649351379,  
1.2196121588758198,  
1.5985131140815898,  
0.060325450296581484,  
-0.7312434635304047,  
0.9413542695101463,  
-0.6701271691421761,  
-1.0680925542186157,  
-0.5192506372311365,  
1.5594784335685845,  
0.17928043514789443,  
0.2455246384495121,

```

-0.053106843359071614,
0.7488220810664211,
1.3030207698426615,
-1.787387332504871,
-1.1184519607509558,
-0.2511275398302805,
1.445676213762956,
1.5991220174606833]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'ngubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#4'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 +
+ 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 +
1 X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z 0 + 1 X 1 X
X 2 + 1 Z 1 + 1 X 2 X 3 +
1 Z 2 + 1 X 3 X 4 + 1 Z 3
+ 1 X 4 X 5 + 1 Z 4 + 1 X
5 X 6 + 1 Z 5 + 1 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -6.630764461698827],
[12, 6, 0, 0, -5.461578440310041]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'status': False,
'value':
0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'status': False,
'value':
0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}],

```

```
    'run_time_sec': 4.446979761123657}},
{ 'config': { 'ansatz': { 'gateset': 1,
                        'layer': 30,
                        'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],
                                                    'cn': [ 0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5],
                                                    'r': 0},
                        'time': { 'max': 10.0, 'min': 0.0},
                        'type': 'ising'}},
  'init_param': { 'value': [ 0.4349098035102067,
                             0.5281397824211302,
                             0.6402833431740305,
                             0.701719039924861,
                             0.8953768954552646,
                             1.4118719346144908,
                             2.230113621742168,
                             2.6548053250922607,
                             3.10433397641996,
                             3.1043339764199596,
                             4.146783795497047,
                             4.146783795497047,
                             4.149760661232294,
                             4.149760661232294,
                             4.223539194779984,
                             4.223539194779984,
                             6.7727886487081435,
                             6.7727886487081435,
                             7.243551717080481,
                             7.282491880183138,
                             7.282491880183137,
                             7.282491880183138,
                             8.806989173945695,
                             8.80698917394569,
                             9.706285648296737,
                             9.809777023075187,
                             9.837118725166619,
                             10.701586770517197,
                             11.185931122995514,
                             11.185931122995514,
                             0.39919688039300266,
                             1.4533249104921768,
                             0.7852252158845567,
                             -0.4957764525834907,
                             -0.3354719566017423,
                             0.16097458435951068,
                             -0.21971891747261646,
                             1.5370438656668401,
                             0.26531517225969137,
                             -0.6386119707402834,
                             0.37748437574064975,
                             1.2333814560270282,
                             0.5934062959304571,
                             1.633059089666515,
                             0.31170790405459564,
                             0.3995146629536743,
                             -0.11155094016301184,
                             0.8138063699882787,
                             0.019467271717771087,
                             -0.38186317682975884,
                             -2.778803401027002,
                             0.7887082829537533,
                             -3.1348050840084074,
                             -1.5109224736536222,
                             -0.38589710406642097,
                             -1.105927053527023,
                             0.3451707237315739,
                             0.6290043291617069,
                             -1.834722402137916,
                             -1.0551446159380258,
                             -1.3581260193610523,
                             0.9666180881078981,
```



-0.05759676522292653,  
1.1866392284178628,  
-1.1308471740259582,  
0.34327443183487805,  
0.17662613760194443,  
-0.043135596735193626,  
-0.03667546733606037,  
-0.4901895513664937,  
-1.0399227541005371,  
0.4880459765792483,  
0.053089003166299456,  
-0.6259966396796703,  
0.03159579372412852,  
-0.09798805529491862,  
0.052872660107769434,  
1.490194875693949,  
0.22167423812356596,  
-0.33497064714209324,  
1.0144679614160885,  
0.01608415027143934,  
0.49167899744128424,  
0.12491439548600353,  
-0.1329609067962543,  
0.8639852596635488,  
-1.6607871811173882,  
0.2801513494447602,  
0.3908501333463579,  
0.6044891435983025,  
0.08637544621327581,  
1.2270127042754213,  
0.11860545946003472,  
-0.13066468162372125,  
-0.998222267933649,  
-1.2643438207146234,  
0.7835210648968657,  
0.8370312354478452,  
0.06527740704106412,  
-1.0235950282739155,  
-0.705070781232052,  
0.037682760290170314,  
1.4778132318704873,  
1.7053977225841355,  
-0.1291331271719845,  
0.1648924115529835,  
2.208642048449397,  
1.1885953055185114,  
-0.8138037079028133,  
0.6715189891287302,  
0.7819572861394978,  
-0.4022064636590845,  
-0.3927127310055937,  
-0.4118784323717791,  
1.3463239978578432,  
-0.3323606385924751,  
0.6664683657180488,  
1.58852177854836,  
-1.212203169826861,  
-0.031436536468697034,  
0.5094262403458202,  
-0.0616688967239856,  
-0.0666169691754888,  
-0.7277012125404719,  
-0.12684196683036533,  
0.5325519345188151,  
2.2778420441533447,  
0.8735933622003313,  
0.9907279467768721,  
1.1448787224294625,  
0.4291077507842401,  
-0.21356701746617238,  
1.7174041100732933,  
0.1885112766205208,  
0.3630143936992631,  
0.6395640633025061,  
-0.2937369198596852,

[illegible]

```

0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4]],
'run_time_sec': 4.373898983001709}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': { 'value': [ 0.3463233138801294,
0.34632331388012944,
0.3463233138801294,
0.3463233138801293,
1.2403205490491955,
1.38033446895038,
3.6939218351946623,
3.6939218351946623,
3.693921835194662,
3.693921835194662,
3.9412089126587,
3.9412089126587,
3.9412089126587007,
3.9412089126587007,
4.8310999601027795,
4.870844593548848,
4.900228671797898,
4.9002286717978984,
4.9002286717978984,
4.900228671797898,
5.70167657474683,
6.21188441483336,
6.21188441483336,
6.686419232103557,
6.723504371727371,
7.618130890836856,
7.618130890836856,
9.420364260644014,
9.420364260644014,
10.775132222422771,
-0.3525750090684208,
1.2748976558430758,
-0.16146998454247521,
1.3224575871686013,
0.0349265192498484,
0.36138711032415904,
-0.5043488106619078,
0.7634801084306476,
-0.3536814593617201,
0.9606809354246906,
-1.1143894720984433,
-0.45289061390722213,
-0.1605333784989486,
-1.594210268458609,
-0.09465166736510336,
0.11132251138190599,
1.004235666711761,
-0.23115493220428254,
0.9451761882751959,
-0.3707284170975133,
-0.17782948231634454,
-0.18433417990028922,
-0.06421460341189031,
-1.155489001827845,
-0.2074908306187579,
-0.036360325422879626,
0.5283181819327893,

```

0.3603171208434518,  
0.6819349944270952,  
-0.2733083993242672,  
0.7075879191324372,  
-0.042779623335368125,  
0.7032435595714176,  
-0.7363942983542189,  
0.9583235184546098,  
-0.5892472427173001,  
-0.7139877518112785,  
-0.12446625268371646,  
-0.439646171766664,  
0.7129808957109575,  
0.3373075268097138,  
0.3345550414369601,  
-0.38068761370203624,  
0.07864964370676188,  
-0.3383553862900091,  
0.6633419895127639,  
-0.578720703894673,  
0.486162302530746,  
-0.06112668401522289,  
0.34417654454775265,  
-0.09182266750822224,  
0.012215000731405658,  
0.5658291917160285,  
-0.16728488191683846,  
0.3754616489195623,  
-0.30497315054621493,  
-0.7559846133933803,  
0.9474959005813702,  
-0.5904076686561035,  
-0.2620011537974264,  
0.1328515248519479,  
-0.44066408562446224,  
-0.7849425610737308,  
0.44059474279745625,  
-0.04646983134951628,  
0.27897770882356554,  
0.36838349877106535,  
1.1610009997739648,  
0.9058411506824863,  
0.3119955912029684,  
-0.5265683545543336,  
1.0661822357546584,  
0.8560044406571757,  
0.5004409227892788,  
0.5192086876555008,  
-0.0019665558968806392,  
-0.23949800878404184,  
0.32563956832297103,  
0.795323960796817,  
1.5213873243487468,  
0.8637563634588281,  
0.07945031145196896,  
1.7583315097859118,  
0.5335864884320034,  
-0.1366270407456156,  
-0.9111102828185913,  
-0.41650979281126865,  
0.20926691692934202,  
0.2776061293997892,  
1.4257231544028384,  
-0.10754544247245298,  
1.0035199546983695,  
1.1162390986419686,  
1.7211522778091677,  
-1.4332245925979028,  
1.4417595659646931,  
-2.106784537892007,  
-0.6878309432904478,  
-0.20360639354575213,  
0.6373705186717347,  
0.051333236332203484,  
-0.35868991955772395,

```

-0.24365907607080922,
1.619736185871098,
0.5895182658245096,
-0.6086170057348131,
0.39774539931448055,
1.409837948786624,
0.17438880158294706,
-0.0415548590378924,
0.1413623732119859,
-0.8192475896231625,
0.5823982141653503,
-0.8462302367353051,
-0.60454163385331,
1.8216629921858374,
1.2634551976945552,
-0.40200420270308274,
-1.5954759495917508,
-1.7732438129518737]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#3'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 '
'+ 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + '
'1 X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z 0 + 1 X 1 '
'X 2 + 1 Z 1 + 1 X 2 X 3 + '
'1 Z 2 + 1 X 3 X 4 + 1 Z 3 '
'+ 1 X 4 X 5 + 1 Z 4 + 1 X '
'5 X 6 + 1 Z 5 + 1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.1514222647937595],
[12, 6, 0, 0, -4.906882414400225]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'status': False,
'value':
0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': {

```

'status': False,

'value':

0},

'noise\_prob': [ 0.001,  
0.001,  
0,  
0],

'status': True,

'type': 'depolarizing'},

'odd\_wires': 4]],

'run\_time\_sec': 4.746487617492676}},

{ 'config': { 'ansatz': { 'gateset': 1,

'layer': 30,

'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],

'cn': [ 0.5,

0.5,

0.5,

0.5,

0.5,

0.5],

'r': 0},

'time': {'max': 10.0, 'min': 0.0},

'type': 'ising'}},

'init\_param': { 'value': [ 0.32980400918867037,

0.7818596814437996,

0.9680306497310072,

1.0586432954274991,

1.7663116348413028,

1.8956491295658664,

2.0436116769319477,

2.0436116769319477,

2.0436116769319477,

2.1846619555479685,

2.1846619555479685,

4.516997836642403,

4.516997836642403,

5.3166564351730035,

5.320130741320412,

5.399447086770547,

5.400046100307029,

5.400046100307029,

5.400046100307029,

5.400046100307029,

7.097750404951498,

7.618222769006738,

7.956666567531361,

7.956666567531361,

8.961109688308255,

8.961109688308255,

11.028500695271937,

11.5809418583784,

11.5809418583784,

11.5809418583784,

0.24114173221382337,

1.3754512844042854,

0.9720111739434927,

-0.29877116871955545,

-0.029737313498699618,

0.3185153459444675,

-0.31840745367437817,

0.6801602139502809,

-0.015407845998522466,

-1.114484654283524,

0.22997676136047449,

1.5201821520192487,

0.3217486942799661,

0.43678760134757944,

0.17618749246228715,

0.7010359103792874,

0.3446701255696699,

1.4700166379981474,

0.3471333265905846,

-0.968444017764766,

-1.1485269521507444,

0.3282504398407059,

-0.7898554413193151,  
-0.22157985789400653,  
0.4570931682042821,  
-0.22158635023930806,  
-0.36549836384277606,  
-0.2366283880333898,  
0.4114765778384287,  
-0.7694643480660831,  
-0.40507000819737765,  
-0.6576468499882752,  
0.2023600853039859,  
-1.2917280200640486,  
0.32702771491506877,  
-0.07546137553843744,  
-0.7713328193108817,  
-0.8163562225239717,  
-0.07772489804090182,  
-0.32841576637855896,  
-0.05728139293162625,  
0.8564947637293437,  
0.15384434981345546,  
0.41944080031994563,  
0.16884394015055976,  
-0.010490661309829376,  
-1.3198249528292274,  
0.07128101806419536,  
0.03515395872296211,  
-0.09826644736389979,  
-0.06882299183557238,  
-0.7062443088386591,  
-0.5280915567870916,  
0.14860690208212682,  
0.338235073517239,  
0.012130023587481156,  
-0.037483081002571056,  
0.8881056862099682,  
0.06312673968269537,  
-0.44738898868242327,  
-0.2463284936792685,  
1.1708672891281489,  
0.5297819270424092,  
-0.5463182826640249,  
-1.667403353493104,  
1.3713545814180228,  
0.9413366263710182,  
-0.021951472934173096,  
1.0345046397029698,  
-0.8002739446090432,  
1.076242700462428,  
0.04994674089563993,  
-1.446235170371471,  
-0.3268246709561185,  
0.6264234635598642,  
-1.2465048991503196,  
0.1169092097763034,  
1.2453937722962254,  
0.7220287063888942,  
0.8114212311039525,  
0.18333674920471413,  
0.7345776889004225,  
0.9807678368065545,  
0.8703572591074042,  
0.28720991162605214,  
-0.9085817320602367,  
1.1216621938695932,  
1.1327477502874412,  
-1.8285395156530388,  
1.4231155243966302,  
0.08156271721069372,  
0.18027327076782884,  
-0.10302960773112253,  
-0.5560482514096969,  
-0.09484541903718098,  
0.5886430341587933,  
-1.1674014904638685,

```

-0.03940950630369794,
0.2792515765657198,
0.08214125135098017,
0.04344924016389119,
-0.7787970529711157,
0.07887586110139429,
0.7532574519080738,
0.17107625040009872,
-0.4128415687827808,
1.3723943620028143,
1.4278581324344195,
0.5879977529754344,
0.28910810409117477,
-1.4412046993697643,
1.624844367134446,
0.19366683662945536,
0.3179841250458877,
0.5357240606734743,
1.5680682524509713,
0.04418323830986127,
0.2311137213204739,
2.8741283660232546,
0.9612408402592636]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#5'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 '
                                '+ 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + '
                                '1 X 5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z 0 + 1 X 1 '
                                                         'X 2 + 1 Z 1 + 1 X 2 X 3 + '
                                                         '1 Z 2 + 1 X 3 X 4 + 1 Z 3 '
                                                         '+ 1 X 4 X 5 + 1 Z 4 + 1 X '
                                                         '5 X 6 + 1 Z 5 + 1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.720969040841223],
                             [12, 6, 0, 0, -5.577003279994283]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': { 'noise_on_init_param': {
'status': False,
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'value':
0},
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},

```



```

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': { 'noise_on_init_param': {
    'value':
      'noise_prob': [ 0.001,
                      0.001,
                      0,
                      0],
    'status': True,
    'type': 'depolarizing'},
    'odd_wires': 4}],
  'run_time_sec': 5.059067964553833}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                         'r': 0},
                                'time': {'max': 10.0, 'min': 0.0},
                                'type': 'ising'}}},
  'init_param': { 'value': [ -4.1290471568429383e-17,
                              0.028387941050870547,
                              0.028387941050870516,
                              0.028387941050870544,
                              0.4764187545019148,
                              0.485154879376271,
                              0.7094706976105217,
                              2.998376901501724,
                              3.486264965503922,
                              3.487775573446841,
                              4.058897205630428,
                              5.020552086463093,
                              5.02158492362958,
                              5.02158492362958,
                              5.0846878698400815,
                              5.0846878698400815,
                              6.794704827143902,
                              6.794704827143902,
                              6.794704827143902,
                              6.794704827143902,
                              8.013356083289752,
                              8.21076169573117,
                              8.21076169573117,
                              8.633075344303478,
                              8.633075344303478,
                              8.930018414781724,
                              8.930018414781724,
                              8.930018414781724,
                              9.990329186240457,
                              9.990329186240457,
                              12.915390927357043,
                              0.8289215528981712,
                              0.6465354442587259,
                              -0.06922368073773534,
                              -2.0853926237797484,
                              0.25605409461249207,
                              -0.765586831155604,
                              0.9589723041272441,
                              0.27455658215646966,
                              -0.07189982532198122,
                              -0.3449139525561357,
                              -0.46800027418386986,
                              1.016480689947782,
                              -0.9706976058410632,
                              -0.9556868223128826,
                              0.9323574793538898,
                              -0.4376613900889883,
                              0.44138701419965265,

```

1.4418520162063444,  
0.8420619129497768,  
-0.025530845682239494,  
-2.3076344184440156,  
0.37458463155346333,  
-0.47031338116346383,  
0.07338001085955462,  
-0.869249007732584,  
1.6824786550253577,  
1.719346297136726,  
-0.9622509832303179,  
0.5779076253870294,  
0.4760527439731688,  
-0.2451715046346434,  
1.5906513054768954,  
0.35918458386075697,  
-0.44817294000256097,  
-0.37416377940751877,  
0.37048554789855764,  
0.693137718643464,  
2.288219219235325,  
-0.26501198620577204,  
0.3689053264668303,  
0.10166782579927121,  
-0.3356073800920907,  
-0.6413954053758932,  
0.28636656044125136,  
-0.8690978212322298,  
1.166030172665772,  
-0.46365263204645707,  
-0.8505396438729699,  
2.4328989003329693,  
-1.4554443951257197,  
2.09134311034601,  
1.7695145471360614,  
1.1170184462314887,  
0.20325573406500014,  
0.34206355374635444,  
0.016804831103183593,  
-0.19882507083844791,  
1.4011478969931443,  
-0.0572616468882171,  
-1.3773340344964602,  
1.1031086912886459,  
0.47433623341773395,  
-0.037679845343088075,  
0.7450954028512253,  
1.3114871459373192,  
-0.18651966717154955,  
1.0750199871192778,  
0.48905379729033566,  
-0.6281827821606347,  
1.322074656325554,  
-1.4761484868509396,  
0.2859918816514792,  
-1.0033541595176405,  
0.8264053813863532,  
0.622010811103528,  
1.1636747207646185,  
-0.31883271288389914,  
-0.0013981850979601159,  
-0.09999405171802342,  
1.3085280853238759,  
-1.3727969089464465,  
-0.08341159264840771,  
1.6249369276484606,  
-0.28082331570516694,  
1.863294400254821,  
2.2932652495309953,  
1.4849536675442596,  
0.6811668802751195,  
1.5380110980874968,  
-0.6615225065895972,  
0.4000828281024264,  
0.33932121588009856,

```

0.48855764825038867,
2.5371111232777053,
-0.7260430040504564,
0.09005940379987407,
-0.8762980817992282,
-0.23800314057977784,
0.9728027685352436,
-0.20857834368009137,
0.6148333457084475,
-1.5171898336040224,
0.8658542069129427,
-1.6478287868490311,
0.5770049367106069,
0.134497700004433,
-0.11612046371881249,
1.5826352840237945,
1.6045820840261675,
-0.08805669980595342,
-1.507745125921201,
-0.11276651576435986,
0.07206005105970639,
-1.7788122679933258,
-0.002988765738482436,
0.7255804452314191,
2.7661804504965604,
-3.1943627011957507,
-0.07088434770936546,
0.10949711075632612}],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                'r': 1},
               'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#1'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 '
                                '+ 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + '
                                '1 X 5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z 0 + 1 X 1 '
                                                         'X 2 + 1 Z 1 + 1 X 2 X 3 + '
                                                         '1 Z 2 + 1 X 3 X 4 + 1 Z 3 '
                                                         '+ 1 X 4 X 5 + 1 Z 4 + 1 X '
                                                         '5 X 6 + 1 Z 5 + 1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.833109640228285],
                             [12, 6, 0, 0, -5.610198560557998]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': { 'noise_on_init_param': {
'status': False,
'value':
0},
'noise_prob': [ 0.001,

```

```

0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'status': False,
0},
'value':
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}],
'run_time_sec': 4.242884874343872}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.4319322451408806,
0.4441934852523559,
0.5878315575931067,
0.5878315575931067,
0.5912427958750637,
0.5947187380620651,
0.5947187380620652,
1.5628074958209335,
1.568718083448373,
2.013035808837258,
2.013035808837258,
2.013035808837258,
2.0277481086167364,
4.114573484042011,
4.1154343976538055,
5.358852938788934,
5.358852938788934,
5.549639110185835,
5.667644288942511,
5.6706149635077026,
7.063797010237488,
7.658675772413245,
8.123010743902626,
8.633070512181217,
8.7849794748515,
8.7849794748515,
10.749769122252356,
10.89899813672382,
11.413879450074099,
11.413879450074099,
-0.04151001581527148,
-2.751209241920508,
-0.5056705094410174,
-0.406548832581749,
0.8633340895103881,
0.17259893989954428,
-0.21235924407313156,
-0.5485334561985523,
0.2012951527025238,
-0.23858034563229433,
2.1364176057207223,
0.7817014982866842,

```

-0.1108899918027214,  
0.6048531661014985,  
1.809261328558185,  
-1.1786415575821785,  
-1.0827170099436865,  
0.4109384498547832,  
0.8090945308822337,  
-0.9356585252219308,  
0.28697429006677655,  
-0.15332459566133277,  
1.2998079093160566,  
0.3870967504567973,  
-0.2413465423953762,  
1.001771196320206,  
0.1138394509020578,  
1.3220786271535379,  
-1.1806565063083097,  
2.2789659185869464,  
0.11875741943281123,  
-0.15631084464392242,  
-2.14680662310284,  
0.18035127914430246,  
-0.260880073181003,  
0.21031876899961,  
0.7641152777599183,  
1.203568210035907,  
1.2767673297334832,  
1.2585129786889195,  
0.24752046596725819,  
0.7203551788145919,  
-0.17420447991641552,  
-1.3486030918499698,  
0.2145369555808404,  
0.8896874485404291,  
-1.6470089821954121,  
-0.37928143051952584,  
-0.29903232984244293,  
0.6984471945997809,  
0.14906235834494008,  
0.054873949093549826,  
1.3877615433857144,  
0.04193983551007985,  
1.2014028569521673,  
-0.02338341588216991,  
-0.05255422822816251,  
-0.1905875093002492,  
0.16425167437144692,  
0.2542835721118732,  
1.1822299841866795,  
1.2032222480152739,  
0.30142488752060526,  
0.09125464470109583,  
-0.45638140154025475,  
0.050260497156630585,  
-0.04000614529085093,  
0.9096133936431033,  
-0.03555378439095736,  
0.4405325841695877,  
-0.48129885373423525,  
-0.3617221403442356,  
-2.5216506086368518,  
-0.5081934521569421,  
0.041332600726076626,  
0.7413771443671474,  
0.2204029987501584,  
-0.7517920276590782,  
-0.21022249714251526,  
1.5607830526955413,  
0.16615947769508344,  
-0.17023919527139658,  
-0.4295619963603494,  
-1.1838803442651602,  
0.6319564057885301,  
-0.3935277768061919,  
0.005550337258741166,

```

-0.4226065324972882,
-0.3715846249960284,
-0.48395498614671884,
-0.4790957128536121,
1.4427293239187895,
0.5875094653073935,
1.404722056846091,
0.6973465258635152,
0.8623508528879442,
-0.5460563718875903,
0.8326491581513842,
-2.4015389244466907,
-0.04583861440999851,
-0.36265388938085896,
-0.5347868312224912,
0.49674658852292397,
-0.6488379607428911,
1.1568053403721041,
0.30662269781395407,
-2.013151608263867,
-0.17383275003878457,
0.5036662539248705,
1.9638910157847163,
3.118155075975211,
0.8117246453310248,
-1.4517859264576565,
-1.4946803709676548,
-2.7792982516572895,
1.1174424252005506,
2.333430423546859,
0.6903927508165344,
-0.2883899927957993,
-0.8542826896862586}],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#7'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 '
+ 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + '
1 X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z 0 + 1 X 1 '
'X 2 + 1 Z 1 + 1 X 2 X 3 + '
'1 Z 2 + 1 X 3 X 4 + 1 Z 3 '
'+ 1 X 4 X 5 + 1 Z 4 + 1 X '
'5 X 6 + 1 Z 5 + 1 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -6.662379321078875],
[12, 6, 0, 0, -5.394498644176584]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],

```

```

'noise_profile': { 'noise_on_init_param': {
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': {
'noise_prob': [ 0.001,
0.001,
0,
0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}},
'run_time_sec': 4.039986610412598}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': { 'value': [ 0.46756606893882113,
0.46983859896604685,
0.5133985927484581,
0.5133985927484581,
0.5133985927484581,
1.4016794842576101,
1.6914116785996751,
1.691411678599675,
1.6941756924801525,
1.6941756924801528,
3.749864451084885,
3.749864451084885,
3.7498644510848855,
3.7498644510848855,
4.969636107010246,
4.969636107010246,
4.969636107010246,
4.969636107010246,
5.983107385388112,
5.983107385388112,
8.378949246097575,
8.378949246097575,
8.635680633753974,
8.635680633753974,
9.108807770997622,
9.108807770997622,
9.108807770997622,
9.960036411132767,
10.436643041587223,
10.716533289695375,
0.5466515694267952,
3.318518267704871,
0.40678728382369284,
0.6290091030083763,
-0.4770983795300032,
-0.7455483390932742,
0.1630064768968011,

```

0.4889724943271746,  
0.10596004146863507,  
-1.4759536729524354,  
0.957604974713893,  
0.6004514101153323,  
0.0725728265044025,  
1.4994700617905987,  
0.15508641282397265,  
-0.15494303336158094,  
-0.5663845144966579,  
2.6663065398173496,  
-0.27086336898318036,  
-1.1828784814640632,  
-0.295045685212881,  
0.6236994649007899,  
1.1769360493970402,  
1.7159795997719172,  
-0.3019600780315931,  
0.651545330446025,  
-2.0782382222089724,  
0.3186344830290561,  
-0.2815476257680432,  
0.4067635126151388,  
-0.8228051832090519,  
-0.4154478828430832,  
2.3723163321732827,  
0.931436930203099,  
0.9804374423714106,  
0.058895326584719035,  
0.3167253661454302,  
0.3390503539155689,  
-0.5024758650485814,  
-0.2425872659725522,  
-0.6703364135359525,  
-0.147558399690948,  
1.1644296968010859,  
0.5475507579506065,  
0.1736068872874216,  
0.30547527216138975,  
0.5300773267023443,  
0.7722201656261689,  
-0.6858549484151734,  
-0.16073113081558088,  
-1.197458252004488,  
-0.507307082981415,  
-0.16437738354723153,  
0.2647407403580543,  
-0.45930133674563567,  
-0.22673992276266391,  
1.8127715449849986,  
-1.4334128748253496,  
-0.759404859696163,  
1.2431110601081345,  
0.8953271645792334,  
0.6963251389999259,  
-0.23147129445607595,  
0.3638861144885483,  
2.2394622330281906,  
1.543816783446588,  
1.7535830084845025,  
-0.3169637330795974,  
0.2453194636587019,  
2.0076391670843647,  
0.286017506499548,  
0.6600449842625801,  
0.19782118041633945,  
0.05463577684798935,  
0.4755005320975566,  
0.055207215781380096,  
0.06969685609102444,  
0.2645328829673777,  
-0.01235845210357445,  
1.01982876424508,  
2.262492417600915,  
1.3443784687440867,



```

0.10698144982242018,
0.428081928456963,
-1.5494921893757727,
1.0701294130786736,
0.39987519173641656,
0.06301738855484718,
-1.6711192593807125,
0.26920159401030147,
-0.08358711295948693,
0.4054786916979446,
-0.5013194648307361,
2.126550690771933,
0.10959959792145137,
0.4205360694942305,
-0.586878230803869,
-0.3381608637889511,
-0.5055401953468239,
-0.45995744817477163,
0.07999668782445096,
-0.4269018063306222,
0.9588276598807326,
1.042187521522261,
0.07821502449201799,
0.6777167152964713,
0.4177387822172794,
-0.18721284346239236,
-0.8064458441104513,
2.8712851588196218,
0.7141862154478698,
-0.9976723444987857,
-0.8529435737233043,
1.9602636639541733,
1.2634521849205176,
-0.7170870121313951,
0.31227949023655405,
-1.0451293221946831,
-0.6787852158143914,
1.8581833428208436}],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#6'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 +
1 X 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 +
1 X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z 0 + 1 X 1 X
2 + 1 Z 1 + 1 X 2 X 3 +
1 Z 2 + 1 X 3 X 4 + 1 Z 3 +
1 X 4 X 5 + 1 Z 4 + 1 X
5 X 6 + 1 Z 5 + 1 Z 6']},

```

```

'output': { 'data_points': [ [4, 2, 0, 0, -6.4878948983695235],
                             [12, 6, 0, 0, -5.297876077058435]],
  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                       'identity_factors': [0, 0, 0, 0],
                       'noise_level': [4, 2, 0, 0],
                       'noise_profile': { 'noise_on_init_param': {
'value':
0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': { 'noise_on_init_param': {
'value':
0},
'noise_prob': [ 0.001,
                0.001,
                0,
                0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}],
'run_time_sec': 5.047370910644531}],
'vqe': [ { 'config': { 'ansatz': { 'gateset': 1,
                                   'layer': 30,
                                   'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                                'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                                                'r': 0},
                                   'time': {'max': 10.0, 'min': 0.0},
                                   'type': 'ising'}}},
  'init_param': {'value': 'random'},
  'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
  'nqubits': 7,
  'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                    'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                    'r': 1},
                  'def': 'ising'},
  'output': { 'draw': {'fig_dpi': 100, 'status': True, 'type': 'png'},
              'file_name_prefix': 'ising_noisefree_time_evo'},
  'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
  'run': 'vqe',
  'state': 'dmatrix',
  'vqe': { 'iteration': 10,
           'optimization': { 'algorithm': 'SLSQP',
                             'constraint': True,
                             'status': True}},
  'zne': { 'data_points': None,
           'degree': 1,
           'method': 'richardson',
           'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 + 1 Z '
                                '2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X 6 + '
                                '1 Z 5 + 1 Z 6',
  'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + '
                                              '1 Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X '
                                              '3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z '
                                              '4 + 1 X 5 X 6 + 1 Z 5 + 1 Z 6']},
'output': { 'exact_sol': -8.56677223350563,
  'initial_cost_history': [ 4.2809785500030175,
                           2.611097744705238,
                           3.419414059277099,
                           1.5773527652373136,
                           3.36522638437751,
                           3.1574660994918307,

```

```
4.256553926466165,
4.577016272245339,
4.50890344694736,
4.056304045999429],
'noise_details': { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': { 'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
'optimized_minimum_cost': [ -6.833109640228162,
-6.51493088468928,
-6.151422264793805,
-6.630764461698797,
-6.72096904084131,
-6.487894898369486,
-6.662379321078827,
-6.6727801903427855,
-6.751241519687556,
-6.406033238196173],
'optimized_parameters': [ [ -4.1290471568429383e-17,
0.028387941050870547,
0.028387941050870516,
0.028387941050870544,
0.4764187545019148,
0.485154879376271,
0.7094706976105217,
2.998376901501724,
3.486264965503922,
3.487775573446841,
4.058897205630428,
5.020552086463093,
5.02158492362958,
5.02158492362958,
5.0846878698400815,
5.0846878698400815,
6.794704827143902,
6.794704827143902,
6.794704827143902,
8.013356083289752,
8.21076169573117,
8.21076169573117,
8.633075344303478,
8.633075344303478,
8.930018414781724,
8.930018414781724,
8.930018414781724,
9.990329186240457,
9.990329186240457,
12.915390927357043,
0.8289215528981712,
0.6465354442587259,
-0.06922368073773534,
-2.0853926237797484,
0.25605409461249207,
-0.765586831155604,
0.9589723041272441,
0.27455658215646966,
-0.07189982532198122,
-0.3449139525561357,
-0.46800027418386986,
1.016480689947782,
-0.9706976058410632,
-0.9556868223128826,
0.9323574793538898,
-0.4376613900889883,
0.44138701419965265,
1.4418520162063444,
0.8420619129497768,
-0.025530845682239494,
-2.3076344184440156,
0.37458463155346333,
```

-0.47031338116346383,  
0.07338001085955462,  
-0.869249007732584,  
1.6824786550253577,  
1.719346297136726,  
-0.9622509832303179,  
0.5779076253870294,  
0.4760527439731688,  
-0.2451715046346434,  
1.5906513054768954,  
0.35918458386075697,  
-0.44817294000256097,  
-0.37416377940751877,  
0.37048554789855764,  
0.693137718643464,  
2.288219219235325,  
-0.26501198620577204,  
0.3689053264668303,  
0.10166782579927121,  
-0.3356073800920907,  
-0.6413954053758932,  
0.28636656044125136,  
-0.8690978212322298,  
1.166030172665772,  
-0.46365263204645707,  
-0.8505396438729699,  
2.4328989003329693,  
-1.4554443951257197,  
2.09134311034601,  
1.7695145471360614,  
1.1170184462314887,  
0.20325573406500014,  
0.34206355374635444,  
0.016804831103183593,  
-0.19882507083844791,  
1.4011478969931443,  
-0.0572616468882171,  
-1.3773340344964602,  
1.1031086912886459,  
0.47433623341773395,  
-0.037679845343088075,  
0.7450954028512253,  
1.3114871459373192,  
-0.18651966717154955,  
1.0750199871192778,  
0.48905379729033566,  
-0.6281827821606347,  
1.322074656325554,  
-1.4761484868509396,  
0.2859918816514792,  
-1.0033541595176405,  
0.8264053813863532,  
0.622010811103528,  
1.1636747207646185,  
-0.31883271288389914,  
-0.0013981850979601159,  
-0.09999405171802342,  
1.3085280853238759,  
-1.3727969089464465,  
-0.08341159264840771,  
1.6249369276484606,  
-0.28082331570516694,  
1.863294400254821,  
2.2932652495309953,  
1.4849536675442596,  
0.6811668802751195,  
1.5380110980874968,  
-0.6615225065895972,  
0.4000828281024264,  
0.33932121588009856,  
0.48855764825038867,  
2.5371111232777053,  
-0.7260430040504564,  
0.09005940379987407,  
-0.8762980817992282,

-0.23800314057977784,  
0.9728027685352436,  
-0.20857834368009137,  
0.6148333457084475,  
-1.5171898336040224,  
0.8658542069129427,  
-1.6478287868490311,  
0.5770049367106069,  
0.134497700004433,  
-0.11612046371881249,  
1.5826352840237945,  
1.6045820840261675,  
-0.08805669980595342,  
-1.507745125921201,  
-0.11276651576435986,  
0.07206005105970639,  
-1.7788122679933258,  
-0.002988765738482436,  
0.7255804452314191,  
2.7661804504965604,  
-3.1943627011957507,  
-0.07088434770936546,  
0.10949711075632612],  
[ 0.27654223573266234,  
0.27654223573266246,  
0.27654223573266246,  
0.4643738922966213,  
0.6582164862517121,  
0.6582164862517121,  
0.6582164862517121,  
1.3424523496852623,  
1.47635793598756,  
1.47635793598756,  
3.385550316280557,  
3.385550316280557,  
3.385550316280557,  
4.494062371253785,  
4.494062371253785,  
5.0204758683966135,  
5.023404188660082,  
7.05704094573064,  
7.087391629397132,  
7.533802135057517,  
8.245970909352765,  
8.390887842007308,  
8.390887842007308,  
8.703391612007538,  
8.703391612007538,  
9.485545381639698,  
9.485545381639698,  
9.849437794456351,  
9.849437794456351,  
10.799155842585746,  
-0.12708089143278917,  
1.4168148977025445,  
-0.13519536748631492,  
-0.32308714516775877,  
0.06981336221044306,  
-0.034321895006426455,  
-0.18209443759399158,  
-0.024858958594746107,  
0.664488174834645,  
0.6897317665852637,  
-0.008774731192519907,  
0.625642551337688,  
0.6862410821653743,  
-0.7670419540542446,  
-0.48055390132433673,  
1.573964677292243,  
-1.0555745677813198,  
1.3159721165631335,  
-0.9138502497993347,  
-0.4641566084568084,  
-0.06966564000847691,  
0.039012746519005555,

1.0827641697579717,  
1.2190093772283843,  
1.5391150382377632,  
-0.6675581491933664,  
0.09104662559232415,  
0.5283818781579022,  
0.04478118244404365,  
1.5836075485651113,  
0.251932560991488,  
-0.3949560381811925,  
0.8854639388207172,  
-0.8611267164776638,  
1.566928747241295,  
-0.15445151319573347,  
-0.01396050433941564,  
0.8172620115356718,  
-0.014658132241289147,  
-0.6623010385304499,  
0.6299284572753584,  
-0.15026947869759505,  
-1.2293112897827836,  
-0.5768656731979434,  
1.231557922062332,  
-1.447872926116422,  
1.4918722706131171,  
0.31945486783385635,  
0.43870804207253483,  
1.3582636256308331,  
-0.8478398442626237,  
0.799518029891469,  
0.5539369896048497,  
0.13453197415145846,  
0.7167498104862234,  
-0.06589109804263343,  
0.041038724923082276,  
1.151975756926885,  
-0.052026838729968425,  
0.3952978000808587,  
-1.1754748970457833,  
-0.01965607042871015,  
-0.2456324144680547,  
-0.01136184217607491,  
0.022503168314325715,  
1.1777923723104653,  
0.14554117253938412,  
-1.2287946167385297,  
-0.9683737383161766,  
1.073329622962756,  
-0.7143583802799215,  
-0.3545002682598469,  
-0.31906110571926777,  
-0.9597094503848127,  
0.8825903987559673,  
-0.08273415521500459,  
0.2895039435279609,  
-0.3388594197258312,  
0.2406459434933063,  
0.3824128671502841,  
-0.5390555829405563,  
0.3757684495816124,  
-0.5015719636333678,  
0.3958257688275076,  
-0.6428354095046468,  
-0.9178624992467067,  
0.29327306512581747,  
-0.09193285724698198,  
0.1770091195095364,  
0.6803523512851801,  
1.05525770275555,  
-0.4646437845139076,  
2.2560908642344026,  
-0.7500939262299234,  
1.92959092052175,  
-0.36895777993274226,  
-0.04538283416771957,

1.2529586558275392,  
-0.57805717638909,  
0.3080585810325818,  
0.031910210614104206,  
0.18519950010488512,  
1.3888566879174211,  
1.087260914864616,  
0.15259355623633358,  
-0.08810167996863522,  
0.07467874103808375,  
1.4444893382870363,  
-1.446220680213735,  
0.8215180856176293,  
2.0151723649306295,  
0.13454991965456886,  
0.21923381008732426,  
0.31112145477192793,  
-0.8977876743954992,  
0.10239876571985529,  
-1.0132922278363503,  
-0.3794863035801566,  
0.8437803973608401,  
1.111671691788496],  
[ 0.3463233138801294,  
0.34632331388012944,  
0.3463233138801294,  
0.3463233138801293,  
1.2403205490491955,  
1.38033446895038,  
3.6939218351946623,  
3.6939218351946623,  
3.693921835194662,  
3.693921835194662,  
3.9412089126587,  
3.9412089126587,  
3.9412089126587007,  
3.9412089126587007,  
4.8310999601027795,  
4.870844593548848,  
4.900228671797898,  
4.9002286717978984,  
4.9002286717978984,  
4.900228671797898,  
5.70167657474683,  
6.21188441483336,  
6.21188441483336,  
6.686419232103557,  
6.723504371727371,  
7.618130890836856,  
7.618130890836856,  
9.420364260644014,  
9.420364260644014,  
10.775132222422771,  
-0.3525750090684208,  
1.2748976558430758,  
-0.16146998454247521,  
1.3224575871686013,  
0.0349265192498484,  
0.36138711032415904,  
-0.5043488106619078,  
0.7634801084306476,  
-0.3536814593617201,  
0.9606809354246906,  
-1.1143894720984433,  
-0.45289061390722213,  
-0.1605333784989486,  
-1.594210268458609,  
-0.09465166736510336,  
0.11132251138190599,  
1.004235666711761,  
-0.23115493220428254,  
0.9451761882751959,  
-0.3707284170975133,  
-0.17782948231634454,  
-0.18433417990028922,

-0.06421460341189031,  
-1.155489001827845,  
-0.2074908306187579,  
-0.036360325422879626,  
0.5283181819327893,  
0.3603171208434518,  
0.6819349944270952,  
-0.2733083993242672,  
0.7075879191324372,  
-0.042779623335368125,  
0.7032435595714176,  
-0.7363942983542189,  
0.9583235184546098,  
-0.5892472427173001,  
-0.7139877518112785,  
-0.12446625268371646,  
-0.439646171766664,  
0.7129808957109575,  
0.3373075268097138,  
0.3345550414369601,  
-0.38068761370203624,  
0.07864964370676188,  
-0.3383553862900091,  
0.6633419895127639,  
-0.578720703894673,  
0.486162302530746,  
-0.06112668401522289,  
0.34417654454775265,  
-0.09182266750822224,  
0.012215000731405658,  
0.5658291917160285,  
-0.16728488191683846,  
0.3754616489195623,  
-0.30497315054621493,  
-0.7559846133933803,  
0.9474959005813702,  
-0.5904076686561035,  
-0.2620011537974264,  
0.1328515248519479,  
-0.44066408562446224,  
-0.7849425610737308,  
0.44059474279745625,  
-0.04646983134951628,  
0.27897770882356554,  
0.36838349877106535,  
1.1610009997739648,  
0.9058411506824863,  
0.3119955912029684,  
-0.5265683545543336,  
1.0661822357546584,  
0.8560044406571757,  
0.5004409227892788,  
0.5192086876555008,  
-0.0019665558968806392,  
-0.23949800878404184,  
0.32563956832297103,  
0.795323960796817,  
1.5213873243487468,  
0.8637563634588281,  
0.07945031145196896,  
1.7583315097859118,  
0.5335864884320034,  
-0.1366270407456156,  
-0.9111102828185913,  
-0.41650979281126865,  
0.20926691692934202,  
0.2776061293997892,  
1.4257231544028384,  
-0.10754544247245298,  
1.0035199546983695,  
1.1162390986419686,  
1.7211522778091677,  
-1.4332245925979028,  
1.4417595659646931,  
-2.106784537892007,



-0.6878309432904478,  
-0.20360639354575213,  
0.6373705186717347,  
0.051333236332203484,  
-0.35868991955772395,  
-0.24365907607080922,  
1.619736185871098,  
0.5895182658245096,  
-0.6086170057348131,  
0.39774539931448055,  
1.409837948786624,  
0.17438880158294706,  
-0.0415548590378924,  
0.1413623732119859,  
-0.8192475896231625,  
0.5823982141653503,  
-0.8462302367353051,  
-0.60454163385331,  
1.8216629921858374,  
1.2634551976945552,  
-0.40200420270308274,  
-1.5954759495917508,  
-1.7732438129518737],  
[ 0.23818326834520384,  
0.242015507589488,  
0.5292100600091615,  
0.5598196968290768,  
0.5598196968290768,  
2.3451854381830244,  
2.3451854381830244,  
3.8453025861748578,  
3.8453025861748578,  
4.395137112369032,  
4.408833101975425,  
4.829585475162733,  
4.867115107997544,  
5.058958687371625,  
5.058958687371625,  
5.058958687371625,  
5.581243202757385,  
6.011433944644334,  
6.011433944644334,  
8.358003932454157,  
8.358003932454157,  
8.358003932454157,  
8.371420896509267,  
8.783744346022278,  
8.783744346022278,  
9.34189587380724,  
9.34189587380724,  
9.39608576624051,  
9.726727464435275,  
10.95102910414735,  
0.14721560345391302,  
1.0205767628001141,  
0.40564926087548847,  
-1.9238321605823567,  
-0.04729505851188324,  
0.482541600628026,  
0.1152155677775581,  
0.8524320040134185,  
0.42380767990264745,  
-0.6219665889019169,  
-0.05759638705357143,  
0.8161328242190486,  
0.7425402472775383,  
0.7535392998290764,  
1.8314745216576223,  
1.3334023135030668,  
0.05552193989453376,  
0.9691374289368472,  
-0.07338372949421543,  
-0.6690664310785921,  
1.168533104165511,  
-0.01962836639606316,

0.6576122461884292,  
-0.037637936325233226,  
-0.0009647519828692927,  
0.4524839512418326,  
-0.013115244288784337,  
1.6270372625341938,  
1.182284078721198,  
0.9533845712158122,  
1.0956662941001023,  
-0.9647918240366662,  
0.1897778948773928,  
-0.04047520420354409,  
0.5790278460715794,  
0.631719469583885,  
-0.3335418357294817,  
1.0603186443819097,  
-0.7449471003423949,  
0.1630231005006795,  
-0.07563007210422526,  
-1.1009042311153838,  
-0.34587951137957407,  
-0.22408475871037167,  
-0.6364303490666092,  
-0.5245531829065874,  
-0.7807390048523051,  
-0.7767575864285188,  
-0.9679768325508518,  
-1.8691843526791756,  
0.4783530568164554,  
0.6133546874260105,  
-0.20020986269221935,  
-0.41532071148562183,  
-0.8557118152516873,  
-0.16985308585729458,  
0.8428338023785568,  
0.6750667051632169,  
1.2795031602880573,  
-0.41384224674171627,  
0.3213362409234008,  
1.2340309605381181,  
1.0506369357289735,  
-0.6415500741723684,  
-0.9628453188140567,  
1.935214357876566,  
1.4159154638103797,  
-2.0864443113151867,  
-0.07426020994129089,  
-1.0538315394110076,  
0.2589745455351295,  
-0.2955978932252484,  
-0.030644528099012087,  
-0.8602288471584197,  
-0.09490606960216369,  
0.4190622694749842,  
-1.5667390101922392,  
-0.7804920738383083,  
0.1255849265457167,  
0.5884338319364165,  
-0.46028089859616994,  
0.2488277677353687,  
-0.7513271615815256,  
-1.0561258734551267,  
0.3697237180501531,  
-0.7108432439071602,  
0.5137418203820399,  
0.946767478727941,  
1.619957961978311,  
1.2944079622561346,  
0.21625880379379211,  
0.007168703139473973,  
-0.334764182643075,  
-0.9086121674985949,  
-0.8247776105092918,  
-0.5734460393428641,  
-0.4381826298821608,

-0.44306191141826123,  
-0.23860269421390362,  
-0.03343496826073402,  
-0.008972211649351379,  
1.2196121588758198,  
1.5985131140815898,  
0.060325450296581484,  
-0.7312434635304047,  
0.9413542695101463,  
-0.6701271691421761,  
-1.0680925542186157,  
-0.5192506372311365,  
1.5594784335685845,  
0.17928043514789443,  
0.2455246384495121,  
-0.053106843359071614,  
0.7488220810664211,  
1.3030207698426615,  
-1.787387332504871,  
-1.1184519607509558,  
-0.2511275398302805,  
1.445676213762956,  
1.5991220174606833],  
[ 0.32980400918867037,  
0.7818596814437996,  
0.9680306497310072,  
1.0586432954274991,  
1.7663116348413028,  
1.8956491295658664,  
2.0436116769319477,  
2.0436116769319477,  
2.0436116769319477,  
2.1846619555479685,  
2.1846619555479685,  
4.516997836642403,  
4.516997836642403,  
5.3166564351730035,  
5.320130741320412,  
5.399447086770547,  
5.400046100307029,  
5.400046100307029,  
5.400046100307029,  
5.400046100307029,  
7.097750404951498,  
7.618222769006738,  
7.956666567531361,  
7.956666567531361,  
8.961109688308255,  
8.961109688308255,  
11.028500695271937,  
11.5809418583784,  
11.5809418583784,  
11.5809418583784,  
0.24114173221382337,  
1.3754512844042854,  
0.9720111739434927,  
-0.29877116871955545,  
-0.029737313498699618,  
0.3185153459444675,  
-0.31840745367437817,  
0.6801602139502809,  
-0.015407845998522466,  
-1.114484654283524,  
0.22997676136047449,  
1.5201821520192487,  
0.3217486942799661,  
0.43678760134757944,  
0.17618749246228715,  
0.7010359103792874,  
0.3446701255696699,  
1.4700166379981474,  
0.3471333265905846,  
-0.968444017764766,  
-1.1485269521507444,  
0.3282504398407059,

-0.7898554413193151,  
-0.22157985789400653,  
0.4570931682042821,  
-0.22158635023930806,  
-0.36549836384277606,  
-0.2366283880333898,  
0.4114765778384287,  
-0.7694643480660831,  
-0.40507000819737765,  
-0.6576468499882752,  
0.2023600853039859,  
-1.2917280200640486,  
0.32702771491506877,  
-0.07546137553843744,  
-0.7713328193108817,  
-0.8163562225239717,  
-0.07772489804090182,  
-0.32841576637855896,  
-0.05728139293162625,  
0.8564947637293437,  
0.15384434981345546,  
0.41944080031994563,  
0.16884394015055976,  
-0.010490661309829376,  
-1.3198249528292274,  
0.07128101806419536,  
0.03515395872296211,  
-0.09826644736389979,  
-0.06882299183557238,  
-0.7062443088386591,  
-0.5280915567870916,  
0.14860690208212682,  
0.338235073517239,  
0.012130023587481156,  
-0.037483081002571056,  
0.8881056862099682,  
0.06312673968269537,  
-0.44738898868242327,  
-0.2463284936792685,  
1.1708672891281489,  
0.5297819270424092,  
-0.5463182826640249,  
-1.667403353493104,  
1.3713545814180228,  
0.9413366263710182,  
-0.021951472934173096,  
1.0345046397029698,  
-0.8002739446090432,  
1.076242700462428,  
0.04994674089563993,  
-1.446235170371471,  
-0.3268246709561185,  
0.6264234635598642,  
-1.2465048991503196,  
0.1169092097763034,  
1.2453937722962254,  
0.7220287063888942,  
0.8114212311039525,  
0.18333674920471413,  
0.7345776889004225,  
0.9807678368065545,  
0.8703572591074042,  
0.28720991162605214,  
-0.9085817320602367,  
1.1216621938695932,  
1.1327477502874412,  
-1.8285395156530388,  
1.4231155243966302,  
0.08156271721069372,  
0.18027327076782884,  
-0.10302960773112253,  
-0.5560482514096969,  
-0.09484541903718098,  
0.5886430341587933,  
-1.1674014904638685,

-0.03940950630369794,  
0.2792515765657198,  
0.08214125135098017,  
0.04344924016389119,  
-0.7787970529711157,  
0.07887586110139429,  
0.7532574519080738,  
0.17107625040009872,  
-0.4128415687827808,  
1.3723943620028143,  
1.4278581324344195,  
0.5879977529754344,  
0.28910810409117477,  
-1.4412046993697643,  
1.624844367134446,  
0.19366683662945536,  
0.3179841250458877,  
0.5357240606734743,  
1.5680682524509713,  
0.04418323830986127,  
0.2311137213204739,  
2.8741283660232546,  
0.9612408402592636],  
[ 0.46756606893882113,  
0.46983859896604685,  
0.5133985927484581,  
0.5133985927484581,  
0.5133985927484581,  
1.4016794842576101,  
1.6914116785996751,  
1.691411678599675,  
1.6941756924801525,  
1.6941756924801528,  
3.749864451084885,  
3.749864451084885,  
3.7498644510848855,  
3.7498644510848855,  
4.969636107010246,  
4.969636107010246,  
4.969636107010246,  
4.969636107010246,  
5.983107385388112,  
5.983107385388112,  
8.378949246097575,  
8.378949246097575,  
8.635680633753974,  
8.635680633753974,  
9.108807770997622,  
9.108807770997622,  
9.108807770997622,  
9.960036411132767,  
10.436643041587223,  
10.716533289695375,  
0.5466515694267952,  
3.318518267704871,  
0.40678728382369284,  
0.6290091030083763,  
-0.4770983795300032,  
-0.7455483390932742,  
0.1630064768968011,  
0.4889724943271746,  
0.10596004146863507,  
-1.4759536729524354,  
0.957604974713893,  
0.6004514101153323,  
0.0725728265044025,  
1.4994700617905987,  
0.15508641282397265,  
-0.15494303336158094,  
-0.5663845144966579,  
2.6663065398173496,  
-0.27086336898318036,  
-1.1828784814640632,  
-0.295045685212881,  
0.6236994649007899,

1.1769360493970402,  
1.7159795997719172,  
-0.3019600780315931,  
0.651545330446025,  
-2.0782382222089724,  
0.3186344830290561,  
-0.2815476257680432,  
0.4067635126151388,  
-0.8228051832090519,  
-0.4154478828430832,  
2.3723163321732827,  
0.931436930203099,  
0.9804374423714106,  
0.058895326584719035,  
0.3167253661454302,  
0.3390503539155689,  
-0.5024758650485814,  
-0.2425872659725522,  
-0.6703364135359525,  
-0.147558399690948,  
1.1644296968010859,  
0.5475507579506065,  
0.1736068872874216,  
0.30547527216138975,  
0.5300773267023443,  
0.7722201656261689,  
-0.6858549484151734,  
-0.16073113081558088,  
-1.197458252004488,  
-0.507307082981415,  
-0.16437738354723153,  
0.2647407403580543,  
-0.45930133674563567,  
-0.22673992276266391,  
1.8127715449849986,  
-1.4334128748253496,  
-0.759404859696163,  
1.2431110601081345,  
0.8953271645792334,  
0.6963251389999259,  
-0.23147129445607595,  
0.3638861144885483,  
2.2394622330281906,  
1.543816783446588,  
1.7535830084845025,  
-0.3169637330795974,  
0.2453194636587019,  
2.0076391670843647,  
0.286017506499548,  
0.6600449842625801,  
0.19782118041633945,  
0.05463577684798935,  
0.4755005320975566,  
0.055207215781380096,  
0.06969685609102444,  
0.2645328829673777,  
-0.01235845210357445,  
1.01982876424508,  
2.262492417600915,  
1.3443784687440867,  
0.10698144982242018,  
0.428081928456963,  
-1.5494921893757727,  
1.0701294130786736,  
0.39987519173641656,  
0.06301738855484718,  
-1.6711192593807125,  
0.26920159401030147,  
-0.08358711295948693,  
0.4054786916979446,  
-0.5013194648307361,  
2.126550690771933,  
0.10959959792145137,  
0.4205360694942305,  
-0.586878230803869,

-0.3381608637889511,  
-0.5055401953468239,  
-0.45995744817477163,  
0.07999668782445096,  
-0.4269018063306222,  
0.9588276598807326,  
1.042187521522261,  
0.07821502449201799,  
0.6777167152964713,  
0.4177387822172794,  
-0.18721284346239236,  
-0.8064458441104513,  
2.8712851588196218,  
0.7141862154478698,  
-0.9976723444987857,  
-0.8529435737233043,  
1.9602636639541733,  
1.2634521849205176,  
-0.7170870121313951,  
0.31227949023655405,  
-1.0451293221946831,  
-0.6787852158143914,  
1.8581833428208436],  
[ 0.4319322451408806,  
0.4441934852523559,  
0.5878315575931067,  
0.5878315575931067,  
0.5912427958750637,  
0.5947187380620651,  
0.5947187380620652,  
1.5628074958209335,  
1.568718083448373,  
2.013035808837258,  
2.013035808837258,  
2.013035808837258,  
2.0277481086167364,  
4.114573484042011,  
4.1154343976538055,  
5.358852938788934,  
5.358852938788934,  
5.549639110185835,  
5.667644288942511,  
5.6706149635077026,  
7.063797010237488,  
7.658675772413245,  
8.123010743902626,  
8.633070512181217,  
8.7849794748515,  
8.7849794748515,  
10.749769122252356,  
10.89899813672382,  
11.413879450074099,  
11.413879450074099,  
-0.04151001581527148,  
-2.751209241920508,  
-0.5056705094410174,  
-0.406548832581749,  
0.8633340895103881,  
0.17259893989954428,  
-0.21235924407313156,  
-0.5485334561985523,  
0.2012951527025238,  
-0.23858034563229433,  
2.1364176057207223,  
0.7817014982866842,  
-0.1108899918027214,  
0.6048531661014985,  
1.809261328558185,  
-1.1786415575821785,  
-1.0827170099436865,  
0.4109384498547832,  
0.8090945308822337,  
-0.9356585252219308,  
0.28697429006677655,  
-0.15332459566133277,

1.2998079093160566,  
0.3870967504567973,  
-0.2413465423953762,  
1.001771196320206,  
0.1138394509020578,  
1.3220786271535379,  
-1.1806565063083097,  
2.2789659185869464,  
0.11875741943281123,  
-0.15631084464392242,  
-2.14680662310284,  
0.18035127914430246,  
-0.260880073181003,  
0.21031876899961,  
0.7641152777599183,  
1.203568210035907,  
1.2767673297334832,  
1.2585129786889195,  
0.24752046596725819,  
0.7203551788145919,  
-0.17420447991641552,  
-1.3486030918499698,  
0.2145369555808404,  
0.8896874485404291,  
-1.6470089821954121,  
-0.37928143051952584,  
-0.29903232984244293,  
0.6984471945997809,  
0.14906235834494008,  
0.054873949093549826,  
1.3877615433857144,  
0.04193983551007985,  
1.2014028569521673,  
-0.02338341588216991,  
-0.05255422822816251,  
-0.1905875093002492,  
0.16425167437144692,  
0.2542835721118732,  
1.1822299841866795,  
1.2032222480152739,  
0.30142488752060526,  
0.09125464470109583,  
-0.45638140154025475,  
0.050260497156630585,  
-0.04000614529085093,  
0.9096133936431033,  
-0.03555378439095736,  
0.4405325841695877,  
-0.48129885373423525,  
-0.3617221403442356,  
-2.5216506086368518,  
-0.5081934521569421,  
0.041332600726076626,  
0.7413771443671474,  
0.2204029987501584,  
-0.7517920276590782,  
-0.21022249714251526,  
1.5607830526955413,  
0.16615947769508344,  
-0.17023919527139658,  
-0.4295619963603494,  
-1.1838803442651602,  
0.6319564057885301,  
-0.3935277768061919,  
0.005550337258741166,  
-0.4226065324972882,  
-0.3715846249960284,  
-0.48395498614671884,  
-0.4790957128536121,  
1.4427293239187895,  
0.5875094653073935,  
1.404722056846091,  
0.6973465258635152,  
0.8623508528879442,  
-0.5460563718875903,



0.8326491581513842,  
-2.4015389244466907,  
-0.04583861440999851,  
-0.36265388938085896,  
-0.5347868312224912,  
0.49674658852292397,  
-0.6488379607428911,  
1.1568053403721041,  
0.30662269781395407,  
-2.013151608263867,  
-0.17383275003878457,  
0.5036662539248705,  
1.9638910157847163,  
3.118155075975211,  
0.8117246453310248,  
-1.4517859264576565,  
-1.4946803709676548,  
-2.7792982516572895,  
1.1174424252005506,  
2.333430423546859,  
0.6903927508165344,  
-0.2883899927957993,  
-0.8542826896862586],  
[ 0.4349098035102067,  
0.5281397824211302,  
0.6402833431740305,  
0.701719039924861,  
0.8953768954552646,  
1.4118719346144908,  
2.230113621742168,  
2.6548053250922607,  
3.10433397641996,  
3.1043339764199596,  
4.146783795497047,  
4.146783795497047,  
4.149760661232294,  
4.149760661232294,  
4.223539194779984,  
4.223539194779984,  
6.7727886487081435,  
6.7727886487081435,  
7.243551717080481,  
7.282491880183138,  
7.282491880183137,  
7.282491880183138,  
8.806989173945695,  
8.80698917394569,  
9.706285648296737,  
9.809777023075187,  
9.837118725166619,  
10.701586770517197,  
11.185931122995514,  
11.185931122995514,  
0.39919688039300266,  
1.4533249104921768,  
0.7852252158845567,  
-0.4957764525834907,  
-0.3354719566017423,  
0.16097458435951068,  
-0.21971891747261646,  
1.5370438656668401,  
0.26531517225969137,  
-0.6386119707402834,  
0.37748437574064975,  
1.2333814560270282,  
0.5934062959304571,  
1.633059089666515,  
0.31170790405459564,  
0.3995146629536743,  
-0.11155094016301184,  
0.8138063699882787,  
0.019467271717771087,  
-0.38186317682975884,  
-2.778803401027002,  
0.7887082829537533,

-3.1348050840084074,  
-1.5109224736536222,  
-0.38589710406642097,  
-1.105927053527023,  
0.3451707237315739,  
0.6290043291617069,  
-1.834722402137916,  
-1.0551446159380258,  
-1.3581260193610523,  
0.9666180881078981,  
-0.05759676522292653,  
1.1866392284178628,  
-1.1308471740259582,  
0.34327443183487805,  
0.17662613760194443,  
-0.043135596735193626,  
-0.03667546733606037,  
-0.4901895513664937,  
-1.0399227541005371,  
0.4880459765792483,  
0.053089003166299456,  
-0.6259966396796703,  
0.03159579372412852,  
-0.09798805529491862,  
0.052872660107769434,  
1.490194875693949,  
0.22167423812356596,  
-0.33497064714209324,  
1.0144679614160885,  
0.01608415027143934,  
0.49167899744128424,  
0.12491439548600353,  
-0.1329609067962543,  
0.8639852596635488,  
-1.6607871811173882,  
0.2801513494447602,  
0.3908501333463579,  
0.6044891435983025,  
0.08637544621327581,  
1.2270127042754213,  
0.11860545946003472,  
-0.13066468162372125,  
-0.998222267933649,  
-1.2643438207146234,  
0.7835210648968657,  
0.8370312354478452,  
0.06527740704106412,  
-1.0235950282739155,  
-0.705070781232052,  
0.037682760290170314,  
1.4778132318704873,  
1.7053977225841355,  
-0.1291331271719845,  
0.1648924115529835,  
2.208642048449397,  
1.1885953055185114,  
-0.8138037079028133,  
0.6715189891287302,  
0.7819572861394978,  
-0.4022064636590845,  
-0.3927127310055937,  
-0.4118784323717791,  
1.3463239978578432,  
-0.3323606385924751,  
0.6664683657180488,  
1.58852177854836,  
-1.212203169826861,  
-0.031436536468697034,  
0.5094262403458202,  
-0.0616688967239856,  
-0.0666169691754888,  
-0.7277012125404719,  
-0.12684196683036533,  
0.5325519345188151,  
2.2778420441533447,

0.8735933622003313,  
0.9907279467768721,  
1.1448787224294625,  
0.4291077507842401,  
-0.21356701746617238,  
1.7174041100732933,  
0.1885112766205208,  
0.3630143936992631,  
0.6395640633025061,  
-0.2937369198596852,  
-0.18128670495631546,  
0.9504587478277511,  
-0.6241293783488098,  
1.8733903679237267,  
0.4875344831143031,  
-0.9182747577406853,  
0.850791268752179,  
-0.46183623376516114,  
-0.634145646812118,  
-0.9165900492445601,  
-0.8973746003077631,  
-0.879107286657044,  
0.15645801311276636],  
[ 0.48023040681030116,  
0.7029544315470944,  
0.722671987246733,  
0.9307929858945541,  
0.9307929858945543,  
2.546598088688794,  
2.546598088688794,  
2.546598088688794,  
2.546598088688794,  
5.184334435330857,  
5.195111458618343,  
5.47436411399969,  
5.47436411399969,  
5.47436411399969,  
5.47436411399969,  
5.47436411399969,  
6.068336244524409,  
6.068336244524409,  
7.838605251840715,  
7.912250316107233,  
7.912250316107233,  
8.562517202814183,  
9.063385768597811,  
9.216218862905647,  
9.216218862905647,  
10.84047371877396,  
10.84047371877396,  
11.044358714867027,  
11.375406566932424,  
11.375406566932424,  
0.18886549713610382,  
0.6040291443391601,  
-0.9727809979878402,  
3.008209947509642,  
0.3239743149147096,  
-0.643987619924633,  
1.0739882269552894,  
0.4935103262912805,  
-1.1713673989643745,  
0.32339055167680386,  
-0.8254170399860232,  
3.387204293956005,  
0.5437302598099015,  
-0.6585961721148387,  
1.0903163929414719,  
-1.5261906384818182,  
1.102349928722959,  
-0.7373436929054379,  
0.1712635196093208,  
1.2086697581514199,  
-0.4977298668106944,  
-0.8828019932256734,

-0.13051782426094366,  
0.048744185631251574,  
-1.0535030780910155,  
0.5224555306604155,  
-0.9502111367985572,  
-0.2573420205933925,  
1.5833039752620888,  
1.3806480812363842,  
0.3864833677006273,  
-0.0006284730712113316,  
0.6487740408134013,  
1.697829570896293,  
-0.20023867528920775,  
-0.32438662287273723,  
1.3674639807988553,  
-1.5592347723565667,  
-0.6294582959326964,  
1.111157394071659,  
1.4895912958038178,  
-0.7203901402661329,  
-0.027076706863032294,  
0.009574786781832467,  
1.1437695218822916,  
0.11720143179507149,  
1.0973549625545624,  
-1.0756168303605034,  
-1.5785125289756954,  
-0.42999007233668873,  
0.7592603373612552,  
0.7357293999316703,  
0.03766014972468404,  
1.450035910180884,  
-0.08978031589044846,  
0.7176267391661779,  
-2.3377280976646966,  
0.3878354316208249,  
-0.8070070584177742,  
0.07084117333557359,  
-0.008998168433091903,  
0.6612796195456235,  
0.6287929626789847,  
0.8601333603228948,  
-0.7786354708155643,  
-0.144476679155352,  
0.39492950957300044,  
-0.20012968159779548,  
0.01326107241550192,  
-0.5649340596325207,  
-0.020398755490040426,  
0.6333499066300691,  
0.400844220606507,  
0.5954749034740784,  
0.8700413681534388,  
1.315868035063538,  
0.9914334712755634,  
0.10418309057983809,  
1.1095991500751576,  
-0.1712743534684691,  
-0.2730581386141925,  
0.1453142903679217,  
-0.3813955795194703,  
0.1280814941289577,  
-0.5627986213807415,  
-1.0576722394029623,  
-1.98721560251358,  
0.519862592148374,  
1.03695228961559,  
0.21101375663462807,  
-1.750252459751414,  
-1.1450993785481438,  
-2.2517541986316916,  
-1.5456964825715331,  
0.6026638989139771,  
0.47561448130168205,  
0.08201672609434518,

0.47464262797792917,  
-0.14585857152212733,  
0.08636040211648545,  
0.7388192170680543,  
1.071366965639021,  
2.5115163876343742,  
-0.4286872636197954,  
-0.2977998181526895,  
0.46569070003689333,  
0.2115019986130443,  
-0.5123638542481742,  
0.09024611293676764,  
-0.3380729423866059,  
1.6314769884628497,  
1.3338027138849353,  
-0.7442166070564612,  
1.2186722356710948,  
1.584709484399307,  
-0.6554175978902271,  
0.36887213174672207,  
-1.365021965092438,  
-0.4623126041921459,  
0.4869420326570461],  
[ 0.5118290521669792,  
0.9034573591840084,  
1.0514460879099101,  
1.1283814725964603,  
1.1293980629167455,  
1.6874068541059999,  
1.8362001710030256,  
2.594529848453243,  
2.5949023258749775,  
4.384420392533986,  
4.804388533064279,  
4.8044974726668155,  
4.925049921883437,  
4.925049921883437,  
6.055903002618935,  
6.0650337145794,  
6.06510024924717,  
6.06510024924717,  
7.719643893437192,  
7.719643893437192,  
8.110116534451196,  
8.374448879129652,  
8.374448879129652,  
9.29045698473019,  
9.2929923765699,  
9.977025927736127,  
9.977025927736127,  
9.977438303479875,  
11.277250876863835,  
11.588901828478656,  
-0.5970483257864091,  
1.048395642841534,  
0.3563299433581316,  
2.04182497417867,  
-1.0659189653240388,  
-1.5711224255679066,  
-0.6854026923334804,  
1.3002799990574343,  
0.334979527312172,  
-0.41771661057992626,  
-0.5255960701407614,  
0.9200835209290303,  
0.5840294212204432,  
0.4309612994747514,  
0.010788324288593443,  
0.8398650983618882,  
0.35555521736822654,  
0.33383672576306345,  
-0.03972798241435421,  
-0.5808926346218187,  
-0.6217506829607715,  
-0.022449055124049946,

-0.4671428723737863,  
1.3840583406465645,  
3.321823997583478,  
1.9516123562000514,  
2.109430068020724,  
0.17138900458361278,  
1.0734765554988877,  
1.1591682463434823,  
-1.5085197494005436,  
0.3709514368460093,  
-0.08354812013321816,  
-0.6849414455501801,  
-1.1807064172516142,  
0.1889544406654655,  
0.45125852432694835,  
0.40946867023093825,  
0.9591749175330944,  
0.862406962512403,  
-0.47565451021668054,  
0.14791469386649075,  
0.012323642821740255,  
-0.3613715829994197,  
-0.6520104899254531,  
1.1500641632479522,  
0.11480411675389499,  
0.37929728325133344,  
-0.12818017639377846,  
1.5548403554359806,  
-0.08803696907532751,  
0.16058007713541472,  
-0.2835300528775952,  
1.4317946638041426,  
0.04218231832431045,  
0.6164913379423986,  
-0.5546192578057587,  
-0.0016176435191898148,  
0.3455446109244303,  
-0.7983090776945799,  
0.06548494602750325,  
0.09601011255154575,  
-1.274882751616874,  
-0.6639296860891427,  
0.08468574728059233,  
0.09178155492125434,  
-1.9746588496307496,  
1.363083624655819,  
-0.11754172722968637,  
-1.7454296260872237,  
0.689437867548643,  
0.09536601432398076,  
2.1875690275532618,  
1.9737367040865754,  
0.19623670188051764,  
1.3618525198389628,  
-1.6551377680800423,  
-1.2796187335858575,  
-0.02979150349567955,  
0.3655877448114123,  
-1.339933806945279,  
-1.6131280858420662,  
1.1268021774842836,  
0.7853899025443938,  
-1.214954346638235,  
1.881374469676006,  
-2.2108375055617597,  
0.38299461206746305,  
-0.062378913993248956,  
-1.0812916442950207,  
0.19113842494911862,  
0.43947065709017896,  
1.4340329690981122,  
-2.1914706359927933,  
1.683520172253517,  
-0.4151753501170658,  
0.2652280013518245,

```

-0.09829123134965576,
-0.4033858255054015,
-0.09488290407421365,
1.1087820722198931,
1.3758250784849964,
0.3693308876448478,
-1.4774754586810708,
0.45790576106810227,
-1.318961759734687,
1.2898775251023542,
0.5291693857421421,
-0.7225860054677886,
-0.6024865845145562,
1.1258609582335735,
1.4545810101615688,
0.4988359655120556,
0.39968483637691726,
1.4778005154845164,
1.6358502222921723,
0.07081811420225437,
1.5336807499569445,
-0.7595143926860392,
0.07947795439670366]],
'run_time_sec': 68705.11171293259}}],
'zne': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': { 'value': [ 0.32980400918867037,
0.7818596814437996,
0.9680306497310072,
1.0586432954274991,
1.7663116348413028,
1.8956491295658664,
2.0436116769319477,
2.0436116769319477,
2.0436116769319477,
2.1846619555479685,
2.1846619555479685,
4.516997836642403,
4.516997836642403,
5.3166564351730035,
5.320130741320412,
5.399447086770547,
5.400046100307029,
5.400046100307029,
5.400046100307029,
5.400046100307029,
7.097750404951498,
7.618222769006738,
7.956666567531361,
7.956666567531361,
8.961109688308255,
8.961109688308255,
11.028500695271937,
11.5809418583784,
11.5809418583784,
11.5809418583784,
0.24114173221382337,
1.3754512844042854,
0.9720111739434927,
-0.29877116871955545,
-0.029737313498699618,
0.3185153459444675,
-0.31840745367437817,
0.6801602139502809,
-0.015407845998522466,
-1.114484654283524,
0.22997676136047449,
1.5201821520192487,
0.3217486942799661,
0.43678760134757944,

```

0.17618749246228715,  
0.7010359103792874,  
0.3446701255696699,  
1.4700166379981474,  
0.3471333265905846,  
-0.968444017764766,  
-1.1485269521507444,  
0.3282504398407059,  
-0.7898554413193151,  
-0.22157985789400653,  
0.4570931682042821,  
-0.22158635023930806,  
-0.36549836384277606,  
-0.2366283880333898,  
0.4114765778384287,  
-0.7694643480660831,  
-0.40507000819737765,  
-0.6576468499882752,  
0.2023600853039859,  
-1.2917280200640486,  
0.32702771491506877,  
-0.07546137553843744,  
-0.7713328193108817,  
-0.8163562225239717,  
-0.07772489804090182,  
-0.32841576637855896,  
-0.05728139293162625,  
0.8564947637293437,  
0.15384434981345546,  
0.41944080031994563,  
0.16884394015055976,  
-0.010490661309829376,  
-1.3198249528292274,  
0.07128101806419536,  
0.03515395872296211,  
-0.09826644736389979,  
-0.06882299183557238,  
-0.7062443088386591,  
-0.5280915567870916,  
0.14860690208212682,  
0.338235073517239,  
0.012130023587481156,  
-0.037483081002571056,  
0.8881056862099682,  
0.06312673968269537,  
-0.44738898868242327,  
-0.2463284936792685,  
1.1708672891281489,  
0.5297819270424092,  
-0.5463182826640249,  
-1.667403353493104,  
1.3713545814180228,  
0.9413366263710182,  
-0.021951472934173096,  
1.0345046397029698,  
-0.8002739446090432,  
1.076242700462428,  
0.04994674089563993,  
-1.446235170371471,  
-0.3268246709561185,  
0.6264234635598642,  
-1.2465048991503196,  
0.1169092097763034,  
1.2453937722962254,  
0.7220287063888942,  
0.8114212311039525,  
0.18333674920471413,  
0.7345776889004225,  
0.9807678368065545,  
0.8703572591074042,  
0.28720991162605214,  
-0.9085817320602367,  
1.1216621938695932,  
1.1327477502874412,  
-1.8285395156530388,



```

1.4231155243966302,
0.08156271721069372,
0.18027327076782884,
-0.10302960773112253,
-0.5560482514096969,
-0.09484541903718098,
0.5886430341587933,
-1.1674014904638685,
-0.03940950630369794,
0.2792515765657198,
0.08214125135098017,
0.04344924016389119,
-0.7787970529711157,
0.07887586110139429,
0.7532574519080738,
0.17107625040009872,
-0.4128415687827808,
1.3723943620028143,
1.4278581324344195,
0.5879977529754344,
0.28910810409117477,
-1.4412046993697643,
1.624844367134446,
0.19366683662945536,
0.3179841250458877,
0.5357240606734743,
1.5680682524509713,
0.04418323830986127,
0.2311137213204739,
2.8741283660232546,
0.9612408402592636]],
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0 },
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#5'},
'redundant': { 'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.720969040841223],
[12, 6, 0, 0, -5.577003279994283]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.504753112792969e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -7.292951921264693,
'others': { 'beta_coefficients': [1.5, -0.5],
'cost_richardson_zne': 2.5,
'sorted_expectation_vals': [ -6.720969040841223,
-5.577003279994283],
'sorted_noise': [6, 18]},
'sampled data': [ [4, 2, 0, 0, -6.720969040841223],
[12, 6, 0, 0, -5.577003279994283]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 0},
'time': { 'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': { 'value': [ -4.1290471568429383e-17,

```

0.028387941050870547,  
0.028387941050870516,  
0.028387941050870544,  
0.4764187545019148,  
0.485154879376271,  
0.7094706976105217,  
2.998376901501724,  
3.486264965503922,  
3.487775573446841,  
4.058897205630428,  
5.020552086463093,  
5.02158492362958,  
5.02158492362958,  
5.0846878698400815,  
5.0846878698400815,  
6.794704827143902,  
6.794704827143902,  
6.794704827143902,  
8.013356083289752,  
8.21076169573117,  
8.21076169573117,  
8.633075344303478,  
8.633075344303478,  
8.930018414781724,  
8.930018414781724,  
8.930018414781724,  
8.930018414781724,  
9.990329186240457,  
9.990329186240457,  
12.915390927357043,  
0.8289215528981712,  
0.6465354442587259,  
-0.06922368073773534,  
-2.0853926237797484,  
0.25605409461249207,  
-0.765586831155604,  
0.9589723041272441,  
0.27455658215646966,  
-0.07189982532198122,  
-0.3449139525561357,  
-0.46800027418386986,  
1.016480689947782,  
-0.9706976058410632,  
-0.9556868223128826,  
0.9323574793538898,  
-0.4376613900889883,  
0.44138701419965265,  
1.4418520162063444,  
0.8420619129497768,  
-0.025530845682239494,  
-2.3076344184440156,  
0.37458463155346333,  
-0.47031338116346383,  
0.07338001085955462,  
-0.869249007732584,  
1.6824786550253577,  
1.719346297136726,  
-0.9622509832303179,  
0.5779076253870294,  
0.4760527439731688,  
-0.2451715046346434,  
1.5906513054768954,  
0.35918458386075697,  
-0.44817294000256097,  
-0.37416377940751877,  
0.37048554789855764,  
0.693137718643464,  
2.288219219235325,  
-0.26501198620577204,  
0.3689053264668303,  
0.10166782579927121,  
-0.3356073800920907,  
-0.6413954053758932,  
0.28636656044125136,  
-0.8690978212322298,  
1.166030172665772,

-0.46365263204645707,  
-0.8505396438729699,  
2.4328989003329693,  
-1.4554443951257197,  
2.09134311034601,  
1.7695145471360614,  
1.1170184462314887,  
0.20325573406500014,  
0.34206355374635444,  
0.016804831103183593,  
-0.19882507083844791,  
1.4011478969931443,  
-0.0572616468882171,  
-1.3773340344964602,  
1.1031086912886459,  
0.47433623341773395,  
-0.037679845343088075,  
0.7450954028512253,  
1.3114871459373192,  
-0.18651966717154955,  
1.0750199871192778,  
0.48905379729033566,  
-0.6281827821606347,  
1.322074656325554,  
-1.4761484868509396,  
0.2859918816514792,  
-1.0033541595176405,  
0.8264053813863532,  
0.622010811103528,  
1.1636747207646185,  
-0.31883271288389914,  
-0.0013981850979601159,  
-0.09999405171802342,  
1.3085280853238759,  
-1.3727969089464465,  
-0.08341159264840771,  
1.6249369276484606,  
-0.28082331570516694,  
1.863294400254821,  
2.2932652495309953,  
1.4849536675442596,  
0.6811668802751195,  
1.5380110980874968,  
-0.6615225065895972,  
0.4000828281024264,  
0.33932121588009856,  
0.48855764825038867,  
2.5371111232777053,  
-0.7260430040504564,  
0.09005940379987407,  
-0.8762980817992282,  
-0.23800314057977784,  
0.9728027685352436,  
-0.20857834368009137,  
0.6148333457084475,  
-1.5171898336040224,  
0.8658542069129427,  
-1.6478287868490311,  
0.5770049367106069,  
0.134497700004433,  
-0.11612046371881249,  
1.5826352840237945,  
1.6045820840261675,  
-0.08805669980595342,  
-1.507745125921201,  
-0.11276651576435986,  
0.07206005105970639,  
-1.7788122679933258,  
-0.002988765738482436,  
0.7255804452314191,  
2.7661804504965604,  
-3.1943627011957507,  
-0.07088434770936546,  
0.10949711075632612]],

'noise\_profile': { 'noise\_on\_init\_param': {'status': False, 'value': 0},

```

'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#1'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.833109640228285],
                          [12, 6, 0, 0, -5.610198560557998]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.5762786865234375e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -7.444565180063428,
                            'others': { 'beta_coefficients': [1.5, -0.5],
                                         'cost_richardson_zne': 2.5,
                                         'sorted_expectation_vals': [ -6.833109640228285,
                                                                       -5.610198560557998],
                                         'sorted_noise': [6, 18]},
                            'sampled data': [ [4, 2, 0, 0, -6.833109640228285],
                                              [12, 6, 0, 0, -5.610198560557998]],
                            'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                                         'r': 0},
                                      'time': {'max': 10.0, 'min': 0.0},
                                      'type': 'ising'}}},
  'init_param': { 'value': [ 0.3463233138801294,
                             0.34632331388012944,
                             0.3463233138801294,
                             0.3463233138801293,
                             1.2403205490491955,
                             1.38033446895038,
                             3.6939218351946623,
                             3.6939218351946623,
                             3.693921835194662,
                             3.693921835194662,
                             3.9412089126587,
                             3.9412089126587,
                             3.9412089126587007,
                             3.9412089126587007,
                             4.8310999601027795,
                             4.870844593548848,
                             4.900228671797898,
                             4.9002286717978984,
                             4.9002286717978984,
                             4.900228671797898,
                             5.70167657474683,
                             6.21188441483336,
                             6.21188441483336,
                             6.686419232103557,
                             6.723504371727371,
                             7.618130890836856,
                             7.618130890836856,
                             9.420364260644014,
                             9.420364260644014,
                             10.775132222422771,
                             -0.3525750090684208,
                             1.2748976558430758,
                             -0.16146998454247521,

```

1.3224575871686013,  
0.0349265192498484,  
0.36138711032415904,  
-0.5043488106619078,  
0.7634801084306476,  
-0.3536814593617201,  
0.9606809354246906,  
-1.1143894720984433,  
-0.45289061390722213,  
-0.1605333784989486,  
-1.594210268458609,  
-0.09465166736510336,  
0.11132251138190599,  
1.004235666711761,  
-0.23115493220428254,  
0.9451761882751959,  
-0.3707284170975133,  
-0.17782948231634454,  
-0.18433417990028922,  
-0.06421460341189031,  
-1.155489001827845,  
-0.2074908306187579,  
-0.036360325422879626,  
0.5283181819327893,  
0.3603171208434518,  
0.6819349944270952,  
-0.2733083993242672,  
0.7075879191324372,  
-0.042779623335368125,  
0.7032435595714176,  
-0.7363942983542189,  
0.9583235184546098,  
-0.5892472427173001,  
-0.7139877518112785,  
-0.12446625268371646,  
-0.439646171766664,  
0.7129808957109575,  
0.3373075268097138,  
0.3345550414369601,  
-0.38068761370203624,  
0.07864964370676188,  
-0.3383553862900091,  
0.6633419895127639,  
-0.578720703894673,  
0.486162302530746,  
-0.06112668401522289,  
0.34417654454775265,  
-0.09182266750822224,  
0.012215000731405658,  
0.5658291917160285,  
-0.16728488191683846,  
0.3754616489195623,  
-0.30497315054621493,  
-0.7559846133933803,  
0.9474959005813702,  
-0.5904076686561035,  
-0.2620011537974264,  
0.1328515248519479,  
-0.44066408562446224,  
-0.7849425610737308,  
0.44059474279745625,  
-0.04646983134951628,  
0.27897770882356554,  
0.36838349877106535,  
1.1610009997739648,  
0.9058411506824863,  
0.3119955912029684,  
-0.5265683545543336,  
1.0661822357546584,  
0.8560044406571757,  
0.5004409227892788,  
0.5192086876555008,  
-0.0019665558968806392,  
-0.23949800878404184,  
0.32563956832297103,

```

0.795323960796817,
1.5213873243487468,
0.8637563634588281,
0.07945031145196896,
1.7583315097859118,
0.5335864884320034,
-0.1366270407456156,
-0.9111102828185913,
-0.41650979281126865,
0.20926691692934202,
0.2776061293997892,
1.4257231544028384,
-0.10754544247245298,
1.0035199546983695,
1.1162390986419686,
1.7211522778091677,
-1.4332245925979028,
1.4417595659646931,
-2.106784537892007,
-0.6878309432904478,
-0.20360639354575213,
0.6373705186717347,
0.051333236332203484,
-0.35868991955772395,
-0.24365907607080922,
1.619736185871098,
0.5895182658245096,
-0.6086170057348131,
0.39774539931448055,
1.409837948786624,
0.17438880158294706,
-0.0415548590378924,
0.1413623732119859,
-0.8192475896231625,
0.5823982141653503,
-0.8462302367353051,
-0.60454163385331,
1.8216629921858374,
1.2634551976945552,
-0.40200420270308274,
-1.5954759495917508,
-1.7732438129518737]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#3'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.1514222647937595],
                          [12, 6, 0, 0, -4.906882414400225]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.7670135498046875e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -6.773692189990527,
                           'others': { 'beta_coeffiecients': [1.5, -0.5],
                                        'cost_richardson_zne': 2.5,
                                        'sorted_expectation_vals': [ -6.1514222647937595,
                                                                    -4.906882414400225],
                                        'sorted_noise': [6, 18]},
                           'status': False}},

```

```

'sampled data': [ [4, 2, 0, 0, -6.1514222647937595],
                  [12, 6, 0, 0, -4.906882414400225]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                                         'r': 0},
                                      'time': { 'max': 10.0, 'min': 0.0},
                                      'type': 'ising'}}},
  'init_param': { 'value': [ 0.27654223573266234,
                              0.27654223573266246,
                              0.27654223573266246,
                              0.4643738922966213,
                              0.6582164862517121,
                              0.6582164862517121,
                              0.6582164862517121,
                              1.3424523496852623,
                              1.47635793598756,
                              1.47635793598756,
                              3.385550316280557,
                              3.385550316280557,
                              3.385550316280557,
                              4.494062371253785,
                              4.494062371253785,
                              5.0204758683966135,
                              5.023404188660082,
                              7.05704094573064,
                              7.087391629397132,
                              7.533802135057517,
                              8.245970909352765,
                              8.390887842007308,
                              8.390887842007308,
                              8.703391612007538,
                              8.703391612007538,
                              9.485545381639698,
                              9.485545381639698,
                              9.849437794456351,
                              9.849437794456351,
                              10.799155842585746,
                              -0.12708089143278917,
                              1.4168148977025445,
                              -0.13519536748631492,
                              -0.32308714516775877,
                              0.06981336221044306,
                              -0.034321895006426455,
                              -0.18209443759399158,
                              -0.024858958594746107,
                              0.664488174834645,
                              0.6897317665852637,
                              -0.008774731192519907,
                              0.625642551337688,
                              0.6862410821653743,
                              -0.7670419540542446,
                              -0.48055390132433673,
                              1.573964677292243,
                              -1.0555745677813198,
                              1.3159721165631335,
                              -0.9138502497993347,
                              -0.4641566084568084,
                              -0.06966564000847691,
                              0.039012746519005555,
                              1.0827641697579717,
                              1.2190093772283843,
                              1.5391150382377632,
                              -0.6675581491933664,
                              0.09104662559232415,
                              0.5283818781579022,
                              0.04478118244404365,
                              1.5836075485651113,
                              0.251932560991488,
                              -0.3949560381811925,
                              0.8854639388207172,
                              -0.8611267164776638,
                              1.566928747241295,

```

-0.15445151319573347,  
-0.01396050433941564,  
0.8172620115356718,  
-0.014658132241289147,  
-0.6623010385304499,  
0.6299284572753584,  
-0.15026947869759505,  
-1.2293112897827836,  
-0.5768656731979434,  
1.231557922062332,  
-1.447872926116422,  
1.4918722706131171,  
0.31945486783385635,  
0.43870804207253483,  
1.3582636256308331,  
-0.8478398442626237,  
0.799518029891469,  
0.5539369896048497,  
0.13453197415145846,  
0.7167498104862234,  
-0.06589109804263343,  
0.041038724923082276,  
1.151975756926885,  
-0.052026838729968425,  
0.3952978000808587,  
-1.1754748970457833,  
-0.01965607042871015,  
-0.2456324144680547,  
-0.01136184217607491,  
0.022503168314325715,  
1.1777923723104653,  
0.14554117253938412,  
-1.2287946167385297,  
-0.9683737383161766,  
1.073329622962756,  
-0.7143583802799215,  
-0.3545002682598469,  
-0.31906110571926777,  
-0.9597094503848127,  
0.8825903987559673,  
-0.08273415521500459,  
0.2895039435279609,  
-0.3388594197258312,  
0.2406459434933063,  
0.3824128671502841,  
-0.5390555829405563,  
0.3757684495816124,  
-0.5015719636333678,  
0.3958257688275076,  
-0.6428354095046468,  
-0.9178624992467067,  
0.29327306512581747,  
-0.09193285724698198,  
0.1770091195095364,  
0.6803523512851801,  
1.05525770275555,  
-0.4646437845139076,  
2.2560908642344026,  
-0.7500939262299234,  
1.92959092052175,  
-0.36895777993274226,  
-0.04538283416771957,  
1.2529586558275392,  
-0.57805717638909,  
0.3080585810325818,  
0.031910210614104206,  
0.18519950010488512,  
1.3888566879174211,  
1.087260914864616,  
0.15259355623633358,  
-0.08810167996863522,  
0.07467874103808375,  
1.4444893382870363,  
-1.446220680213735,  
0.8215180856176293,



```

2.0151723649306295,
0.13454991965456886,
0.21923381008732426,
0.31112145477192793,
-0.8977876743954992,
0.10239876571985529,
-1.0132922278363503,
-0.3794863035801566,
0.8437803973608401,
1.111671691788496]],
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#2'},
'redundant': { 'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.51493088468928],
[12, 6, 0, 0, -5.310706408751286]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.361701965332031e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -7.117043122658277,
'others': { 'beta_coefficients': [1.5, -0.5],
'cost_richardson_zne': 2.5,
'sorted_expectation_vals': [ -6.51493088468928,
-5.310706408751286],
'sorted_noise': [6, 18]},
'sampled data': [ [4, 2, 0, 0, -6.51493088468928],
[12, 6, 0, 0, -5.310706408751286]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 0},
'time': { 'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.46756606893882113,
0.46983859896604685,
0.5133985927484581,
0.5133985927484581,
0.5133985927484581,
1.4016794842576101,
1.6914116785996751,
1.691411678599675,
1.6941756924801525,
1.6941756924801528,
3.749864451084885,
3.749864451084885,
3.749864451084885,
3.749864451084885,
4.969636107010246,
4.969636107010246,
4.969636107010246,
4.969636107010246,
5.983107385388112,
5.983107385388112,
8.378949246097575,
8.378949246097575,

```

8.635680633753974,  
8.635680633753974,  
9.108807770997622,  
9.108807770997622,  
9.108807770997622,  
9.960036411132767,  
10.436643041587223,  
10.716533289695375,  
0.5466515694267952,  
3.318518267704871,  
0.40678728382369284,  
0.6290091030083763,  
-0.4770983795300032,  
-0.7455483390932742,  
0.1630064768968011,  
0.4889724943271746,  
0.10596004146863507,  
-1.4759536729524354,  
0.957604974713893,  
0.6004514101153323,  
0.0725728265044025,  
1.4994700617905987,  
0.15508641282397265,  
-0.15494303336158094,  
-0.5663845144966579,  
2.6663065398173496,  
-0.27086336898318036,  
-1.1828784814640632,  
-0.295045685212881,  
0.6236994649007899,  
1.1769360493970402,  
1.7159795997719172,  
-0.3019600780315931,  
0.651545330446025,  
-2.0782382222089724,  
0.3186344830290561,  
-0.2815476257680432,  
0.4067635126151388,  
-0.8228051832090519,  
-0.4154478828430832,  
2.3723163321732827,  
0.931436930203099,  
0.9804374423714106,  
0.058895326584719035,  
0.3167253661454302,  
0.3390503539155689,  
-0.5024758650485814,  
-0.2425872659725522,  
-0.6703364135359525,  
-0.147558399690948,  
1.1644296968010859,  
0.5475507579506065,  
0.1736068872874216,  
0.30547527216138975,  
0.5300773267023443,  
0.7722201656261689,  
-0.6858549484151734,  
-0.16073113081558088,  
-1.197458252004488,  
-0.507307082981415,  
-0.16437738354723153,  
0.2647407403580543,  
-0.45930133674563567,  
-0.22673992276266391,  
1.8127715449849986,  
-1.4334128748253496,  
-0.759404859696163,  
1.2431110601081345,  
0.8953271645792334,  
0.6963251389999259,  
-0.23147129445607595,  
0.3638861144885483,  
2.2394622330281906,  
1.543816783446588,  
1.7535830084845025,

```

-0.3169637330795974,
0.2453194636587019,
2.0076391670843647,
0.286017506499548,
0.6600449842625801,
0.19782118041633945,
0.05463577684798935,
0.4755005320975566,
0.055207215781380096,
0.06969685609102444,
0.2645328829673777,
-0.01235845210357445,
1.01982876424508,
2.262492417600915,
1.3443784687440867,
0.10698144982242018,
0.428081928456963,
-1.5494921893757727,
1.0701294130786736,
0.39987519173641656,
0.06301738855484718,
-1.6711192593807125,
0.26920159401030147,
-0.08358711295948693,
0.4054786916979446,
-0.5013194648307361,
2.126550690771933,
0.10959959792145137,
0.4205360694942305,
-0.586878230803869,
-0.3381608637889511,
-0.5055401953468239,
-0.45995744817477163,
0.07999668782445096,
-0.4269018063306222,
0.9588276598807326,
1.042187521522261,
0.07821502449201799,
0.6777167152964713,
0.4177387822172794,
-0.18721284346239236,
-0.8064458441104513,
2.8712851588196218,
0.7141862154478698,
-0.9976723444987857,
-0.8529435737233043,
1.9602636639541733,
1.2634521849205176,
-0.7170870121313951,
0.31227949023655405,
-1.0451293221946831,
-0.6787852158143914,
1.8581833428208436]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#6'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.4878948983695235],
                          [12, 6, 0, 0, -5.297876077058435]],
        'degree': 0,

```

```

        'method': 'richardson',
        'sampling': 'default'}}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.9591064453125e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -7.082904309025067,
                            'others': { 'beta_coefficients': [1.5, -0.5],
                                         'cost_richardson_zne': 2.5,
                                         'sorted_expectation_vals': [ -6.4878948983695235,
                                                                    -5.297876077058435],
                                         'sorted_noise': [6, 18]},
                            'sampled data': [ [4, 2, 0, 0, -6.4878948983695235],
                                              [12, 6, 0, 0, -5.297876077058435]],
                            'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                                         'r': 0},
                                      'time': {'max': 10.0, 'min': 0.0},
                                      'type': 'ising'}}},
  'init_param': { 'value': [ 0.4319322451408806,
                             0.4441934852523559,
                             0.5878315575931067,
                             0.5878315575931067,
                             0.5912427958750637,
                             0.5947187380620651,
                             0.5947187380620652,
                             1.5628074958209335,
                             1.568718083448373,
                             2.013035808837258,
                             2.013035808837258,
                             2.013035808837258,
                             2.0277481086167364,
                             4.114573484042011,
                             4.1154343976538055,
                             5.358852938788934,
                             5.358852938788934,
                             5.549639110185835,
                             5.667644288942511,
                             5.6706149635077026,
                             7.063797010237488,
                             7.658675772413245,
                             8.123010743902626,
                             8.633070512181217,
                             8.7849794748515,
                             8.7849794748515,
                             10.749769122252356,
                             10.89899813672382,
                             11.413879450074099,
                             11.413879450074099,
                             -0.04151001581527148,
                             -2.751209241920508,
                             -0.5056705094410174,
                             -0.406548832581749,
                             0.8633340895103881,
                             0.17259893989954428,
                             -0.21235924407313156,
                             -0.5485334561985523,
                             0.2012951527025238,
                             -0.23858034563229433,
                             2.1364176057207223,
                             0.7817014982866842,
                             -0.1108899918027214,
                             0.6048531661014985,
                             1.809261328558185,
                             -1.1786415575821785,
                             -1.0827170099436865,
                             0.4109384498547832,
                             0.8090945308822337,
                             -0.9356585252219308,
                             0.28697429006677655,
                             -0.15332459566133277,
                             1.2998079093160566,
                             0.3870967504567973,

```

-0.2413465423953762,  
1.001771196320206,  
0.1138394509020578,  
1.3220786271535379,  
-1.1806565063083097,  
2.2789659185869464,  
0.11875741943281123,  
-0.15631084464392242,  
-2.14680662310284,  
0.18035127914430246,  
-0.260880073181003,  
0.21031876899961,  
0.7641152777599183,  
1.203568210035907,  
1.2767673297334832,  
1.2585129786889195,  
0.24752046596725819,  
0.7203551788145919,  
-0.17420447991641552,  
-1.3486030918499698,  
0.2145369555808404,  
0.8896874485404291,  
-1.6470089821954121,  
-0.37928143051952584,  
-0.29903232984244293,  
0.6984471945997809,  
0.14906235834494008,  
0.054873949093549826,  
1.3877615433857144,  
0.04193983551007985,  
1.2014028569521673,  
-0.02338341588216991,  
-0.05255422822816251,  
-0.1905875093002492,  
0.16425167437144692,  
0.2542835721118732,  
1.1822299841866795,  
1.203222480152739,  
0.30142488752060526,  
0.09125464470109583,  
-0.45638140154025475,  
0.050260497156630585,  
-0.04000614529085093,  
0.9096133936431033,  
-0.03555378439095736,  
0.4405325841695877,  
-0.48129885373423525,  
-0.3617221403442356,  
-2.5216506086368518,  
-0.5081934521569421,  
0.041332600726076626,  
0.7413771443671474,  
0.2204029987501584,  
-0.7517920276590782,  
-0.21022249714251526,  
1.5607830526955413,  
0.16615947769508344,  
-0.17023919527139658,  
-0.4295619963603494,  
-1.1838803442651602,  
0.6319564057885301,  
-0.3935277768061919,  
0.005550337258741166,  
-0.4226065324972882,  
-0.3715846249960284,  
-0.48395498614671884,  
-0.4790957128536121,  
1.4427293239187895,  
0.5875094653073935,  
1.404722056846091,  
0.6973465258635152,  
0.8623508528879442,  
-0.5460563718875903,  
0.8326491581513842,  
-2.4015389244466907,

```

-0.04583861440999851,
-0.36265388938085896,
-0.5347868312224912,
0.49674658852292397,
-0.6488379607428911,
1.1568053403721041,
0.30662269781395407,
-2.013151608263867,
-0.17383275003878457,
0.5036662539248705,
1.9638910157847163,
3.118155075975211,
0.8117246453310248,
-1.4517859264576565,
-1.4946803709676548,
-2.7792982516572895,
1.1174424252005506,
2.333430423546859,
0.6903927508165344,
-0.2883899927957993,
-0.8542826896862586]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#7'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.662379321078875],
[12, 6, 0, 0, -5.394498644176584]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.886222839355469e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -7.296319659530022,
'others': { 'beta_coeffieicients': [1.5, -0.5],
'cost_richardson_zne': 2.5,
'sorted_expectation_vals': [ -6.662379321078875,
-5.394498644176584],
'sorted_noise': [6, 18]},
'sampled data': [ [4, 2, 0, 0, -6.662379321078875],
[12, 6, 0, 0, -5.394498644176584]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.23818326834520384,
0.242015507589488,
0.5292100600091615,
0.5598196968290768,
0.5598196968290768,
2.3451854381830244,
2.3451854381830244,
3.8453025861748578,
3.8453025861748578,
4.395137112369032,
4.408833101975425,

```

4.829585475162733,  
4.867115107997544,  
5.058958687371625,  
5.058958687371625,  
5.058958687371625,  
5.581243202757385,  
6.011433944644334,  
6.011433944644334,  
8.358003932454157,  
8.358003932454157,  
8.358003932454157,  
8.371420896509267,  
8.783744346022278,  
8.783744346022278,  
9.34189587380724,  
9.34189587380724,  
9.39608576624051,  
9.726727464435275,  
10.95102910414735,  
0.14721560345391302,  
1.0205767628001141,  
0.40564926087548847,  
-1.9238321605823567,  
-0.04729505851188324,  
0.482541600628026,  
0.1152155677775581,  
0.8524320040134185,  
0.42380767990264745,  
-0.6219665889019169,  
-0.05759638705357143,  
0.8161328242190486,  
0.7425402472775383,  
0.7535392998290764,  
1.8314745216576223,  
1.3334023135030668,  
0.05552193989453376,  
0.9691374289368472,  
-0.07338372949421543,  
-0.6690664310785921,  
1.168533104165511,  
-0.01962836639606316,  
0.6576122461884292,  
-0.037637936325233226,  
-0.0009647519828692927,  
0.4524839512418326,  
-0.013115244288784337,  
1.6270372625341938,  
1.182284078721198,  
0.9533845712158122,  
1.0956662941001023,  
-0.9647918240366662,  
0.1897778948773928,  
-0.04047520420354409,  
0.5790278460715794,  
0.631719469583885,  
-0.3335418357294817,  
1.0603186443819097,  
-0.7449471003423949,  
0.1630231005006795,  
-0.07563007210422526,  
-1.1009042311153838,  
-0.34587951137957407,  
-0.22408475871037167,  
-0.6364303490666092,  
-0.5245531829065874,  
-0.7807390048523051,  
-0.7767575864285188,  
-0.9679768325508518,  
-1.8691843526791756,  
0.4783530568164554,  
0.6133546874260105,  
-0.20020986269221935,  
-0.41532071148562183,  
-0.8557118152516873,  
-0.16985308585729458,

```

0.8428338023785568,
0.6750667051632169,
1.2795031602880573,
-0.41384224674171627,
0.3213362409234008,
1.2340309605381181,
1.0506369357289735,
-0.6415500741723684,
-0.9628453188140567,
1.935214357876566,
1.4159154638103797,
-2.0864443113151867,
-0.07426020994129089,
-1.0538315394110076,
0.2589745455351295,
-0.2955978932252484,
-0.030644528099012087,
-0.8602288471584197,
-0.09490606960216369,
0.4190622694749842,
-1.5667390101922392,
-0.7804920738383083,
0.1255849265457167,
0.5884338319364165,
-0.46028089859616994,
0.2488277677353687,
-0.7513271615815256,
-1.0561258734551267,
0.3697237180501531,
-0.7108432439071602,
0.5137418203820399,
0.946767478727941,
1.619957961978311,
1.2944079622561346,
0.21625880379379211,
0.007168703139473973,
-0.334764182643075,
-0.9086121674985949,
-0.8247776105092918,
-0.5734460393428641,
-0.4381826298821608,
-0.44306191141826123,
-0.23860269421390362,
-0.03343496826073402,
-0.008972211649351379,
1.2196121588758198,
1.5985131140815898,
0.060325450296581484,
-0.7312434635304047,
0.9413542695101463,
-0.6701271691421761,
-1.0680925542186157,
-0.5192506372311365,
1.5594784335685845,
0.17928043514789443,
0.2455246384495121,
-0.053106843359071614,
0.7488220810664211,
1.3030207698426615,
-1.787387332504871,
-1.1184519607509558,
-0.2511275398302805,
1.445676213762956,
1.5991220174606833}},
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':

```



```

'AUTOMATE_ising_noisefree_time_evo_ric2_sample#4'},
  'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
  'run': 'zne',
  'state': 'dmatrix',
  'vqe': { 'iteration': 1,
    'optimization': { 'algorithm': 'SLSQP',
      'constraint': True,
      'status': False}},
  'zne': { 'data_points': [ [4, 2, 0, 0, -6.630764461698827],
    [12, 6, 0, 0, -5.461578440310041]],
    'degree': 0,
    'method': 'richardson',
    'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
    'run_time_sec': 4.00543212890625e-05,
    'zne_values': { 'degree': 0,
      'extrapolated_value': -7.215357472393219,
      'others': { 'beta_coefficients': [1.5, -0.5],
        'cost_richardson_zne': 2.5,
        'sorted_expectation_vals': [ -6.630764461698827,
          -5.461578440310041],
        'sorted_noise': [6, 18]},
      'sampled data': [ [4, 2, 0, 0, -6.630764461698827],
        [12, 6, 0, 0, -5.461578440310041]],
      'sampling': 'default'}}},
  { 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
      'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
      'r': 0},
    'time': { 'max': 10.0, 'min': 0.0},
    'type': 'ising'}}},
    'init_param': { 'value': [ 0.48023040681030116,
      0.7029544315470944,
      0.722671987246733,
      0.9307929858945541,
      0.9307929858945543,
      2.546598088688794,
      2.546598088688794,
      2.546598088688794,
      2.546598088688794,
      5.184334435330857,
      5.195111458618343,
      5.47436411399969,
      5.47436411399969,
      5.47436411399969,
      5.47436411399969,
      5.47436411399969,
      6.068336244524409,
      6.068336244524409,
      7.838605251840715,
      7.912250316107233,
      7.912250316107233,
      8.562517202814183,
      9.063385768597811,
      9.216218862905647,
      9.216218862905647,
      10.84047371877396,
      10.84047371877396,
      11.044358714867027,
      11.375406566932424,
      11.375406566932424,
      0.18886549713610382,
      0.6040291443391601,
      -0.9727809979878402,
      3.008209947509642,
      0.3239743149147096,
      -0.643987619924633,
      1.0739882269552894,
      0.4935103262912805,
      -1.1713673989643745,
      0.32339055167680386,
      -0.8254170399860232,
      3.387204293956005,
      0.5437302598099015,

```

-0.6585961721148387,  
1.0903163929414719,  
-1.5261906384818182,  
1.102349928722959,  
-0.7373436929054379,  
0.1712635196093208,  
1.2086697581514199,  
-0.4977298668106944,  
-0.8828019932256734,  
-0.13051782426094366,  
0.048744185631251574,  
-1.0535030780910155,  
0.5224555306604155,  
-0.9502111367985572,  
-0.2573420205933925,  
1.5833039752620888,  
1.3806480812363842,  
0.3864833677006273,  
-0.0006284730712113316,  
0.6487740408134013,  
1.697829570896293,  
-0.20023867528920775,  
-0.32438662287273723,  
1.3674639807988553,  
-1.5592347723565667,  
-0.6294582959326964,  
1.111157394071659,  
1.4895912958038178,  
-0.7203901402661329,  
-0.027076706863032294,  
0.009574786781832467,  
1.1437695218822916,  
0.11720143179507149,  
1.0973549625545624,  
-1.0756168303605034,  
-1.5785125289756954,  
-0.42999007233668873,  
0.7592603373612552,  
0.7357293999316703,  
0.03766014972468404,  
1.450035910180884,  
-0.08978031589044846,  
0.7176267391661779,  
-2.3377280976646966,  
0.3878354316208249,  
-0.8070070584177742,  
0.07084117333557359,  
-0.008998168433091903,  
0.6612796195456235,  
0.6287929626789847,  
0.8601333603228948,  
-0.7786354708155643,  
-0.144476679155352,  
0.39492950957300044,  
-0.20012968159779548,  
0.01326107241550192,  
-0.5649340596325207,  
-0.020398755490040426,  
0.6333499066300691,  
0.400844220606507,  
0.5954749034740784,  
0.8700413681534388,  
1.315868035063538,  
0.9914334712755634,  
0.10418309057983809,  
1.1095991500751576,  
-0.1712743534684691,  
-0.2730581386141925,  
0.1453142903679217,  
-0.3813955795194703,  
0.1280814941289577,  
-0.5627986213807415,  
-1.0576722394029623,  
-1.98721560251358,  
0.519862592148374,

```

1.03695228961559,
0.21101375663462807,
-1.750252459751414,
-1.1450993785481438,
-2.2517541986316916,
-1.5456964825715331,
0.6026638989139771,
0.47561448130168205,
0.08201672609434518,
0.47464262797792917,
-0.14585857152212733,
0.08636040211648545,
0.7388192170680543,
1.071366965639021,
2.5115163876343742,
-0.4286872636197954,
-0.2977998181526895,
0.46569070003689333,
0.2115019986130443,
-0.5123638542481742,
0.09024611293676764,
-0.3380729423866059,
1.6314769884628497,
1.3338027138849353,
-0.7442166070564612,
1.2186722356710948,
1.584709484399307,
-0.6554175978902271,
0.36887213174672207,
-1.365021965092438,
-0.4623126041921459,
0.4869420326570461}],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#9'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.751241519687581],
[12, 6, 0, 0, -5.575778108730956]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.314018249511719e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -7.338973225165893,
'others': { 'beta_coeffieicients': [1.5, -0.5],
'cost_richardson_zne': 2.5,
'sorted_expectation_vals': [ -6.751241519687581,
-5.575778108730956],
'sorted_noise': [6, 18]},
'sampled data': [ [4, 2, 0, 0, -6.751241519687581],
[12, 6, 0, 0, -5.575778108730956]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},

```

```
'init_param': { 'value': [ 0.5118290521669792,  
0.9034573591840084,  
1.0514460879099101,  
1.1283814725964603,  
1.1293980629167455,  
1.6874068541059999,  
1.8362001710030256,  
2.594529848453243,  
2.5949023258749775,  
4.384420392533986,  
4.804388533064279,  
4.8044974726668155,  
4.925049921883437,  
4.925049921883437,  
6.055903002618935,  
6.0650337145794,  
6.06510024924717,  
6.06510024924717,  
7.719643893437192,  
7.719643893437192,  
8.110116534451196,  
8.374448879129652,  
8.374448879129652,  
9.29045698473019,  
9.2929923765699,  
9.977025927736127,  
9.977025927736127,  
9.977438303479875,  
11.277250876863835,  
11.588901828478656,  
-0.5970483257864091,  
1.048395642841534,  
0.3563299433581316,  
2.04182497417867,  
-1.0659189653240388,  
-1.5711224255679066,  
-0.6854026923334804,  
1.3002799990574343,  
0.334979527312172,  
-0.41771661057992626,  
-0.5255960701407614,  
0.9200835209290303,  
0.5840294212204432,  
0.4309612994747514,  
0.010788324288593443,  
0.8398650983618882,  
0.35555521736822654,  
0.33383672576306345,  
-0.03972798241435421,  
-0.5808926346218187,  
-0.6217506829607715,  
-0.022449055124049946,  
-0.4671428723737863,  
1.3840583406465645,  
3.321823997583478,  
1.9516123562000514,  
2.109430068020724,  
0.17138900458361278,  
1.0734765554988877,  
1.1591682463434823,  
-1.5085197494005436,  
0.3709514368460093,  
-0.08354812013321816,  
-0.6849414455501801,  
-1.1807064172516142,  
0.1889544406654655,  
0.45125852432694835,  
0.40946867023093825,  
0.9591749175330944,  
0.862406962512403,  
-0.47565451021668054,  
0.14791469386649075,  
0.012323642821740255,  
-0.3613715829994197,  
-0.6520104899254531,
```

1.1500641632479522,  
0.11480411675389499,  
0.37929728325133344,  
-0.12818017639377846,  
1.5548403554359806,  
-0.08803696907532751,  
0.16058007713541472,  
-0.2835300528775952,  
1.4317946638041426,  
0.04218231832431045,  
0.6164913379423986,  
-0.5546192578057587,  
-0.0016176435191898148,  
0.3455446109244303,  
-0.7983090776945799,  
0.06548494602750325,  
0.09601011255154575,  
-1.274882751616874,  
-0.6639296860891427,  
0.08468574728059233,  
0.09178155492125434,  
-1.9746588496307496,  
1.363083624655819,  
-0.11754172722968637,  
-1.7454296260872237,  
0.689437867548643,  
0.09536601432398076,  
2.1875690275532618,  
1.9737367040865754,  
0.19623670188051764,  
1.3618525198389628,  
-1.6551377680800423,  
-1.2796187335858575,  
-0.02979150349567955,  
0.3655877448114123,  
-1.339933806945279,  
-1.6131280858420662,  
1.1268021774842836,  
0.7853899025443938,  
-1.214954346638235,  
1.881374469676006,  
-2.2108375055617597,  
0.38299461206746305,  
-0.062378913993248956,  
-1.0812916442950207,  
0.19113842494911862,  
0.43947065709017896,  
1.4340329690981122,  
-2.1914706359927933,  
1.683520172253517,  
-0.4151753501170658,  
0.2652280013518245,  
-0.09829123134965576,  
-0.4033858255054015,  
-0.09488290407421365,  
1.1087820722198931,  
1.3758250784849964,  
0.3693308876448478,  
-1.4774754586810708,  
0.45790576106810227,  
-1.318961759734687,  
1.2898775251023542,  
0.5291693857421421,  
-0.7225860054677886,  
-0.6024865845145562,  
1.1258609582335735,  
1.4545810101615688,  
0.4988359655120556,  
0.39968483637691726,  
1.4778005154845164,  
1.6358502222921723,  
0.07081811420225437,  
1.5336807499569445,  
-0.7595143926860392,  
0.07947795439670366]},

```

'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#10'},
'redundant': { 'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.406033238196167],
                          [12, 6, 0, 0, -5.147683680770249]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.62396240234375e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -7.035208016909126,
                           'others': { 'beta_coeffiecients': [1.5, -0.5],
                                        'cost_richardson_zne': 2.5,
                                        'sorted_expectation_vals': [ -6.406033238196167,
                                                                    -5.147683680770249],
                                        'sorted_noise': [6, 18]},
                           'sampled data': [ [4, 2, 0, 0, -6.406033238196167],
                                              [12, 6, 0, 0, -5.147683680770249]],
                           'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                                         'r': 0},
                                    'time': { 'max': 10.0, 'min': 0.0},
                                    'type': 'ising'}}},
  'init_param': { 'value': [ 0.4349098035102067,
                              0.5281397824211302,
                              0.6402833431740305,
                              0.701719039924861,
                              0.8953768954552646,
                              1.4118719346144908,
                              2.230113621742168,
                              2.6548053250922607,
                              3.10433397641996,
                              3.1043339764199596,
                              4.146783795497047,
                              4.146783795497047,
                              4.149760661232294,
                              4.149760661232294,
                              4.223539194779984,
                              4.223539194779984,
                              6.7727886487081435,
                              6.7727886487081435,
                              7.243551717080481,
                              7.282491880183138,
                              7.282491880183137,
                              7.282491880183138,
                              8.806989173945695,
                              8.80698917394569,
                              9.706285648296737,
                              9.809777023075187,
                              9.837118725166619,
                              10.701586770517197,
                              11.185931122995514,
                              11.185931122995514,
                              0.39919688039300266,
                              1.4533249104921768,

```

0.7852252158845567,  
-0.4957764525834907,  
-0.3354719566017423,  
0.16097458435951068,  
-0.21971891747261646,  
1.5370438656668401,  
0.26531517225969137,  
-0.6386119707402834,  
0.37748437574064975,  
1.2333814560270282,  
0.5934062959304571,  
1.633059089666515,  
0.31170790405459564,  
0.3995146629536743,  
-0.11155094016301184,  
0.8138063699882787,  
0.019467271717771087,  
-0.38186317682975884,  
-2.778803401027002,  
0.7887082829537533,  
-3.1348050840084074,  
-1.5109224736536222,  
-0.38589710406642097,  
-1.105927053527023,  
0.3451707237315739,  
0.6290043291617069,  
-1.834722402137916,  
-1.0551446159380258,  
-1.3581260193610523,  
0.9666180881078981,  
-0.05759676522292653,  
1.1866392284178628,  
-1.1308471740259582,  
0.34327443183487805,  
0.17662613760194443,  
-0.043135596735193626,  
-0.03667546733606037,  
-0.4901895513664937,  
-1.0399227541005371,  
0.4880459765792483,  
0.053089003166299456,  
-0.6259966396796703,  
0.03159579372412852,  
-0.09798805529491862,  
0.052872660107769434,  
1.490194875693949,  
0.22167423812356596,  
-0.33497064714209324,  
1.0144679614160885,  
0.01608415027143934,  
0.49167899744128424,  
0.12491439548600353,  
-0.1329609067962543,  
0.8639852596635488,  
-1.6607871811173882,  
0.2801513494447602,  
0.3908501333463579,  
0.6044891435983025,  
0.08637544621327581,  
1.2270127042754213,  
0.11860545946003472,  
-0.13066468162372125,  
-0.998222267933649,  
-1.2643438207146234,  
0.7835210648968657,  
0.8370312354478452,  
0.06527740704106412,  
-1.0235950282739155,  
-0.705070781232052,  
0.037682760290170314,  
1.4778132318704873,  
1.7053977225841355,  
-0.1291331271719845,  
0.1648924115529835,  
2.208642048449397,

```

1.1885953055185114,
-0.8138037079028133,
0.6715189891287302,
0.7819572861394978,
-0.4022064636590845,
-0.3927127310055937,
-0.4118784323717791,
1.3463239978578432,
-0.3323606385924751,
0.6664683657180488,
1.58852177854836,
-1.212203169826861,
-0.031436536468697034,
0.5094262403458202,
-0.0616688967239856,
-0.0666169691754888,
-0.7277012125404719,
-0.12684196683036533,
0.5325519345188151,
2.2778420441533447,
0.8735933622003313,
0.9907279467768721,
1.1448787224294625,
0.4291077507842401,
-0.21356701746617238,
1.7174041100732933,
0.1885112766205208,
0.3630143936992631,
0.6395640633025061,
-0.2937369198596852,
-0.18128670495631546,
0.9504587478277511,
-0.6241293783488098,
1.8733903679237267,
0.4875344831143031,
-0.9182747577406853,
0.850791268752179,
-0.46183623376516114,
-0.634145646812118,
-0.9165900492445601,
-0.8973746003077631,
-0.879107286657044,
0.15645801311276636]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric2_sample#8'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.672780190342767],
[12, 6, 0, 0, -5.522238922989663]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 4.00543212890625e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -7.248050824019319,
'others': { 'beta_coefficients': [1.5, -0.5],
'cost_richardson_zne': 2.5,
'sorted_expectation_vals': [ -6.672780190342767,
-5.522238922989663]},

```



```

'sorted_noise': [6, 18]],
'sampled_data': [ [4, 2, 0, 0, -6.672780190342767],
                  [12, 6, 0, 0, -5.522238922989663]],
'sampling': 'default']}]},
'ising-ric3-uniform-scaling': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
                                'layer': 30,
                                'ugate': { 'coefficients': { 'bn': [ 0,
                                                                    0,
                                                                    0,
                                                                    0,
                                                                    0,
                                                                    0],
                                                                    'cn': [ 0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5],
                                                                    'r': 0},
                                'time': { 'max': 10.0, 'min': 0.0},
                                'type': 'ising'}},
                                'init_param': { 'value': 'random'},
                                'noise_profile': { 'noise_on_init_param': { 'status':
                                                                    'value': 0},
                                'noise_prob': [ 0.001,
                                                0.001,
                                                0.001,
                                                0.001],
                                'status': False,
                                'type': 'depolarizing'},
                                'nqubits': 7,
                                'observable': { 'coefficients': { 'bn': [ 1.0,
                                                                    1.0,
                                                                    1.0,
                                                                    1.0,
                                                                    1.0,
                                                                    1.0,
                                                                    1.0],
                                                                    'cn': [ 0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5],
                                                                    'r': 1},
                                'def': 'ising'},
                                'output': { 'draw': { 'fig_dpi': 100,
                                                        'status': True,
                                                        'type': 'png'},
                                'file_name_prefix': 'ising_noise_off'},
                                'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                    [1, 1, 0, 0]]},
                                'run': 'vqe',
                                'state': 'dmatrix',
                                'vqe': { 'iteration': 10,
                                'optimization': { 'algorithm': 'SLSQP',
                                'constraint': True,
                                'status': True}},
                                'zne': { 'data_points': None,
                                'degree': 1,
                                'method': 'richardson',
                                'sampling': 'default'}},
                                'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
                                                                    'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
                                                                    '4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
                                                                    'X 5 X 6 + 1 Z 5 + 1 Z 6',
                                'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + '
                                                                    '1 Z 0 + 1 X '
                                                                    '1 X 2 + 1 Z '
                                                                    '1 + 1 X 2 X '
                                                                    '3 + 1 Z 2 + '
                                                                    '1 X 3 X 4 + '
                                                                    '1 Z 3 + 1 X '

```

False,

```

'output': { 'exact_sol': -8.56677223350563,
            'initial_cost_history': [ 3.7901552515724086,
                                      3.396779462430669,
                                      3.6416626483897634,
                                      5.191980344851134,
                                      3.300383519902229,
                                      4.2302694452267025,
                                      5.5832854157035126,
                                      3.424340408479732,
                                      4.575860085354091,
                                      3.843028199719871],
            'noise_details': { 'gates_num': [4, 1, 1, 0],
                               'identity_factors': [0, 0, 0, 0],
                               'noise_level': [0, 0, 0, 0],
                               'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [
0.001,
0.001,
0.001,
0.001],
'status': False,
'type':
'depolarizing'},
'odd_wires': 4},
'optimized_minimum_cost': [ -7.3566708947935595,
                             -7.585318923493526,
                             -7.222021821934782,
                             -7.637732542535524,
                             -6.9717347656162385,
                             -7.183899566070664,
                             -7.312238847468353,
                             -7.55546648538883,
                             -6.871387778407254,
                             -7.103750879845002],
'optimized_parameters': [ [ -8.981486547411966e-18,
                             0.2355269100006643,
                             0.6734351680867104,
                             0.7281872519006076,
                             0.8287057436356319,
                             0.9968962697957876,
                             0.9968962697957877,
                             0.9968962697957875,
                             0.9968962697957875,
                             1.6732799868313266,
                             1.9939389913716405,
                             1.9939389913716405,
                             1.9939389913716405,
                             2.7786795690350794,
                             2.7786795690350794,
                             4.834741825646661,
                             4.843194997300159,
                             5.442664851556481,
                             6.006041306704694,
                             6.006041306704694,
                             6.42159854018659,
                             6.42159854018659,
                             7.172079495244572,
                             7.835006027334925,
                             7.835006027334925,
                             7.835006027334926,
                             9.27390458565848,
                             10.142272229921797,
                             10.547148172870333,
                             11.945646083493756,
                             0.30631338507375855,
                             0.950240081652421,
                             0.3197394260348401,
                             -0.8989315334324052,
                             -0.19972246213391193,

```

1.1515465399564957,  
0.5794269610995502,  
0.029234461946744308,  
-0.3033609133811924,  
-0.5068802243159589,  
0.41891242044729254,  
1.2272962791271989,  
0.3217023759538914,  
-0.0389595358377685,  
-0.2818159573379153,  
0.40344301100056285,  
0.012601476380185236,  
-0.7249227034698249,  
-0.28859136632269766,  
0.9177183017829931,  
0.3192674751581855,  
-0.6960323093564068,  
0.9954617266198262,  
-0.0960673339612117,  
0.30357952531427623,  
0.9148253966896076,  
-0.41157308092318357,  
-0.2244725515886058,  
0.900815469140735,  
-0.8704821270800919,  
-0.2201886465573435,  
-0.058451834208670006,  
-0.5564504264806815,  
1.0028418241392123,  
0.6862825176439941,  
-0.07515432929364027,  
-0.132716959754057,  
0.3156193912732197,  
-0.5571752224261073,  
-1.1266280252389607,  
-0.2496012410462972,  
0.4568813812573679,  
0.5040642955504137,  
-0.27382094178370653,  
0.738802930675346,  
-2.1017467172452315,  
1.7134969759675782,  
0.19045289169065632,  
0.4959480509883087,  
0.2725041426894662,  
-0.020113534287112555,  
-0.27730132318570966,  
0.9121222342974794,  
0.7771919661145833,  
1.2410984938270941,  
0.698373852916785,  
0.049079898076347495,  
0.4715079446630061,  
-0.0012225173391828686,  
1.2380103358912495,  
0.18126256323161893,  
0.02822806167971892,  
0.9624172506978782,  
-0.1017646649934255,  
0.10712069411267353,  
0.11059700546555196,  
0.1764728469149672,  
1.0536625920020957,  
-0.43614672067179516,  
1.1290800077402758,  
-0.7544321351970764,  
0.20178203991689547,  
0.545960403958859,  
-1.271331788368515,  
0.3827893670869708,  
0.514944994226915,  
0.9987612988518954,  
0.9130737051848579,  
-0.33354580533033523,  
0.4110572637290035,

-1.0065548546569214,  
0.05504586363332423,  
-0.8123464439408392,  
0.9622209015425294,  
-1.7981345279534349,  
0.8489846299822246,  
1.9191971402543575,  
-2.019266402915899,  
-1.6151954323496909,  
1.693158829823371,  
0.8368996699819713,  
-0.7925788637806501,  
-1.416264150106769,  
-0.7484853165625206,  
-1.026066230288144,  
0.2591646216069995,  
0.9485984853376032,  
1.624644962520762,  
0.1389264160191751,  
1.7901079295930897,  
0.28173803525757823,  
-0.06727915670909099,  
-0.39998196135024877,  
-0.911581975644718,  
-0.8802717995009537,  
-0.6496644186002655,  
0.9474433579476823,  
0.5810351318438188,  
-0.5928504020318089,  
0.40429180463166087,  
0.19955746243713188,  
0.14940534343654552,  
1.148493268597809,  
-0.6171972430901704,  
2.358530954611547,  
1.6132804954395525,  
1.5230819806307347,  
0.07100911239249047,  
-0.9821849785093056,  
-1.2186503325370892],  
[ 0.43242608326371745,  
0.47036005705701023,  
0.6035896599876003,  
0.6406575109863006,  
1.589410377648682,  
1.589410377648682,  
1.589410377648682,  
1.9902163938334159,  
1.9902163938334156,  
2.6096176446013035,  
2.6096176446013035,  
3.039961339509649,  
3.039961339509649,  
3.0408788822093955,  
3.0408788822093955,  
4.1325863285768,  
4.1325863285768,  
4.801738885893826,  
5.558430388585627,  
5.558430388585628,  
6.48703427557745,  
6.599293033589678,  
7.119130597501129,  
7.119130597501129,  
8.096879981584715,  
8.096879981584715,  
11.989689272176165,  
12.289334556064002,  
12.289334556064002,  
12.695171119049377,  
-2.1320303145314323,  
1.164574641976517,  
0.2281426394568994,  
0.5098216286601104,  
-0.15959745874570574,

-0.06246168319786304,  
-1.335183444898994,  
1.1253611654826523,  
-2.453373641849758,  
1.542670605477509,  
-0.23459513075014657,  
0.7629240608803527,  
0.7066862387679962,  
0.023354672976759586,  
-0.26545157517882206,  
0.8070755399487665,  
0.621829996842247,  
-0.8206657495436546,  
-0.6456938685697818,  
-0.8432536462697657,  
1.5481421634749726,  
0.030458967225015475,  
-0.6362611752642527,  
-0.5779049484598997,  
0.15136987691256515,  
0.37940285865801,  
-0.13025289482332936,  
-0.6088352960517447,  
1.0137338691570092,  
0.9312563664781934,  
-0.06260332826127091,  
0.16422266217724538,  
-0.44919022316429513,  
0.7120810093352475,  
-0.045811140982536094,  
1.4693096124875311,  
1.3068674578470139,  
0.3099696428239748,  
0.05726716998373588,  
1.4138231816748696,  
1.3251150202531472,  
2.4661338582136705,  
-1.9221360663147242,  
1.6309773912120944,  
1.012572768899168,  
1.1304323717308846,  
-0.10014704960087417,  
1.2138621646932324,  
0.9150507542177275,  
-0.1931179153053463,  
-0.19983886142442753,  
-0.37113288193216537,  
1.0783926703777422,  
0.7626802083907843,  
-0.5396621733108105,  
-1.0558614970998554,  
-0.5031372556139323,  
-0.1733591918410679,  
-0.05810492443974475,  
0.15252588011535415,  
-1.3613790038949474,  
0.14268023162896296,  
2.1247307661901087,  
-0.2996908036461345,  
0.2682896527620792,  
-0.6487468384363545,  
0.0174900962257196,  
0.7865320417875226,  
-0.4365770411878935,  
0.12280152026315115,  
0.2668485276831852,  
1.0055493052017264,  
-0.13783144983938653,  
0.16428177903351826,  
-0.4107244428852575,  
-0.5006989958309392,  
0.4728442136126457,  
-0.5756228808846314,  
-0.2555605201147205,  
-0.6655897533222209,

0.27354627255859315,  
1.056546145946755,  
-1.0108463744632321,  
0.8570822622523233,  
1.1003650202540056,  
-0.13364446072464353,  
0.19686136380997882,  
-2.015333107317771,  
-0.3474605408709381,  
0.5127772990877489,  
0.8873132714146144,  
-0.1538651896386833,  
-0.49691154598038334,  
2.4337764506921564,  
0.11687121421819974,  
0.2637773919076603,  
1.1119719051108947,  
-1.1407171454187541,  
0.293218856784229,  
0.9089141681578352,  
1.0587297353590328,  
0.41354403585027527,  
0.26331197174432663,  
0.04763876798960274,  
2.8376965303594455,  
0.038400591301352385,  
0.732378529151854,  
1.259237861002353,  
-0.09371603030550141,  
-2.6524545055620123,  
0.166545686266708,  
0.8383948517861464,  
0.5625425863873136,  
0.6352389159281269,  
-0.3793199251622615,  
1.4353166704457385,  
-0.06088962240819872,  
0.5575840323453971,  
-0.4370866693930651,  
-1.3477496560670819],  
[ 0.5485274765250757,  
0.6924497584354614,  
0.77926902254116,  
1.4968846113254817,  
1.4968846113254817,  
1.617988193716464,  
1.617988193716464,  
2.3157329555892914,  
2.3157329555892914,  
2.3157329555892914,  
2.6599448622122046,  
2.6599448622122046,  
3.198693955827293,  
3.198693955827293,  
4.93646112072991,  
5.0183990860356085,  
5.166530398168251,  
5.732062846348599,  
6.452081956191476,  
6.950653712152026,  
6.950653712152026,  
7.527182443059662,  
8.141470761550243,  
8.141470761550243,  
8.23161566953153,  
8.23161566953153,  
8.263835107953264,  
9.693553204732913,  
9.696078071259171,  
10.987802073160276,  
0.31236348113638823,  
-1.370738548013981,  
-0.19640846640845944,  
-1.409184053738275,  
-0.00366718677866519,

0.6361615892126344,  
-0.6796219270984741,  
-1.7803162192131878,  
-1.2406782697025376,  
-0.17521451360574944,  
-0.2890470362486656,  
-0.7870591534070972,  
0.6214527622340972,  
-0.5055171901576345,  
0.3099897895999387,  
0.6495941239175653,  
0.4137491249725721,  
0.292781258130194,  
-0.18467758047440086,  
-0.2764099099100952,  
-0.12795113266111025,  
0.14328500307003156,  
0.1623766240720685,  
0.09884205682735484,  
0.07093196196575538,  
0.17766773916349385,  
0.1810420204025737,  
-0.037056767883675096,  
-0.38325428434024456,  
-1.808138895166064,  
-1.2174086587283277,  
0.2723541238647832,  
0.0911451526301191,  
0.829454165789877,  
-0.7076888645983359,  
-1.1582847892183987,  
-0.2789235155040628,  
-0.1868914176693055,  
-0.03618003850886602,  
1.0797789643516258,  
0.010710633626313776,  
0.3041103423483441,  
0.027606917069623423,  
0.09715752300035431,  
-0.025081467189021912,  
0.7307804473426243,  
-0.028312324696826655,  
-0.5439567135695698,  
1.0353579775860826,  
0.03274794094556986,  
0.338229999884877,  
0.003923288912346083,  
0.011059712392702849,  
-0.24419721784886275,  
0.0538500196620971,  
-0.29704802197132957,  
-0.9714959737951582,  
-1.3776571886055275,  
-0.4387141762272093,  
-0.9013896619503009,  
-0.2890811474761574,  
-0.5664350037938545,  
-1.265940570830118,  
-0.36500389888052437,  
-0.11634811830012508,  
-1.0092353619257808,  
-0.6849489189933503,  
0.9856942680495377,  
0.8277230147066852,  
0.2903619348614201,  
-0.3836733140597432,  
-0.530059482018533,  
0.8169168177018395,  
0.5323656053240163,  
0.649672850550592,  
-0.3032256260984974,  
-0.8829469814645045,  
-0.00635052379210004,  
0.35535568318583244,  
-0.06185634463022188,

0.10533559478429602,  
1.2902435643868964,  
0.8825397316379378,  
0.3070411861797082,  
-0.07934132673084492,  
0.09844318572655962,  
0.7695889603351249,  
0.14399374014816757,  
1.8827194490661865,  
0.013305728022345127,  
1.2201617371808122,  
0.13458781619262966,  
-0.42760236848753097,  
1.3132997483594182,  
0.29586095969137777,  
0.14782133458354627,  
1.1539512755729704,  
0.8255769419022573,  
2.1284509830181357,  
1.5067425074661367,  
1.2286171121451426,  
0.8625402575232176,  
0.5254367589291086,  
0.8683165111711829,  
0.35804094605055825,  
-1.3678290318224675,  
-0.3952095755717416,  
2.8373763512718595,  
-1.2381307915304474,  
0.21836664096244152,  
-1.0373469190584237,  
0.35616351546904684,  
-0.48865262743063154,  
0.5395297676370602,  
-0.0068350558769426075,  
-1.6240423184716037,  
-1.005087252746991,  
-0.324331708942255,  
1.56936745287968,  
1.3955283874562228],  
[ 0.3026146462879133,  
0.3869510743764029,  
0.3869510743764029,  
0.5382374643481795,  
0.7459322218289088,  
0.7459322218289088,  
0.8083924716224152,  
0.8083924716224152,  
3.219627607910341,  
3.2253302931763046,  
3.9244184219369176,  
4.114742178023509,  
4.115220647252454,  
4.115220647252454,  
4.115220647252454,  
4.65196408394345,  
5.196968879903224,  
5.736027504566688,  
5.736027504566688,  
6.321573696596394,  
6.7009287553652,  
6.7009287553652,  
6.7009287553652,  
8.383675014305652,  
8.383675014305652,  
8.383675014305652,  
8.383675014305652,  
9.235844817182018,  
9.235844817182018,  
12.415877726713473,  
1.4636821166030158,  
0.8436356038076634,  
-0.6467230542935267,  
0.2472607630354758,  
0.028721536942984512,



0.5720112007049558,  
-0.179388461505878,  
0.6605644899444229,  
-0.2997484495809327,  
-0.5848737649454969,  
0.7567373384637915,  
-0.3113371232415861,  
1.5925608798994126,  
0.15551153490893768,  
1.144256524486279,  
-1.0086304067563407,  
0.4692085043130235,  
-0.5289416707772752,  
0.6895537558918402,  
-0.9023920029674053,  
0.6687255575647186,  
1.3626463195064957,  
0.18435277462186048,  
0.04101567185284027,  
1.2334404589145347,  
-0.8099334611041354,  
0.47217953762833137,  
-0.19021445340255347,  
-0.47126223762254077,  
0.21535783789089086,  
-0.13160146544027274,  
-0.14745399432080403,  
-0.2131109368071074,  
0.6116235033000932,  
0.7187755412423116,  
-0.7690585507561546,  
0.333613273647484,  
0.29688326543860977,  
0.022443242058892903,  
-0.12904022561026712,  
1.1137507228270036,  
-0.1754869613868649,  
0.6791619259450926,  
0.2688019369707634,  
-0.33561997076117317,  
-0.4910450017308718,  
-0.2921449581476723,  
0.07017675650466139,  
-0.5628878746231101,  
0.23633646017547374,  
-0.4408658192483561,  
0.6337746650828207,  
-0.5275874765915898,  
-0.11397090424872018,  
0.7713694979315344,  
-0.24077591679338844,  
0.7998056369050096,  
0.5449521212196076,  
0.6440774810386566,  
0.0012540722532346088,  
0.4406697804838639,  
-0.4697708168210915,  
-0.38183296272166767,  
0.4926783027265995,  
0.012102728676941394,  
0.9995268367701109,  
-0.489600116502774,  
-0.9378926015671718,  
0.7538025600192173,  
-0.9270581698564858,  
0.23395173940139535,  
-1.5047568644302813,  
-0.6335501933328295,  
-0.1851947866597326,  
-0.18416301345971506,  
-0.15010118329037675,  
-0.30085163208099847,  
-0.030658108221894752,  
0.48141025496380413,  
1.2807653372993688,

-0.27688172784497056,  
-0.9404124429777033,  
0.07772158149530461,  
1.2206520244647234,  
0.07167829739929571,  
1.5514296753518346,  
-0.22739832257997444,  
-0.5457307695824859,  
-0.05085143495318925,  
1.4086504148457157,  
-0.02595768387677813,  
1.2057536466860386,  
-0.5009834455732999,  
1.0234750156328314,  
-0.34572346527257924,  
1.4975050133157242,  
0.6424858734227697,  
-0.5412025600486546,  
-0.965195784498948,  
0.8078930733387817,  
-0.8747920106317195,  
1.6444412493640082,  
-1.3120143788008718,  
0.7469227938848356,  
0.7428309989793587,  
0.25043937013438866,  
-0.7176977899841391,  
1.6961228018637329,  
0.8286720852002186,  
-0.08923208660690117,  
-0.4564959840968765,  
-0.10389957398275913,  
-0.04652285532782134,  
0.6308845069083873,  
-0.025008046054888575,  
-1.0109619026173717,  
0.31698532529812806,  
-0.07816069204265776,  
2.517427548138029,  
1.300984357739734],  
[ 0.48696254731677435,  
0.9433356258260287,  
1.8515151481415904,  
3.298386332934612,  
3.298386332934612,  
3.298386332934612,  
3.298386332934612,  
3.298386332934612,  
3.374346159341203,  
3.374346159341203,  
5.043620376468771,  
5.043620376468771,  
5.218159502227583,  
5.683079438253876,  
5.683079438253876,  
5.902572186502105,  
5.902572186502105,  
5.902572186502105,  
6.17408053545979,  
6.17408053545979,  
6.17408053545979,  
6.17408053545979,  
8.600010985810668,  
8.600010985810668,  
9.424738936566825,  
9.424738936566825,  
9.43568443936613,  
10.707654072137746,  
10.707654072137748,  
11.243950101093004,  
0.30560526927017156,  
-0.6023681078531374,  
-0.5052271452160477,  
-1.0944465846035194,  
0.24881605409968105,

1.5229622975948298,  
1.730509331816328,  
-1.3834281548913137,  
-0.8373914729231547,  
-1.186133470726964,  
-0.983750614650609,  
1.3432121337567746,  
1.6569377678026054,  
0.14131844528439758,  
2.9464329846729154,  
1.3448953312948555,  
0.7896925151532842,  
-0.22765810177877452,  
-1.6238177025568765,  
1.1679097532601286,  
1.5429785141845107,  
0.44641536771583223,  
-0.4990561654458825,  
0.2890079097559007,  
0.07664205286689205,  
1.0463374337388847,  
1.0582154531020835,  
-0.7032713068941808,  
-0.5914102053027229,  
0.4481794192989112,  
-0.597054072340342,  
0.6503285491619032,  
-1.3548677382206493,  
0.3073247134537545,  
-0.42900928099090013,  
0.8290869769130189,  
0.25661934620723303,  
-0.41883276922189405,  
-0.25409113110415216,  
-0.2750324278847333,  
1.8535327289298686,  
0.7375047938415388,  
0.21982546706442144,  
0.3355829615333414,  
-0.18885187042138774,  
-0.09263125664317409,  
0.8768150768205386,  
-0.31105067773622297,  
0.11882768143806702,  
0.007542537022557154,  
0.6689687664434811,  
0.7431113887615772,  
0.9447406593038509,  
1.0052341467989638,  
1.4439497926806117,  
0.4202121214316228,  
0.3604666875525164,  
-1.6888556500060994,  
0.1396130584965534,  
0.10094819946612499,  
0.5021137054548022,  
0.3961649599525077,  
0.4932381662816783,  
1.3418440833635417,  
0.09854079710503719,  
-0.9989986964474209,  
1.2672439763832217,  
-0.07601477770236317,  
0.46767000685442095,  
0.3227070865546575,  
-0.7175096141500144,  
0.2758047915288214,  
-0.24095833900456404,  
0.058134638501602325,  
0.6051082814423787,  
0.5442716652871094,  
0.3025208071236723,  
-0.6679934596266708,  
0.8499265434495678,  
0.1803663678751026,

-0.3707988225819567,  
0.6812577092957876,  
1.2284831501706344,  
0.20883808756632122,  
0.03358446867125293,  
0.026609877934757803,  
-0.40919242519291843,  
-0.07640273708110212,  
-1.1643751408115468,  
-0.16769301556045021,  
-1.2911947285322207,  
0.037223344859154565,  
-0.05786091979914895,  
-1.8047938425602224,  
0.014158596153457605,  
0.534864509903787,  
0.006329420481561668,  
1.239578876475735,  
0.2639865904342132,  
1.2160651224901187,  
-0.2035728984920286,  
0.6511657116444571,  
0.3064364057804899,  
2.45196454382623,  
0.8340823063941794,  
1.113505687918428,  
0.049528306503774544,  
0.12947314602533921,  
-0.5399313265794791,  
-1.2647403981540062,  
-0.3482737106911781,  
0.09697429466359891,  
2.20804968215061,  
-0.15489516431237316,  
0.1250815357650574,  
-0.13157603031624435,  
-1.2324441762654297,  
-0.4179909399666764,  
0.3779753490492196,  
1.6472121643813018],  
[ -1.1990978117137884e-16,  
0.0939706539344674,  
0.583570497583306,  
0.583570497583306,  
1.7474308983833136,  
1.7474308983833136,  
2.435631059267761,  
2.4356310592677604,  
2.435631059267761,  
2.4356310592677612,  
2.9757043839921162,  
2.975704383992116,  
4.1141402268542535,  
4.1141402268542535,  
4.889622687428616,  
5.085553065152385,  
5.14502423979873,  
6.38608549233117,  
6.405094454380333,  
6.807050165246778,  
6.807050165246778,  
6.997225211250308,  
7.82493752524197,  
8.419597935808826,  
8.419597935808826,  
8.756502393683652,  
9.514795580339912,  
10.006329694888725,  
10.008671195739254,  
10.582332645019955,  
-0.18325409339400697,  
-1.8356335907661927,  
-0.6014425812689169,  
1.272854521157504,  
0.38561099010389943,

-1.3354103698578268,  
1.2089446007576305,  
-0.16684037696101606,  
1.5272415494549387,  
-0.21803857489548387,  
0.659293576456549,  
-0.7629850988015884,  
-2.0880787600158244,  
-0.2200967935369742,  
-0.21257917133409554,  
0.05335328813343252,  
0.740881120097457,  
0.002552459203101907,  
2.0381278489789163,  
0.07009602349011958,  
-0.027486349535234322,  
-0.5162309983105858,  
-0.018107734929441965,  
0.3459554204227654,  
1.1337361200247116,  
0.6158218713410994,  
-0.5251391279578093,  
0.2758552924607382,  
1.227089028823027,  
-0.16405595633516176,  
0.7587337472599636,  
-1.1046949665522132,  
0.7157795020690486,  
-0.9666557350608269,  
0.5941166908158014,  
-0.3035426485157296,  
-1.1713314559961463,  
-0.3285214016177699,  
0.15201600725182188,  
1.158582769628082,  
-0.2335509332665805,  
0.021624313631101504,  
-0.7981749327134954,  
0.12400359670343174,  
-0.00041124409742626503,  
0.10665347356443583,  
-0.030437347790731137,  
-0.22360998336164295,  
0.21313944649575595,  
0.08788738041696632,  
-1.2878790640853577,  
-0.028446563531964782,  
-0.12898316604526575,  
-0.29469285393680966,  
-0.07114900510733681,  
-0.8104482788171727,  
0.6394923422746198,  
0.6811407094584414,  
0.15127654478155184,  
0.5799864823630293,  
-0.55116978803857,  
-0.5805840448115108,  
0.9630930231089359,  
0.9222833564508055,  
-0.28733988453131243,  
2.645322235680672,  
0.02138581028992107,  
-0.12421624460779133,  
-1.4608772192659922,  
-1.289711141721096,  
-1.433469567857053,  
-0.01041716118532159,  
0.3377052351749707,  
-1.74263853738129,  
-0.6445874089376945,  
0.6790378089998735,  
0.0019732068694448615,  
0.6260241949545162,  
-1.3812938119718974,  
0.06110738334511842,

0.919936405723882,  
-2.761538990972181,  
0.01773377957551518,  
0.6041489324828,  
-0.281847147959406,  
0.36931104439326196,  
0.14008962906529285,  
1.0402771661903438,  
0.40062198057764514,  
-0.03775531840468896,  
-0.4974133017905023,  
0.5298490799692606,  
-1.7184458207495306,  
-0.7561470763062167,  
-0.5888363413103725,  
-0.9669502040570058,  
1.3911426640670486,  
-1.922807929753264,  
-0.7347523142785206,  
-0.6976214468215837,  
-0.9022103009000106,  
-0.17554401086360705,  
-0.7004215075729389,  
-1.1648825394224225,  
-1.1285064327861984,  
1.3794410327712907,  
0.7524041737227146,  
-0.600926776988818,  
0.724704963452131,  
0.24574404734520428,  
1.3856850730269805,  
0.505698953761027,  
-0.030535393994814766,  
-0.4836980977841504,  
0.6166564120021005,  
2.4235804988343936,  
0.6827837636480912,  
0.3673788389460804,  
0.11748797515103059,  
1.4924513209248702],  
[ 1.112287766890805e-16,  
0.11579095179987547,  
1.7588846075757274,  
1.7588846075757274,  
1.998030831219005,  
3.2454648629288743,  
3.248106797240174,  
3.248106797240174,  
4.259596531772135,  
4.958175754196259,  
5.7210454174100525,  
5.861260496697951,  
5.861260496697951,  
6.7588095170100075,  
6.7588095170100075,  
6.758809517010007,  
7.044198424034494,  
7.044198424034494,  
7.044198424034494,  
7.044198424034494,  
8.232813771743604,  
8.791432218349115,  
8.791432218349115,  
8.791432218349115,  
9.616347292478379,  
9.616347292478379,  
9.869492613451865,  
9.869492613451865,  
10.182429226961672,  
13.25758469112181,  
0.5705572906646224,  
0.09014038635403764,  
0.1263845657016112,  
1.0203985977202104,  
-1.095649826264738,

0.019398597884167954,  
-1.3544747652103108,  
0.8866931148929111,  
-0.18940184666069662,  
1.0130589658671383,  
0.15424354259331335,  
-0.8117851912876255,  
0.28413415623416743,  
1.542699745821886,  
1.836477396464815,  
0.7160099188075301,  
-0.9589348876176362,  
0.00854407549207699,  
0.36750908199249616,  
0.7288091138524155,  
0.9748756553152056,  
0.7257579234395075,  
-1.9128288506616224,  
0.515489770530508,  
-0.8485176532957428,  
0.21376115901922352,  
1.0834633235702664,  
0.404913552038143,  
-0.12863840971929708,  
0.8333794222571905,  
2.496813054711946,  
-0.7354302042700512,  
0.27199375272502646,  
-1.0107781002238316,  
-1.201703662816619,  
-0.3331724830549245,  
1.3030593505928814,  
-0.8138384777541797,  
1.9586180892259586,  
1.1713603302631173,  
1.08196422334098143,  
-1.1784039537689197,  
-0.12146178641002908,  
-0.1717950232658355,  
0.13833462928205204,  
-0.8697724612180706,  
0.7515471411202548,  
1.166125613326729,  
0.37941686042382794,  
0.17074885851048915,  
-0.33600856179263133,  
-0.13669943521352546,  
0.548834657399268,  
-0.2522233718783481,  
0.009665778262181637,  
-0.5020120590858954,  
0.16617168999240312,  
-0.46390045473242114,  
-0.05573261329441784,  
1.1182956755615927,  
0.0937037366596967,  
-0.4441962997721035,  
-0.21050297984767188,  
-1.0381458298882043,  
0.830180513233935,  
-0.8157309834659043,  
-0.5833742339287631,  
-1.5354704640903527,  
0.44493118131447734,  
0.13057382050598434,  
-0.7034976447329113,  
0.6218444459919024,  
-0.2420386731361673,  
-0.7867967091164098,  
-0.168935029173583,  
-1.6928247400206122,  
0.22571922404505704,  
0.1126763335131705,  
-0.22160264498444046,  
2.299575126838168,

2.5415010654218975,  
-0.5449604787415219,  
-1.005432959888493,  
-1.722931012111005,  
-0.6732620373630841,  
-0.0004890899721480893,  
1.492586488782192,  
-0.9055437852306896,  
1.1298576359465664,  
-0.5182549439372126,  
0.6586606791613716,  
0.7929632788713356,  
0.08462141435268096,  
0.5066414628201175,  
0.6503902510816232,  
0.06456835392989443,  
-1.687283870544211,  
-0.2816102525113523,  
0.9601910446201565,  
-1.0364808528540121,  
0.32603884641661884,  
-0.37671408634672476,  
-0.16068551007585027,  
0.6157148912247653,  
2.0105220675930333,  
1.7580796652062145,  
1.7229426093703843,  
-0.5199627188331776,  
-1.3760925920420213,  
0.8290526991464299,  
-0.08765267414283408,  
-0.456659399307068,  
1.4313668535261046,  
0.635052489001378,  
2.136142869643981,  
-1.5755126698917075,  
-0.40116032394931217,  
-0.004321541181387126,  
3.301925406547275,  
0.7673504276272846],  
[ 0.49826187507447023,  
0.6110785201427625,  
0.6558173388435118,  
1.2433731466916595,  
1.2468055416987345,  
1.9464512542038723,  
2.109950686395802,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
5.054414830549875,  
5.106961698737131,  
5.488040579082762,  
5.488040579082762,  
6.832391146999917,  
6.967864562238176,  
6.967864562238176,  
7.490508971727458,  
8.20118277218113,  
8.612503180124596,  
9.093659709060372,  
9.807153774862888,  
10.372385504551621,  
10.372385504551621,  
11.272736556325881,  
11.767303580595307,  
11.767303580595307,  
0.035679258194077725,  
-0.8723307875716305,  
-1.7560663493087938,  
1.9629136553479551,  
1.9120807210302333,



-0.39357388790453784,  
0.036182026687196715,  
-0.21816401975370772,  
0.8090968256508778,  
0.22775227657680963,  
-0.9402388060640036,  
1.9199330583190146,  
-0.6293921442826633,  
-0.37521158500092616,  
-2.4122776248196542,  
0.47614923103710605,  
-0.2356719275662886,  
0.5930119757607211,  
-0.08067436637158562,  
-0.6975308853470512,  
-0.1533962892581602,  
0.6838091266999453,  
0.243129377869582,  
0.5896632240559074,  
0.12048284254834898,  
1.186903891075025,  
0.22948374273850122,  
-0.9592798973456383,  
1.431786126792839,  
1.099938502501145,  
-0.6421065764259075,  
-0.4570128400176702,  
-0.40361390122591434,  
-0.030699975686000303,  
0.5709596867047622,  
0.8129177753256275,  
0.0978347154858261,  
-0.1791413540365364,  
1.316347643480991,  
1.0669242344323897,  
0.9542637314281797,  
0.2732710750226029,  
-0.24925074976969727,  
0.14351675204102743,  
-2.058043419369877,  
-0.5772495977232713,  
0.4759355346590471,  
-0.3040209890415461,  
0.07360159687611288,  
0.11769956200453384,  
0.01709491725825118,  
1.1325236656251834,  
0.008658928128351846,  
-0.21852721169551936,  
-0.1826844911726131,  
0.39535377862993026,  
0.035729500082236576,  
-1.0747644579938396,  
-0.15992271631488378,  
0.8234408989300128,  
2.679077704708449,  
0.2559692131167249,  
1.5592174030452497,  
0.3453465662341248,  
-0.24046357809578378,  
-0.6876498012434461,  
-0.01750342347144341,  
0.34704200676536884,  
0.2033679229118891,  
-1.5920113668255755,  
-0.5283783493172445,  
0.4351355192977228,  
-0.8281455342425702,  
0.2974457926897622,  
-1.336557258227178,  
0.2885982325597283,  
-1.2111847441179915,  
0.698629224522434,  
-1.072563817644129,  
-1.2092878769637225,

-0.33153669598628793,  
-0.2558676939050336,  
-0.039300685015777354,  
0.5730206646846686,  
0.6772024906875076,  
-0.5431857921175166,  
-0.32242263836861185,  
-1.2435651530921474,  
0.6447338068594848,  
-1.1796614873773261,  
-0.5517178991847818,  
-0.9950127711245446,  
-0.750107619545704,  
1.546476758712725,  
0.7798072495873917,  
-1.3969546244577882,  
-1.3869625997614359,  
-0.5499269608373658,  
-2.0698482195340895,  
-0.31472418351029113,  
1.3858906356684872,  
-2.3234389152233144,  
0.8580050890595776,  
0.5574876161662472,  
0.12663545081840322,  
0.0024286165622580055,  
1.4351555562364873,  
-0.018100010671135307,  
-1.4466701603237728,  
1.0091335554802272,  
-0.25739419705547106,  
0.8584486110461004,  
-1.6353613496727522,  
1.3481381905015994,  
1.664215570319441,  
-1.4688501218242656,  
0.6630999772073086,  
-1.3598408860414706,  
-0.9086993193406631,  
-0.7720609621308895],  
[ 0.03916643192220903,  
0.09260151508853934,  
0.5125042140553085,  
0.5342494495137248,  
1.4070055183169814,  
1.4076098722130033,  
1.4080234932826805,  
1.9886432369288551,  
1.988643236970097,  
2.4501760969485846,  
2.4501760969572235,  
2.6141080657383133,  
2.614108094671839,  
2.6141080978874367,  
2.614108199851818,  
2.614108200075538,  
2.6141082008692407,  
4.121207830152765,  
4.126135109264967,  
4.126137501750553,  
4.129417665319773,  
4.731890053629371,  
4.734221022017094,  
4.783748744413943,  
6.888546551790504,  
7.435120796142169,  
9.27338967383107,  
9.884598996480708,  
9.884598996488108,  
10.57466535326793,  
0.042050619766987055,  
1.2200437115279086,  
-0.1897539908832087,  
0.3883222993215419,  
-0.3953259161886337,

0.9433481261689909,  
0.03976732857871137,  
0.380475950476648,  
-1.6480061036631655,  
0.19200671798130073,  
1.8964236385178486,  
0.5825466621902844,  
-0.7017933974726621,  
0.46167134168781887,  
1.3455780978346443,  
1.000341055668334,  
0.3220859397336833,  
0.4901021103591929,  
1.7507755726531005,  
0.22815940378303187,  
-0.27415827045663116,  
-0.06669089502017891,  
-1.2681856141960832,  
-1.4186851222947996,  
-0.7484212831710693,  
-0.2624358161393499,  
0.22137315279362701,  
0.8266616228870926,  
-0.28382763940078026,  
0.4526868734709094,  
-0.03876262869445461,  
0.028933904781200354,  
0.2124235174903725,  
0.5275601102845284,  
-0.035224229477880745,  
-0.11459385773709553,  
0.4537223625267385,  
1.3135706165796082,  
-0.4103066311241145,  
-0.06740865621875465,  
0.07865262902016133,  
-0.8220672300227196,  
0.05131914396597353,  
-0.012779296277522511,  
1.6650491211728184,  
-0.5271258879235212,  
-0.2286028431320702,  
0.9810985313826684,  
0.5796827949136435,  
-1.4216581678953852,  
0.908254540613963,  
0.7809397666182989,  
0.23060365236949015,  
-1.629683736567043,  
0.08687379015275534,  
0.5302421766128769,  
0.858319872120405,  
-1.2816124200556078,  
0.08255098737682609,  
0.49190330494839835,  
1.2241314669476433,  
-1.6043734869556,  
0.35480117328822147,  
-1.3692690448046365,  
0.08801115679730828,  
-0.3416815622800032,  
0.5349891528238044,  
0.23599371094677032,  
-0.2955967206364773,  
0.7351110566185237,  
-0.1358629473726594,  
-0.2538927978152746,  
-0.18822579896800806,  
0.023625415865148318,  
-0.47104955898400697,  
0.3192033261234258,  
1.3512870657881308,  
-0.7816632422470443,  
-1.6469850516046918,  
0.27638573599623373,

-0.3090269715855155,  
-0.4193062343229584,  
-0.1377874030219536,  
0.0004776579492072504,  
0.08325659247733753,  
1.4611032338266408,  
0.021431340914286272,  
0.20066912699708425,  
0.29328305426482204,  
2.42997753887945,  
-0.5690256391604135,  
-1.480840559800266,  
-0.1363946771767577,  
-1.376439435407693,  
0.06387998538825271,  
-1.110029094439266,  
0.9868538484965683,  
0.962243917255456,  
-0.41126656322102295,  
-0.657103189069447,  
1.1434637843768656,  
-0.9757973897576084,  
1.448315222432508,  
1.3110742046722172,  
2.3333185683193554,  
0.7520157773640208,  
-0.20203562372486106,  
0.34414613752805073,  
0.5926366260275047,  
-1.985044802604821,  
2.6078832019778186,  
-1.6883872397325923,  
-1.6784323905215754,  
-0.4297482144956373,  
0.6572781395405978,  
0.02277885553642172,  
1.3256214503718338,  
0.25673693454286806,  
-0.6358308725577859,  
-1.6133180674191239],  
[ 0.4366123913610663,  
0.4768198412180804,  
0.9843286193666714,  
1.2674678431689148,  
1.5775702096396949,  
1.5775702096396946,  
2.2591837513222837,  
2.2591837513222837,  
3.168921311818864,  
3.1689213118188637,  
3.1689213118188637,  
3.2207076420855234,  
3.220707642085524,  
4.00024951310582,  
4.479169433031019,  
5.572620903211533,  
5.572620903211533,  
7.169574827830268,  
7.200887753316444,  
7.200887753316444,  
7.4320670533634186,  
7.4320670533634186,  
7.668889448658714,  
7.668889448658714,  
8.088052955990618,  
8.127936129548912,  
8.127936129548912,  
8.129700499301142,  
8.129700499301142,  
13.234708916500516,  
-0.8409114197195183,  
0.13809956722013594,  
-1.3698910408430074,  
-0.1271619514190957,  
-1.0028759735951214,

-0.7519751568518348,  
-1.7027753599694198,  
-0.5003000098057334,  
1.7803062126367422,  
-0.6956057702973542,  
-0.5292841478808504,  
1.3371604427134443,  
-0.6271315116651272,  
-0.9849660401714492,  
-1.0245042646602094,  
1.7746289077120558,  
0.789646250683077,  
2.3274439120303834,  
1.0250145144124314,  
0.236963759763461,  
0.6449585291401012,  
0.5302895792637682,  
-0.17332551626046228,  
0.13296008629005646,  
1.3001365941190501,  
-0.5491163203391332,  
0.8939708861040915,  
-0.1183728413911535,  
-0.27672563627574315,  
1.7953720191393387,  
-0.00825054985875676,  
-0.6170579146731886,  
1.801545679753067,  
-0.6786704865717594,  
-0.5702663839537956,  
-1.2235657195316856,  
0.059502931568887765,  
0.15944146767128192,  
-0.5445588526685949,  
1.0645821939979259,  
-0.3246614360002631,  
1.6342475668463907,  
-0.6365693512803821,  
-0.25644806680599874,  
0.9153791587574333,  
-1.5555971818784813,  
1.7626038696684259,  
0.29250830199243494,  
0.4597874603079029,  
-0.4983420660721544,  
0.22206047990995867,  
0.11089125969329257,  
1.9712857917750568,  
-0.8482820514299444,  
1.7711968287204813,  
-0.3356021753581158,  
-2.239225908466879,  
-0.021402454584719684,  
1.6641712424719513,  
0.5059308187330879,  
1.9296669762106724,  
0.7155610478862724,  
1.024294278133781,  
0.2881031759975837,  
0.06318491357276658,  
0.8308741396333285,  
0.16800005476886462,  
-0.26845892946467115,  
-0.378371667085078,  
-2.374474400887392,  
-0.26943703763693594,  
-0.698442208248677,  
1.5029972614102114,  
0.7682274655447995,  
1.7790823677975025,  
1.1233449399645796,  
-0.1962677980677998,  
-0.6013220679983903,  
1.243366811759978,  
0.23851493156650586,

```

-1.3516830763738037,
0.4546075088056473,
0.45461165179145885,
0.29299766155391044,
0.9768506591689141,
-1.3614782254940123,
-0.1864841683590143,
0.03417328589702677,
-0.12392810093414776,
1.4042342901901068,
0.4181387945528863,
0.6171624447156228,
0.5887687464980093,
0.07995045192475739,
0.12406497411608935,
-0.1304256749231809,
0.5172871404602656,
1.1235454838537668,
1.5976273357881063,
-0.7195312648953682,
-0.7697726746437508,
-0.1718403740134208,
0.48757574872507614,
0.7291603816887677,
1.3754811895843486,
0.06384938170591244,
0.9009847125572167,
1.0744001081352503,
1.7305303874736466,
0.491454536253661,
0.11643540469065636,
0.5925455840333324,
-1.2877724397991297,
0.052924560657905566,
-0.8760423919600488,
0.6313576901954856,
2.736167065037608,
0.029295634649204143,
2.1044233481865446,
0.6660786050345296]],
'run_time_sec': 43335.76831364632}}],
'redundant': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': { 'value': [ 0.4319322451408806,
0.4441934852523559,
0.5878315575931067,
0.5878315575931067,
0.5912427958750637,
0.5947187380620651,
0.5947187380620652,
1.5628074958209335,
1.568718083448373,
2.013035808837258,
2.013035808837258,
2.013035808837258,
2.0277481086167364,
4.114573484042011,
4.1154343976538055,
5.358852938788934,

```

5.358852938788934,  
5.549639110185835,  
5.667644288942511,  
5.6706149635077026,  
7.063797010237488,  
7.658675772413245,  
8.123010743902626,  
8.633070512181217,  
8.7849794748515,  
8.7849794748515,  
10.749769122252356,  
10.89899813672382,  
11.413879450074099,  
11.413879450074099,  
-0.04151001581527148,  
-2.751209241920508,  
-0.5056705094410174,  
-0.406548832581749,  
0.8633340895103881,  
0.17259893989954428,  
-0.21235924407313156,  
-0.5485334561985523,  
0.2012951527025238,  
-0.23858034563229433,  
2.1364176057207223,  
0.7817014982866842,  
-0.1108899918027214,  
0.6048531661014985,  
1.809261328558185,  
-1.1786415575821785,  
-1.0827170099436865,  
0.4109384498547832,  
0.8090945308822337,  
-0.9356585252219308,  
0.28697429006677655,  
-0.15332459566133277,  
1.2998079093160566,  
0.3870967504567973,  
-0.2413465423953762,  
1.001771196320206,  
0.1138394509020578,  
1.3220786271535379,  
-1.1806565063083097,  
2.2789659185869464,  
0.11875741943281123,  
-0.15631084464392242,  
-2.14680662310284,  
0.18035127914430246,  
-0.260880073181003,  
0.21031876899961,  
0.7641152777599183,  
1.203568210035907,  
1.2767673297334832,  
1.2585129786889195,  
0.24752046596725819,  
0.7203551788145919,  
-0.17420447991641552,  
-1.3486030918499698,  
0.2145369555808404,  
0.8896874485404291,  
-1.6470089821954121,  
-0.37928143051952584,  
-0.29903232984244293,  
0.6984471945997809,  
0.14906235834494008,  
0.054873949093549826,  
1.3877615433857144,  
0.04193983551007985,  
1.2014028569521673,  
-0.02338341588216991,  
-0.05255422822816251,  
-0.1905875093002492,  
0.16425167437144692,  
0.2542835721118732,  
1.1822299841866795,

```

1.2032222480152739,
0.30142488752060526,
0.09125464470109583,
-0.45638140154025475,
0.050260497156630585,
-0.04000614529085093,
0.9096133936431033,
-0.03555378439095736,
0.4405325841695877,
-0.48129885373423525,
-0.3617221403442356,
-2.5216506086368518,
-0.5081934521569421,
0.041332600726076626,
0.7413771443671474,
0.2204029987501584,
-0.7517920276590782,
-0.21022249714251526,
1.5607830526955413,
0.16615947769508344,
-0.17023919527139658,
-0.4295619963603494,
-1.1838803442651602,
0.6319564057885301,
-0.3935277768061919,
0.005550337258741166,
-0.4226065324972882,
-0.3715846249960284,
-0.48395498614671884,
-0.4790957128536121,
1.4427293239187895,
0.5875094653073935,
1.404722056846091,
0.6973465258635152,
0.8623508528879442,
-0.5460563718875903,
0.8326491581513842,
-2.4015389244466907,
-0.04583861440999851,
-0.36265388938085896,
-0.5347868312224912,
0.49674658852292397,
-0.6488379607428911,
1.1568053403721041,
0.30662269781395407,
-2.013151608263867,
-0.17383275003878457,
0.5036662539248705,
1.9638910157847163,
3.118155075975211,
0.8117246453310248,
-1.4517859264576565,
-1.4946803709676548,
-2.7792982516572895,
1.1174424252005506,
2.333430423546859,
0.6903927508165344,
-0.2883899927957993,
-0.8542826896862586]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,

```

False,



```

0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#7'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
                                'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
                                '4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
                                'X 5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
                                                         '+ 1 Z 0 + '
                                                         '1 X 1 X 2 '
                                                         '+ 1 Z 1 + '
                                                         '1 X 2 X 3 '
                                                         '+ 1 Z 2 + '
                                                         '1 X 3 X 4 '
                                                         '+ 1 Z 3 + '
                                                         '1 X 4 X 5 '
                                                         '+ 1 Z 4 + '
                                                         '1 X 5 X 6 '
                                                         '+ 1 Z 5 + '
                                                         '1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.662379321078876],
                             [12, 6, 0, 0, -5.394498644176583],
                             [20, 10, 0, 0, -4.374551061230002]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                     'identity_factors': [0, 0, 0, 0],
                     'noise_level': [4, 2, 0, 0],
                     'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],

```

```

'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {
    'noise_prob': [
        0.001,
        0.001,
        0,
        0],
        'status': True,
        'type':
            'depolarizing'},
        'odd_wires': 4}},
        'run_time_sec': 7.118944406509399}},
{ 'config': { 'ansatz': { 'gateset': 1,
                        'layer': 30,
                        'ugate': { 'coefficients': { 'bn': [ 0,
                                                            0,
                                                            0,
                                                            0,
                                                            0,
                                                            0,
                                                            0],
                                                            'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                            'r': 0},
                                'time': {'max': 10.0, 'min': 0.0},
                                'type': 'ising'}}},
    'init_param': { 'value': [ -4.1290471568429383e-17,
                                0.028387941050870547,
                                0.028387941050870516,
                                0.028387941050870544,
                                0.4764187545019148,
                                0.485154879376271,
                                0.7094706976105217,
                                2.998376901501724,
                                3.486264965503922,
                                3.487775573446841,
                                4.058897205630428,
                                5.020552086463093,
                                5.02158492362958,
                                5.02158492362958,
                                5.0846878698400815,
                                5.0846878698400815,
                                6.794704827143902,
                                6.794704827143902,
                                6.794704827143902,
                                8.013356083289752,
                                8.21076169573117,
                                8.21076169573117,
                                8.633075344303478,
                                8.633075344303478,
                                8.930018414781724,
                                8.930018414781724,
                                8.930018414781724,
                                9.990329186240457,
                                9.990329186240457,
                                12.915390927357043,
                                0.8289215528981712,
                                0.6465354442587259,
                                -0.06922368073773534,
                                -2.0853926237797484,
                                0.25605409461249207,
                                -0.765586831155604,
                                0.9589723041272441,
                                0.27455658215646966,
                                -0.07189982532198122,
                                -0.3449139525561357,
                                -0.46800027418386986,
                                1.016480689947782,

```

-0.9706976058410632,  
-0.9556868223128826,  
0.9323574793538898,  
-0.4376613900889883,  
0.44138701419965265,  
1.4418520162063444,  
0.8420619129497768,  
-0.025530845682239494,  
-2.3076344184440156,  
0.37458463155346333,  
-0.47031338116346383,  
0.07338001085955462,  
-0.869249007732584,  
1.6824786550253577,  
1.719346297136726,  
-0.9622509832303179,  
0.5779076253870294,  
0.4760527439731688,  
-0.2451715046346434,  
1.5906513054768954,  
0.35918458386075697,  
-0.44817294000256097,  
-0.37416377940751877,  
0.37048554789855764,  
0.693137718643464,  
2.288219219235325,  
-0.26501198620577204,  
0.3689053264668303,  
0.10166782579927121,  
-0.3356073800920907,  
-0.6413954053758932,  
0.28636656044125136,  
-0.8690978212322298,  
1.166030172665772,  
-0.46365263204645707,  
-0.8505396438729699,  
2.4328989003329693,  
-1.4554443951257197,  
2.09134311034601,  
1.7695145471360614,  
1.1170184462314887,  
0.20325573406500014,  
0.34206355374635444,  
0.016804831103183593,  
-0.19882507083844791,  
1.4011478969931443,  
-0.0572616468882171,  
-1.3773340344964602,  
1.1031086912886459,  
0.47433623341773395,  
-0.037679845343088075,  
0.7450954028512253,  
1.3114871459373192,  
-0.18651966717154955,  
1.0750199871192778,  
0.48905379729033566,  
-0.6281827821606347,  
1.322074656325554,  
-1.4761484868509396,  
0.2859918816514792,  
-1.0033541595176405,  
0.8264053813863532,  
0.622010811103528,  
1.1636747207646185,  
-0.31883271288389914,  
-0.0013981850979601159,  
-0.09999405171802342,  
1.3085280853238759,  
-1.3727969089464465,  
-0.08341159264840771,  
1.6249369276484606,  
-0.28082331570516694,  
1.863294400254821,  
2.2932652495309953,  
1.4849536675442596,

```

0.6811668802751195,
1.5380110980874968,
-0.6615225065895972,
0.4000828281024264,
0.33932121588009856,
0.48855764825038867,
2.5371111232777053,
-0.7260430040504564,
0.09005940379987407,
-0.8762980817992282,
-0.23800314057977784,
0.9728027685352436,
-0.20857834368009137,
0.6148333457084475,
-1.5171898336040224,
0.8658542069129427,
-1.6478287868490311,
0.5770049367106069,
0.134497700004433,
-0.11612046371881249,
1.5826352840237945,
1.6045820840261675,
-0.08805669980595342,
-1.507745125921201,
-0.11276651576435986,
0.07206005105970639,
-1.7788122679933258,
-0.002988765738482436,
0.7255804452314191,
2.7661804504965604,
-3.1943627011957507,
-0.07088434770936546,
0.10949711075632612]],
'noise_profile': { 'noise_on_init_param': { 'status':
False,
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'ngubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#1'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X

```

```

'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
      '+ 1 Z 0 + '
      '1 X 1 X 2 '
      '+ 1 Z 1 + '
      '1 X 2 X 3 '
      '+ 1 Z 2 + '
      '1 X 3 X 4 '
      '+ 1 Z 3 + '
      '1 X 4 X 5 '
      '+ 1 Z 4 + '
      '1 X 5 X 6 '
      '+ 1 Z 5 + '
      '1 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -6.833109640228284],
      [12, 6, 0, 0, -5.610198560557999],
      [20, 10, 0, 0, -4.609901567200479]],
  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
    'identity_factors': [0, 0, 0, 0],
    'noise_level': [4, 2, 0, 0],
    'noise_profile': {
      'noise_prob': [
0.001,
0.001,
0,
0],
      'status': True,
      'type':
'depolarizing'},
    'odd_wires': 4},
    { 'gates_num': [12, 3, 1, 0],
      'identity_factors': [1, 1, 0, 0],
      'noise_level': [12, 6, 0, 0],
      'noise_profile': {
        'noise_prob': [
0.001,
0.001,
0,
0],
        'status': True,
        'type':
'depolarizing'},
        'odd_wires': 4},
        { 'gates_num': [20, 5, 1, 0],
          'identity_factors': [2, 2, 0, 0],
          'noise_level': [20, 10, 0, 0],
          'noise_profile': {
            'noise_prob': [
0.001,
0.001,
0,
0],
            'status': True,
            'type':
'depolarizing'},
            'odd_wires': 4}]],
  'run_time_sec': 6.902796030044556}},
{ 'config': { 'ansatz': { 'gateset': 1,
  'layer': 30,
  'ugate': { 'coefficients': { 'bn': [ 0,
    0,
    0,
    0,
    0,
    0],
    'cn': [ 0.5,
    0.5,
```

```
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.32980400918867037,
0.7818596814437996,
0.9680306497310072,
1.0586432954274991,
1.7663116348413028,
1.8956491295658664,
2.0436116769319477,
2.0436116769319477,
2.0436116769319477,
2.1846619555479685,
2.1846619555479685,
4.516997836642403,
4.516997836642403,
5.3166564351730035,
5.320130741320412,
5.399447086770547,
5.400046100307029,
5.400046100307029,
5.400046100307029,
5.400046100307029,
7.097750404951498,
7.618222769006738,
7.956666567531361,
7.956666567531361,
8.961109688308255,
8.961109688308255,
11.028500695271937,
11.5809418583784,
11.5809418583784,
11.5809418583784,
0.24114173221382337,
1.3754512844042854,
0.9720111739434927,
-0.29877116871955545,
-0.029737313498699618,
0.3185153459444675,
-0.31840745367437817,
0.6801602139502809,
-0.015407845998522466,
-1.114484654283524,
0.22997676136047449,
1.5201821520192487,
0.3217486942799661,
0.43678760134757944,
0.17618749246228715,
0.7010359103792874,
0.3446701255696699,
1.4700166379981474,
0.3471333265905846,
-0.968444017764766,
-1.1485269521507444,
0.3282504398407059,
-0.7898554413193151,
-0.22157985789400653,
0.4570931682042821,
-0.22158635023930806,
-0.36549836384277606,
-0.2366283880333898,
0.4114765778384287,
-0.7694643480660831,
-0.40507000819737765,
-0.6576468499882752,
0.2023600853039859,
-1.2917280200640486,
0.32702771491506877,
-0.07546137553843744,
-0.7713328193108817,
-0.8163562225239717,
```

-0.07772489804090182,  
-0.32841576637855896,  
-0.05728139293162625,  
0.8564947637293437,  
0.15384434981345546,  
0.41944080031994563,  
0.16884394015055976,  
-0.010490661309829376,  
-1.3198249528292274,  
0.07128101806419536,  
0.03515395872296211,  
-0.09826644736389979,  
-0.06882299183557238,  
-0.7062443088386591,  
-0.5280915567870916,  
0.14860690208212682,  
0.338235073517239,  
0.012130023587481156,  
-0.037483081002571056,  
0.8881056862099682,  
0.06312673968269537,  
-0.44738898868242327,  
-0.2463284936792685,  
1.1708672891281489,  
0.5297819270424092,  
-0.5463182826640249,  
-1.667403353493104,  
1.3713545814180228,  
0.9413366263710182,  
-0.021951472934173096,  
1.0345046397029698,  
-0.8002739446090432,  
1.076242700462428,  
0.04994674089563993,  
-1.446235170371471,  
-0.3268246709561185,  
0.6264234635598642,  
-1.2465048991503196,  
0.1169092097763034,  
1.2453937722962254,  
0.7220287063888942,  
0.8114212311039525,  
0.18333674920471413,  
0.7345776889004225,  
0.9807678368065545,  
0.8703572591074042,  
0.28720991162605214,  
-0.9085817320602367,  
1.1216621938695932,  
1.1327477502874412,  
-1.8285395156530388,  
1.4231155243966302,  
0.08156271721069372,  
0.18027327076782884,  
-0.10302960773112253,  
-0.5560482514096969,  
-0.09484541903718098,  
0.5886430341587933,  
-1.1674014904638685,  
-0.03940950630369794,  
0.2792515765657198,  
0.08214125135098017,  
0.04344924016389119,  
-0.7787970529711157,  
0.07887586110139429,  
0.7532574519080738,  
0.17107625040009872,  
-0.4128415687827808,  
1.3723943620028143,  
1.4278581324344195,  
0.5879977529754344,  
0.28910810409117477,  
-1.4412046993697643,  
1.624844367134446,  
0.19366683662945536,

```

0.3179841250458877,
0.5357240606734743,
1.5680682524509713,
0.04418323830986127,
0.2311137213204739,
2.8741283660232546,
0.9612408402592636]],
'noise_profile': { 'noise_on_init_param': { 'status':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1}},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#5'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
'+ 1 Z 0 + '
'1 X 1 X 2 '
'+ 1 Z 1 + '
'1 X 2 X 3 '
'+ 1 Z 2 + '
'1 X 3 X 4 '
'+ 1 Z 3 + '
'1 X 4 X 5 '
'+ 1 Z 4 + '
'1 X 5 X 6 '
'+ 1 Z 5 + '
'1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.720969040841222],
[12, 6, 0, 0, -5.577003279994282],
[20, 10, 0, 0, -4.626982768162376]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,

```



```

0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 7.242948770523071}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': { 'value': [ 0.27654223573266234,
0.27654223573266246,
0.27654223573266246,
0.4643738922966213,
0.6582164862517121,
0.6582164862517121,
0.6582164862517121,
1.3424523496852623,
1.47635793598756,
1.47635793598756,
3.385550316280557,
3.385550316280557,
3.385550316280557,
4.494062371253785,
4.494062371253785,
5.0204758683966135,
5.023404188660082,
7.05704094573064,
7.087391629397132,

```

7.533802135057517,  
8.245970909352765,  
8.390887842007308,  
8.390887842007308,  
8.703391612007538,  
8.703391612007538,  
9.485545381639698,  
9.485545381639698,  
9.849437794456351,  
9.849437794456351,  
10.799155842585746,  
-0.12708089143278917,  
1.4168148977025445,  
-0.13519536748631492,  
-0.32308714516775877,  
0.06981336221044306,  
-0.034321895006426455,  
-0.18209443759399158,  
-0.024858958594746107,  
0.664488174834645,  
0.6897317665852637,  
-0.008774731192519907,  
0.625642551337688,  
0.6862410821653743,  
-0.7670419540542446,  
-0.48055390132433673,  
1.573964677292243,  
-1.0555745677813198,  
1.3159721165631335,  
-0.9138502497993347,  
-0.4641566084568084,  
-0.06966564000847691,  
0.039012746519005555,  
1.0827641697579717,  
1.2190093772283843,  
1.5391150382377632,  
-0.6675581491933664,  
0.09104662559232415,  
0.5283818781579022,  
0.04478118244404365,  
1.5836075485651113,  
0.251932560991488,  
-0.3949560381811925,  
0.8854639388207172,  
-0.8611267164776638,  
1.566928747241295,  
-0.15445151319573347,  
-0.01396050433941564,  
0.8172620115356718,  
-0.014658132241289147,  
-0.6623010385304499,  
0.6299284572753584,  
-0.15026947869759505,  
-1.2293112897827836,  
-0.5768656731979434,  
1.231557922062332,  
-1.447872926116422,  
1.4918722706131171,  
0.31945486783385635,  
0.43870804207253483,  
1.3582636256308331,  
-0.8478398442626237,  
0.799518029891469,  
0.5539369896048497,  
0.13453197415145846,  
0.7167498104862234,  
-0.06589109804263343,  
0.041038724923082276,  
1.151975756926885,  
-0.052026838729968425,  
0.3952978000808587,  
-1.1754748970457833,  
-0.01965607042871015,  
-0.2456324144680547,  
-0.01136184217607491,

```
0.022503168314325715,
1.1777923723104653,
0.14554117253938412,
-1.2287946167385297,
-0.9683737383161766,
1.073329622962756,
-0.7143583802799215,
-0.3545002682598469,
-0.31906110571926777,
-0.9597094503848127,
0.8825903987559673,
-0.08273415521500459,
0.2895039435279609,
-0.3388594197258312,
0.2406459434933063,
0.3824128671502841,
-0.5390555829405563,
0.3757684495816124,
-0.5015719636333678,
0.3958257688275076,
-0.6428354095046468,
-0.9178624992467067,
0.29327306512581747,
-0.09193285724698198,
0.1770091195095364,
0.6803523512851801,
1.05525770275555,
-0.4646437845139076,
2.2560908642344026,
-0.7500939262299234,
1.92959092052175,
-0.36895777993274226,
-0.04538283416771957,
1.2529586558275392,
-0.57805717638909,
0.3080585810325818,
0.031910210614104206,
0.18519950010488512,
1.3888566879174211,
1.087260914864616,
0.15259355623633358,
-0.08810167996863522,
0.07467874103808375,
1.4444893382870363,
-1.446220680213735,
0.8215180856176293,
2.0151723649306295,
0.13454991965456886,
0.21923381008732426,
0.31112145477192793,
-0.8977876743954992,
0.10239876571985529,
-1.0132922278363503,
-0.3794863035801566,
0.8437803973608401,
1.111671691788496]],
```

```
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [ 0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5,
```

False,

```

                                0.5],
                                'r': 1},
                                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                        'status': False,
                        'type': 'png'},
            'file_name_prefix':

'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#2'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                [1, 1, 0, 0],
                                                [2, 2, 0, 0]]},

            'run': 'redundant',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                    'optimization': { 'algorithm': 'SLSQP',
                                      'constraint': True,
                                      'status': False}},

            'zne': { 'data_points': None,
                    'degree': 0,
                    'method': 'richardson',
                    'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
                                'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
                                '4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
                                'X 5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
                                                        '+ 1 Z 0 + '
                                                        '1 X 1 X 2 '
                                                        '+ 1 Z 1 + '
                                                        '1 X 2 X 3 '
                                                        '+ 1 Z 2 + '
                                                        '1 X 3 X 4 '
                                                        '+ 1 Z 3 + '
                                                        '1 X 4 X 5 '
                                                        '+ 1 Z 4 + '
                                                        '1 X 5 X 6 '
                                                        '+ 1 Z 5 + '
                                                        '1 Z 6']},

'output': { 'data_points': [ [4, 2, 0, 0, -6.514930884689279],
                             [12, 6, 0, 0, -5.310706408751285],
                             [20, 10, 0, 0, -4.328532484009807]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': {

'noise_on_init_param': { 'status': False,
                        'value': 0},

                                'noise_prob': [

0.001,
0.001,
0,
0],

                                'status': True,
                                'type':

'depolarizing'},

                                'odd_wires': 4},
                                { 'gates_num': [12, 3, 1, 0],
                                'identity_factors': [1, 1, 0, 0],
                                'noise_level': [12, 6, 0, 0],
                                'noise_profile': {

'noise_on_init_param': { 'status': False,
                        'value': 0},

                                'noise_prob': [

0.001,
0.001,
0,
0],

                                'status': True,
                                'type':

'depolarizing'},

                                'odd_wires': 4},
                                { 'gates_num': [20, 5, 1, 0],
                                'identity_factors': [2, 2, 0, 0],
                                'noise_level': [20, 10, 0, 0],
                                'noise_profile': {

```

```

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'noise_prob': [

'status': True,
'type':

'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 8.669902801513672}},
{ 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [ 0,
        0,
        0,
        0,
        0,
        0],
        'cn': [ 0.5,
            0.5,
            0.5,
            0.5,
            0.5,
            0.5],
            'r': 0},
        'time': {'max': 10.0, 'min': 0.0},
        'type': 'ising'}}},
'init_param': { 'value': [ 0.3463233138801294,
    0.34632331388012944,
    0.3463233138801294,
    0.3463233138801293,
    1.2403205490491955,
    1.38033446895038,
    3.6939218351946623,
    3.6939218351946623,
    3.693921835194662,
    3.693921835194662,
    3.9412089126587,
    3.9412089126587,
    3.9412089126587007,
    3.9412089126587007,
    4.8310999601027795,
    4.870844593548848,
    4.900228671797898,
    4.9002286717978984,
    4.9002286717978984,
    4.900228671797898,
    5.70167657474683,
    6.21188441483336,
    6.21188441483336,
    6.686419232103557,
    6.723504371727371,
    7.618130890836856,
    7.618130890836856,
    9.420364260644014,
    9.420364260644014,
    10.775132222422771,
    -0.3525750090684208,
    1.2748976558430758,
    -0.16146998454247521,
    1.3224575871686013,
    0.0349265192498484,
    0.36138711032415904,
    -0.5043488106619078,
    0.7634801084306476,
    -0.3536814593617201,
    0.9606809354246906,
    -1.1143894720984433,
    -0.45289061390722213,
    -0.1605333784989486,
    -1.594210268458609,
    -0.09465166736510336,

```

0.11132251138190599,  
1.004235666711761,  
-0.23115493220428254,  
0.9451761882751959,  
-0.3707284170975133,  
-0.17782948231634454,  
-0.18433417990028922,  
-0.06421460341189031,  
-1.155489001827845,  
-0.2074908306187579,  
-0.036360325422879626,  
0.5283181819327893,  
0.3603171208434518,  
0.6819349944270952,  
-0.2733083993242672,  
0.7075879191324372,  
-0.042779623335368125,  
0.7032435595714176,  
-0.7363942983542189,  
0.9583235184546098,  
-0.5892472427173001,  
-0.7139877518112785,  
-0.12446625268371646,  
-0.439646171766664,  
0.7129808957109575,  
0.3373075268097138,  
0.3345550414369601,  
-0.38068761370203624,  
0.07864964370676188,  
-0.3383553862900091,  
0.6633419895127639,  
-0.578720703894673,  
0.486162302530746,  
-0.06112668401522289,  
0.34417654454775265,  
-0.09182266750822224,  
0.012215000731405658,  
0.5658291917160285,  
-0.16728488191683846,  
0.3754616489195623,  
-0.30497315054621493,  
-0.7559846133933803,  
0.9474959005813702,  
-0.5904076686561035,  
-0.2620011537974264,  
0.1328515248519479,  
-0.44066408562446224,  
-0.7849425610737308,  
0.44059474279745625,  
-0.04646983134951628,  
0.27897770882356554,  
0.36838349877106535,  
1.1610009997739648,  
0.9058411506824863,  
0.3119955912029684,  
-0.5265683545543336,  
1.0661822357546584,  
0.8560044406571757,  
0.5004409227892788,  
0.5192086876555008,  
-0.0019665558968806392,  
-0.23949800878404184,  
0.32563956832297103,  
0.795323960796817,  
1.5213873243487468,  
0.8637563634588281,  
0.07945031145196896,  
1.7583315097859118,  
0.5335864884320034,  
-0.1366270407456156,  
-0.9111102828185913,  
-0.41650979281126865,  
0.20926691692934202,  
0.2776061293997892,  
1.4257231544028384,

```

-0.10754544247245298,
1.0035199546983695,
1.1162390986419686,
1.7211522778091677,
-1.4332245925979028,
1.4417595659646931,
-2.106784537892007,
-0.6878309432904478,
-0.20360639354575213,
0.6373705186717347,
0.051333236332203484,
-0.35868991955772395,
-0.24365907607080922,
1.619736185871098,
0.5895182658245096,
-0.6086170057348131,
0.39774539931448055,
1.409837948786624,
0.17438880158294706,
-0.0415548590378924,
0.1413623732119859,
-0.8192475896231625,
0.5823982141653503,
-0.8462302367353051,
-0.60454163385331,
1.8216629921858374,
1.2634551976945552,
-0.40200420270308274,
-1.5954759495917508,
-1.7732438129518737]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#3'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
                                'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
                                '4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
                                'X 5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '

```





```
0.5],  
      'r': 0},  
    'time': {'max': 10.0, 'min': 0.0},  
    'type': 'ising'}},  
  'init_param': { 'value': [ 0.48023040681030116,  
                              0.7029544315470944,  
                              0.722671987246733,  
                              0.9307929858945541,  
                              0.9307929858945543,  
                              2.546598088688794,  
                              2.546598088688794,  
                              2.546598088688794,  
                              2.546598088688794,  
                              5.184334435330857,  
                              5.195111458618343,  
                              5.47436411399969,  
                              5.47436411399969,  
                              5.47436411399969,  
                              5.47436411399969,  
                              5.47436411399969,  
                              6.068336244524409,  
                              6.068336244524409,  
                              7.838605251840715,  
                              7.912250316107233,  
                              7.912250316107233,  
                              8.562517202814183,  
                              9.063385768597811,  
                              9.216218862905647,  
                              9.216218862905647,  
                              10.84047371877396,  
                              10.84047371877396,  
                              11.044358714867027,  
                              11.375406566932424,  
                              11.375406566932424,  
                              0.18886549713610382,  
                              0.6040291443391601,  
                              -0.9727809979878402,  
                              3.008209947509642,  
                              0.3239743149147096,  
                              -0.643987619924633,  
                              1.0739882269552894,  
                              0.4935103262912805,  
                              -1.1713673989643745,  
                              0.32339055167680386,  
                              -0.8254170399860232,  
                              3.387204293956005,  
                              0.5437302598099015,  
                              -0.6585961721148387,  
                              1.0903163929414719,  
                              -1.5261906384818182,  
                              1.102349928722959,  
                              -0.7373436929054379,  
                              0.1712635196093208,  
                              1.2086697581514199,  
                              -0.4977298668106944,  
                              -0.8828019932256734,  
                              -0.13051782426094366,  
                              0.048744185631251574,  
                              -1.0535030780910155,  
                              0.5224555306604155,  
                              -0.9502111367985572,  
                              -0.2573420205933925,  
                              1.5833039752620888,  
                              1.3806480812363842,  
                              0.3864833677006273,  
                              -0.0006284730712113316,  
                              0.6487740408134013,  
                              1.697829570896293,  
                              -0.20023867528920775,  
                              -0.32438662287273723,  
                              1.3674639807988553,  
                              -1.5592347723565667,  
                              -0.6294582959326964,  
                              1.111157394071659,  
                              1.4895912958038178,
```

-0.7203901402661329,  
-0.027076706863032294,  
0.009574786781832467,  
1.1437695218822916,  
0.11720143179507149,  
1.0973549625545624,  
-1.0756168303605034,  
-1.5785125289756954,  
-0.42999007233668873,  
0.7592603373612552,  
0.7357293999316703,  
0.03766014972468404,  
1.450035910180884,  
-0.08978031589044846,  
0.7176267391661779,  
-2.3377280976646966,  
0.3878354316208249,  
-0.8070070584177742,  
0.07084117333557359,  
-0.008998168433091903,  
0.6612796195456235,  
0.6287929626789847,  
0.8601333603228948,  
-0.7786354708155643,  
-0.144476679155352,  
0.39492950957300044,  
-0.20012968159779548,  
0.01326107241550192,  
-0.5649340596325207,  
-0.020398755490040426,  
0.6333499066300691,  
0.400844220606507,  
0.5954749034740784,  
0.8700413681534388,  
1.315868035063538,  
0.9914334712755634,  
0.10418309057983809,  
1.1095991500751576,  
-0.1712743534684691,  
-0.2730581386141925,  
0.1453142903679217,  
-0.3813955795194703,  
0.1280814941289577,  
-0.5627986213807415,  
-1.0576722394029623,  
-1.98721560251358,  
0.519862592148374,  
1.03695228961559,  
0.21101375663462807,  
-1.750252459751414,  
-1.1450993785481438,  
-2.2517541986316916,  
-1.5456964825715331,  
0.6026638989139771,  
0.47561448130168205,  
0.08201672609434518,  
0.47464262797792917,  
-0.14585857152212733,  
0.08636040211648545,  
0.7388192170680543,  
1.071366965639021,  
2.5115163876343742,  
-0.4286872636197954,  
-0.2977998181526895,  
0.46569070003689333,  
0.2115019986130443,  
-0.5123638542481742,  
0.09024611293676764,  
-0.3380729423866059,  
1.6314769884628497,  
1.3338027138849353,  
-0.7442166070564612,  
1.2186722356710948,  
1.584709484399307,  
-0.6554175978902271,

```

0.36887213174672207,
-1.365021965092438,
-0.4623126041921459,
0.4869420326570461}],
'noise_profile': { 'noise_on_init_param': { 'status':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
'+ 1 Z 0 + '
'1 X 1 X 2 '
'+ 1 Z 1 + '
'1 X 2 X 3 '
'+ 1 Z 2 + '
'1 X 3 X 4 '
'+ 1 Z 3 + '
'1 X 4 X 5 '
'+ 1 Z 4 + '
'1 X 5 X 6 '
'+ 1 Z 5 + '
'1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.75124151968758],
[12, 6, 0, 0, -5.5757781087309555],
[20, 10, 0, 0, -4.6095181057209125]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],

```

```

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'odd_wires': 4}},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {

'noise_prob': [

'status': True,
'type':

'odd_wires': 4}},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {

'noise_prob': [

'status': True,
'type':

'odd_wires': 4}},
'run_time_sec': 6.46916651725769}},
{ 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [ 0,
    0,
    0,
    0,
    0,
    0,
    0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 0},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'ising'}}},
'init_param': { 'value': [ 0.46756606893882113,
    0.46983859896604685,
    0.5133985927484581,
    0.5133985927484581,
    0.5133985927484581,
    1.4016794842576101,
    1.6914116785996751,
    1.691411678599675,
    1.6941756924801525,
    1.6941756924801528,
    3.749864451084885,
    3.749864451084885,
    3.749864451084885,
    3.749864451084885,
    4.969636107010246,
    4.969636107010246,
    4.969636107010246,
    4.969636107010246,
    5.983107385388112,
    5.983107385388112,
    8.378949246097575,
    8.378949246097575,

```

8.635680633753974,  
8.635680633753974,  
9.108807770997622,  
9.108807770997622,  
9.108807770997622,  
9.108807770997622,  
9.960036411132767,  
10.436643041587223,  
10.716533289695375,  
0.5466515694267952,  
3.318518267704871,  
0.40678728382369284,  
0.6290091030083763,  
-0.4770983795300032,  
-0.7455483390932742,  
0.1630064768968011,  
0.4889724943271746,  
0.10596004146863507,  
-1.4759536729524354,  
0.957604974713893,  
0.6004514101153323,  
0.0725728265044025,  
1.4994700617905987,  
0.15508641282397265,  
-0.15494303336158094,  
-0.5663845144966579,  
2.6663065398173496,  
-0.27086336898318036,  
-1.1828784814640632,  
-0.295045685212881,  
0.6236994649007899,  
1.1769360493970402,  
1.7159795997719172,  
-0.3019600780315931,  
0.651545330446025,  
-2.0782382222089724,  
0.3186344830290561,  
-0.2815476257680432,  
0.4067635126151388,  
-0.8228051832090519,  
-0.4154478828430832,  
2.3723163321732827,  
0.931436930203099,  
0.9804374423714106,  
0.058895326584719035,  
0.3167253661454302,  
0.3390503539155689,  
-0.5024758650485814,  
-0.2425872659725522,  
-0.6703364135359525,  
-0.147558399690948,  
1.1644296968010859,  
0.5475507579506065,  
0.1736068872874216,  
0.30547527216138975,  
0.5300773267023443,  
0.7722201656261689,  
-0.6858549484151734,  
-0.16073113081558088,  
-1.197458252004488,  
-0.507307082981415,  
-0.16437738354723153,  
0.2647407403580543,  
-0.45930133674563567,  
-0.22673992276266391,  
1.8127715449849986,  
-1.4334128748253496,  
-0.759404859696163,  
1.2431110601081345,  
0.8953271645792334,  
0.6963251389999259,  
-0.23147129445607595,  
0.3638861144885483,  
2.2394622330281906,  
1.543816783446588,  
1.7535830084845025,

```

-0.3169637330795974,
0.2453194636587019,
2.0076391670843647,
0.286017506499548,
0.6600449842625801,
0.19782118041633945,
0.05463577684798935,
0.4755005320975566,
0.055207215781380096,
0.06969685609102444,
0.2645328829673777,
-0.01235845210357445,
1.01982876424508,
2.262492417600915,
1.3443784687440867,
0.10698144982242018,
0.428081928456963,
-1.5494921893757727,
1.0701294130786736,
0.39987519173641656,
0.06301738855484718,
-1.6711192593807125,
0.26920159401030147,
-0.08358711295948693,
0.4054786916979446,
-0.5013194648307361,
2.126550690771933,
0.10959959792145137,
0.4205360694942305,
-0.586878230803869,
-0.3381608637889511,
-0.5055401953468239,
-0.45995744817477163,
0.07999668782445096,
-0.4269018063306222,
0.9588276598807326,
1.042187521522261,
0.07821502449201799,
0.6777167152964713,
0.4177387822172794,
-0.18721284346239236,
-0.8064458441104513,
2.8712851588196218,
0.7141862154478698,
-0.9976723444987857,
-0.8529435737233043,
1.9602636639541733,
1.2634521849205176,
-0.7170870121313951,
0.31227949023655405,
-1.0451293221946831,
-0.6787852158143914,
1.8581833428208436}],
'noise_profile': { 'noise_on_init_param': { 'status':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},

```

False,

```

'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#6'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 0, 0],
                                                  [2, 2, 0, 0]]},
            'run': 'redundant',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                       'constraint': True,
                                       'status': False}},
            'zne': { 'data_points': None,
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
                                'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
                                '4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
                                'X 5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
                                                         '+ 1 Z 0 + '
                                                         '1 X 1 X 2 '
                                                         '+ 1 Z 1 + '
                                                         '1 X 2 X 3 '
                                                         '+ 1 Z 2 + '
                                                         '1 X 3 X 4 '
                                                         '+ 1 Z 3 + '
                                                         '1 X 4 X 5 '
                                                         '+ 1 Z 4 + '
                                                         '1 X 5 X 6 '
                                                         '+ 1 Z 5 + '
                                                         '1 Z 6']},
            'output': { 'data_points': [ [4, 2, 0, 0, -6.487894898369523],
                                          [12, 6, 0, 0, -5.297876077058435],
                                          [20, 10, 0, 0, -4.3310003849914125]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
                                'noise_prob': [
0.001,
0.001,
0,
0],
                                'status': True,
                                'type':
'depolarizing'},
                                'odd_wires': 4},
                              { 'gates_num': [12, 3, 1, 0],
                                'identity_factors': [1, 1, 0, 0],
                                'noise_level': [12, 6, 0, 0],
                                'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
                                'noise_prob': [
0.001,
0.001,
0,
0],
                                'status': True,
                                'type':
'depolarizing'},
                                'odd_wires': 4},
                              { 'gates_num': [20, 5, 1, 0],
                                'identity_factors': [2, 2, 0, 0],
                                'noise_level': [20, 10, 0, 0],
                                'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
                                'noise_prob': [
0.001,
0.001,
0,
0],
                                'status': True,
                                'type':
'depolarizing'},
                                'odd_wires': 4}
                              ]
            }
    }

```

```

0.001,
0.001,
0,
0],

                                'status': True,
                                'type':

'depolarizing'},

                                'odd_wires': 4}},
                                'run_time_sec': 7.285674571990967}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'ising'}}},
  'init_param': { 'value': [ 0.23818326834520384,
                              0.242015507589488,
                              0.5292100600091615,
                              0.5598196968290768,
                              0.5598196968290768,
                              2.3451854381830244,
                              2.3451854381830244,
                              3.8453025861748578,
                              3.8453025861748578,
                              4.395137112369032,
                              4.408833101975425,
                              4.829585475162733,
                              4.867115107997544,
                              5.058958687371625,
                              5.058958687371625,
                              5.058958687371625,
                              5.581243202757385,
                              6.011433944644334,
                              6.011433944644334,
                              8.358003932454157,
                              8.358003932454157,
                              8.358003932454157,
                              8.371420896509267,
                              8.783744346022278,
                              8.783744346022278,
                              9.34189587380724,
                              9.34189587380724,
                              9.39608576624051,
                              9.726727464435275,
                              10.95102910414735,
                              0.14721560345391302,
                              1.0205767628001141,
                              0.40564926087548847,
                              -1.9238321605823567,
                              -0.04729505851188324,
                              0.482541600628026,
                              0.11521556777775581,
                              0.8524320040134185,
                              0.42380767990264745,
                              -0.6219665889019169,
                              -0.05759638705357143,
                              0.8161328242190486,
                              0.7425402472775383,
                              0.7535392998290764,
                              1.8314745216576223,
                              1.3334023135030668,
                              0.05552193989453376,
                              0.9691374289368472,

```



-0.07338372949421543,  
-0.6690664310785921,  
1.168533104165511,  
-0.01962836639606316,  
0.6576122461884292,  
-0.037637936325233226,  
-0.0009647519828692927,  
0.4524839512418326,  
-0.013115244288784337,  
1.6270372625341938,  
1.182284078721198,  
0.9533845712158122,  
1.0956662941001023,  
-0.9647918240366662,  
0.1897778948773928,  
-0.04047520420354409,  
0.5790278460715794,  
0.631719469583885,  
-0.3335418357294817,  
1.0603186443819097,  
-0.7449471003423949,  
0.1630231005006795,  
-0.07563007210422526,  
-1.1009042311153838,  
-0.34587951137957407,  
-0.22408475871037167,  
-0.6364303490666092,  
-0.5245531829065874,  
-0.7807390048523051,  
-0.7767575864285188,  
-0.9679768325508518,  
-1.8691843526791756,  
0.4783530568164554,  
0.6133546874260105,  
-0.20020986269221935,  
-0.41532071148562183,  
-0.8557118152516873,  
-0.16985308585729458,  
0.8428338023785568,  
0.6750667051632169,  
1.2795031602880573,  
-0.41384224674171627,  
0.3213362409234008,  
1.2340309605381181,  
1.0506369357289735,  
-0.6415500741723684,  
-0.9628453188140567,  
1.935214357876566,  
1.4159154638103797,  
-2.0864443113151867,  
-0.07426020994129089,  
-1.0538315394110076,  
0.2589745455351295,  
-0.2955978932252484,  
-0.030644528099012087,  
-0.8602288471584197,  
-0.09490606960216369,  
0.4190622694749842,  
-1.5667390101922392,  
-0.7804920738383083,  
0.1255849265457167,  
0.5884338319364165,  
-0.46028089859616994,  
0.2488277677353687,  
-0.7513271615815256,  
-1.0561258734551267,  
0.3697237180501531,  
-0.7108432439071602,  
0.5137418203820399,  
0.946767478727941,  
1.619957961978311,  
1.2944079622561346,  
0.21625880379379211,  
0.007168703139473973,  
-0.334764182643075,

```

-0.9086121674985949,
-0.8247776105092918,
-0.5734460393428641,
-0.4381826298821608,
-0.44306191141826123,
-0.23860269421390362,
-0.03343496826073402,
-0.008972211649351379,
1.2196121588758198,
1.5985131140815898,
0.060325450296581484,
-0.7312434635304047,
0.9413542695101463,
-0.6701271691421761,
-1.0680925542186157,
-0.5192506372311365,
1.5594784335685845,
0.17928043514789443,
0.2455246384495121,
-0.053106843359071614,
0.7488220810664211,
1.3030207698426615,
-1.787387332504871,
-1.1184519607509558,
-0.2511275398302805,
1.445676213762956,
1.5991220174606833}],
'noise_profile': { 'noise_on_init_param': { 'status':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'}},
'ngubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#4'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1
'+ 1 Z 0 +
'1 X 1 X 2
'+ 1 Z 1 +

```



```
    'type': 'ising'}}},
'init_param': { 'value': [ 0.5118290521669792,
    0.9034573591840084,
    1.0514460879099101,
    1.1283814725964603,
    1.1293980629167455,
    1.6874068541059999,
    1.8362001710030256,
    2.594529848453243,
    2.5949023258749775,
    4.384420392533986,
    4.804388533064279,
    4.8044974726668155,
    4.925049921883437,
    4.925049921883437,
    6.055903002618935,
    6.0650337145794,
    6.06510024924717,
    6.06510024924717,
    7.719643893437192,
    7.719643893437192,
    8.110116534451196,
    8.374448879129652,
    8.374448879129652,
    9.29045698473019,
    9.2929923765699,
    9.977025927736127,
    9.977025927736127,
    9.977438303479875,
    11.277250876863835,
    11.588901828478656,
    -0.5970483257864091,
    1.048395642841534,
    0.3563299433581316,
    2.04182497417867,
    -1.0659189653240388,
    -1.5711224255679066,
    -0.6854026923334804,
    1.3002799990574343,
    0.334979527312172,
    -0.41771661057992626,
    -0.5255960701407614,
    0.9200835209290303,
    0.5840294212204432,
    0.4309612994747514,
    0.010788324288593443,
    0.8398650983618882,
    0.35555521736822654,
    0.33383672576306345,
    -0.03972798241435421,
    -0.5808926346218187,
    -0.6217506829607715,
    -0.022449055124049946,
    -0.4671428723737863,
    1.3840583406465645,
    3.321823997583478,
    1.9516123562000514,
    2.109430068020724,
    0.17138900458361278,
    1.0734765554988877,
    1.1591682463434823,
    -1.5085197494005436,
    0.3709514368460093,
    -0.08354812013321816,
    -0.6849414455501801,
    -1.1807064172516142,
    0.1889544406654655,
    0.45125852432694835,
    0.40946867023093825,
    0.9591749175330944,
    0.862406962512403,
    -0.47565451021668054,
    0.14791469386649075,
    0.012323642821740255,
    -0.3613715829994197,
```

-0.6520104899254531,  
1.1500641632479522,  
0.11480411675389499,  
0.37929728325133344,  
-0.12818017639377846,  
1.5548403554359806,  
-0.08803696907532751,  
0.16058007713541472,  
-0.2835300528775952,  
1.4317946638041426,  
0.04218231832431045,  
0.6164913379423986,  
-0.5546192578057587,  
-0.0016176435191898148,  
0.3455446109244303,  
-0.7983090776945799,  
0.06548494602750325,  
0.09601011255154575,  
-1.274882751616874,  
-0.6639296860891427,  
0.08468574728059233,  
0.09178155492125434,  
-1.9746588496307496,  
1.363083624655819,  
-0.11754172722968637,  
-1.7454296260872237,  
0.689437867548643,  
0.09536601432398076,  
2.1875690275532618,  
1.9737367040865754,  
0.19623670188051764,  
1.3618525198389628,  
-1.6551377680800423,  
-1.2796187335858575,  
-0.02979150349567955,  
0.3655877448114123,  
-1.339933806945279,  
-1.6131280858420662,  
1.1268021774842836,  
0.7853899025443938,  
-1.214954346638235,  
1.881374469676006,  
-2.2108375055617597,  
0.38299461206746305,  
-0.062378913993248956,  
-1.0812916442950207,  
0.19113842494911862,  
0.43947065709017896,  
1.4340329690981122,  
-2.1914706359927933,  
1.683520172253517,  
-0.4151753501170658,  
0.2652280013518245,  
-0.09829123134965576,  
-0.4033858255054015,  
-0.09488290407421365,  
1.1087820722198931,  
1.3758250784849964,  
0.3693308876448478,  
-1.4774754586810708,  
0.45790576106810227,  
-1.318961759734687,  
1.2898775251023542,  
0.5291693857421421,  
-0.7225860054677886,  
-0.6024865845145562,  
1.1258609582335735,  
1.4545810101615688,  
0.4988359655120556,  
0.39968483637691726,  
1.4778005154845164,  
1.6358502222921723,  
0.07081811420225437,  
1.5336807499569445,  
-0.7595143926860392,

```

False,
0.07947795439670366]],
'noise_profile': { 'noise_on_init_param': { 'status':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#10'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
'+ 1 Z 0 + '
'1 X 1 X 2 '
'+ 1 Z 1 + '
'1 X 2 X 3 '
'+ 1 Z 2 + '
'1 X 3 X 4 '
'+ 1 Z 3 + '
'1 X 4 X 5 '
'+ 1 Z 4 + '
'1 X 5 X 6 '
'+ 1 Z 5 + '
'1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.406033238196167],
[12, 6, 0, 0, -5.14768368077025],
[20, 10, 0, 0, -4.13060369641699]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},

```

```

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'odd_wires': 4}},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {

'noise_prob': [

'status': True,
'type':

'odd_wires': 4}},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {

'noise_prob': [

'status': True,
'type':

'odd_wires': 4}},
'run_time_sec': 7.40142035484314}},
{ 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [ 0,
    0,
    0,
    0,
    0,
    0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 0},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'ising'}},
'init_param': { 'value': [ 0.4349098035102067,
    0.5281397824211302,
    0.6402833431740305,
    0.701719039924861,
    0.8953768954552646,
    1.4118719346144908,
    2.230113621742168,
    2.6548053250922607,
    3.10433397641996,
    3.1043339764199596,
    4.146783795497047,
    4.146783795497047,
    4.149760661232294,
    4.149760661232294,
    4.223539194779984,
    4.223539194779984,
    6.7727886487081435,
    6.7727886487081435,
    7.243551717080481,
    7.282491880183138,
    7.282491880183137,
    7.282491880183138,
    8.806989173945695,
    8.80698917394569,
    9.706285648296737,

```

9.809777023075187,  
9.837118725166619,  
10.701586770517197,  
11.185931122995514,  
11.185931122995514,  
0.39919688039300266,  
1.4533249104921768,  
0.7852252158845567,  
-0.4957764525834907,  
-0.3354719566017423,  
0.16097458435951068,  
-0.21971891747261646,  
1.5370438656668401,  
0.26531517225969137,  
-0.6386119707402834,  
0.37748437574064975,  
1.2333814560270282,  
0.5934062959304571,  
1.633059089666515,  
0.31170790405459564,  
0.3995146629536743,  
-0.11155094016301184,  
0.8138063699882787,  
0.019467271717771087,  
-0.38186317682975884,  
-2.778803401027002,  
0.7887082829537533,  
-3.1348050840084074,  
-1.5109224736536222,  
-0.38589710406642097,  
-1.105927053527023,  
0.3451707237315739,  
0.6290043291617069,  
-1.834722402137916,  
-1.0551446159380258,  
-1.3581260193610523,  
0.9666180881078981,  
-0.05759676522292653,  
1.1866392284178628,  
-1.1308471740259582,  
0.34327443183487805,  
0.17662613760194443,  
-0.043135596735193626,  
-0.03667546733606037,  
-0.4901895513664937,  
-1.0399227541005371,  
0.4880459765792483,  
0.053089003166299456,  
-0.6259966396796703,  
0.03159579372412852,  
-0.09798805529491862,  
0.052872660107769434,  
1.490194875693949,  
0.22167423812356596,  
-0.33497064714209324,  
1.0144679614160885,  
0.01608415027143934,  
0.49167899744128424,  
0.12491439548600353,  
-0.1329609067962543,  
0.8639852596635488,  
-1.6607871811173882,  
0.2801513494447602,  
0.3908501333463579,  
0.6044891435983025,  
0.08637544621327581,  
1.2270127042754213,  
0.11860545946003472,  
-0.13066468162372125,  
-0.998222267933649,  
-1.2643438207146234,  
0.7835210648968657,  
0.8370312354478452,  
0.06527740704106412,  
-1.0235950282739155,



```

-0.705070781232052,
0.037682760290170314,
1.4778132318704873,
1.7053977225841355,
-0.1291331271719845,
0.1648924115529835,
2.208642048449397,
1.1885953055185114,
-0.8138037079028133,
0.6715189891287302,
0.7819572861394978,
-0.4022064636590845,
-0.3927127310055937,
-0.4118784323717791,
1.3463239978578432,
-0.3323606385924751,
0.6664683657180488,
1.58852177854836,
-1.212203169826861,
-0.031436536468697034,
0.5094262403458202,
-0.0616688967239856,
-0.0666169691754888,
-0.7277012125404719,
-0.12684196683036533,
0.5325519345188151,
2.2778420441533447,
0.8735933622003313,
0.9907279467768721,
1.1448787224294625,
0.4291077507842401,
-0.21356701746617238,
1.7174041100732933,
0.1885112766205208,
0.3630143936992631,
0.6395640633025061,
-0.2937369198596852,
-0.18128670495631546,
0.9504587478277511,
-0.6241293783488098,
1.8733903679237267,
0.4875344831143031,
-0.9182747577406853,
0.850791268752179,
-0.46183623376516114,
-0.634145646812118,
-0.9165900492445601,
-0.8973746003077631,
-0.879107286657044,
0.15645801311276636}],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},

```

False,

```

'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                      [1, 1, 0, 0],
                                      [2, 2, 0, 0]]},

'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},

'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
                                'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
                                '4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
                                'X 5 X 6 + 1 Z 5 + 1 Z 6',
         'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
                                                    '+ 1 Z 0 + '
                                                    '1 X 1 X 2 '
                                                    '+ 1 Z 1 + '
                                                    '1 X 2 X 3 '
                                                    '+ 1 Z 2 + '
                                                    '1 X 3 X 4 '
                                                    '+ 1 Z 3 + '
                                                    '1 X 4 X 5 '
                                                    '+ 1 Z 4 + '
                                                    '1 X 5 X 6 '
                                                    '+ 1 Z 5 + '
                                                    '1 Z 6']},

'output': { 'data_points': [ [4, 2, 0, 0, -6.672780190342767],
                              [12, 6, 0, 0, -5.522238922989663],
                              [20, 10, 0, 0, -4.5712287338679385]],
         'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                              'identity_factors': [0, 0, 0, 0],
                              'noise_level': [4, 2, 0, 0],
                              'noise_profile': {

'noise_on_init_param': { 'status': False,
                        'value': 0},

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {

'noise_on_init_param': { 'status': False,
                        'value': 0},

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {

'noise_on_init_param': { 'status': False,
                        'value': 0},

'noise_prob': [

0.001,
0.001,
0,
0],

```

0],

```
'status': True,
'type':
'depolarizing'},

'odd_wires': 4]],
'run_time_sec': 8.05130386352539}}],
'vqe': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': {'value': 'random'},
'noise_profile': { 'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': True,
'type': 'png'},
'file_name_prefix': 'ising_noise_free_time_evo'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0]],
'run': 'vqe',
'state': 'dmatrix',
'vqe': { 'iteration': 10,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': True}},
'zne': { 'data_points': None,
'degree': 1,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 +
1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 +
1 X 4 X 5 + 1 Z 4 + 1 X 5 X 6 + 1 Z 5 +
1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z
0 + 1 X 1 X 2 +
1 Z 1 + 1 X 2 X
3 + 1 Z 2 + 1 X
3 X 4 + 1 Z 3 +
1 X 4 X 5 + 1 Z
4 + 1 X 5 X 6 +
1 Z 5 + 1 Z 6']],
'output': { 'exact_sol': -8.56677223350563,
```

'status': False,  
'value': 0},

```
'initial_cost_history': [ 4.2809785500030175,  
                          2.611097744705238,  
                          3.419414059277099,  
                          1.5773527652373136,  
                          3.36522638437751,  
                          3.1574660994918307,  
                          4.256553926466165,  
                          4.577016272245339,  
                          4.50890344694736,  
                          4.056304045999429],  
'noise_details': { 'gates_num': [4, 1, 1, 0],  
                   'identity_factors': [0, 0, 0, 0],  
                   'noise_level': [4, 2, 0, 0],  
                   'noise_profile': { 'noise_on_init_param': {  
                                     'noise_prob': [ 0.001,  
                                                     0.001,  
                                                     0,  
                                                     0],  
                                     'status': True,  
                                     'type': 'depolarizing'}},  
                   'odd_wires': 4},  
'optimized_minimum_cost': [ -6.833109640228162,  
                             -6.51493088468928,  
                             -6.151422264793805,  
                             -6.630764461698797,  
                             -6.72096904084131,  
                             -6.487894898369486,  
                             -6.662379321078827,  
                             -6.6727801903427855,  
                             -6.751241519687556,  
                             -6.406033238196173],  
'optimized_parameters': [ [ -4.1290471568429383e-17,  
                             0.028387941050870547,  
                             0.028387941050870516,  
                             0.028387941050870544,  
                             0.4764187545019148,  
                             0.485154879376271,  
                             0.7094706976105217,  
                             2.998376901501724,  
                             3.486264965503922,  
                             3.487775573446841,  
                             4.058897205630428,  
                             5.020552086463093,  
                             5.02158492362958,  
                             5.02158492362958,  
                             5.0846878698400815,  
                             5.0846878698400815,  
                             6.794704827143902,  
                             6.794704827143902,  
                             6.794704827143902,  
                             8.013356083289752,  
                             8.21076169573117,  
                             8.21076169573117,  
                             8.633075344303478,  
                             8.633075344303478,  
                             8.930018414781724,  
                             8.930018414781724,  
                             8.930018414781724,  
                             9.990329186240457,  
                             9.990329186240457,  
                             12.915390927357043,  
                             0.8289215528981712,  
                             0.6465354442587259,  
                             -0.06922368073773534,  
                             -2.0853926237797484,  
                             0.25605409461249207,  
                             -0.765586831155604,  
                             0.9589723041272441,  
                             0.27455658215646966,  
                             -0.07189982532198122,  
                             -0.3449139525561357,  
                             -0.46800027418386986,  
                             1.016480689947782,
```

-0.9706976058410632,  
-0.9556868223128826,  
0.9323574793538898,  
-0.4376613900889883,  
0.44138701419965265,  
1.4418520162063444,  
0.8420619129497768,  
-0.025530845682239494,  
-2.3076344184440156,  
0.37458463155346333,  
-0.47031338116346383,  
0.07338001085955462,  
-0.869249007732584,  
1.6824786550253577,  
1.719346297136726,  
-0.9622509832303179,  
0.5779076253870294,  
0.4760527439731688,  
-0.2451715046346434,  
1.5906513054768954,  
0.35918458386075697,  
-0.44817294000256097,  
-0.37416377940751877,  
0.37048554789855764,  
0.693137718643464,  
2.288219219235325,  
-0.26501198620577204,  
0.3689053264668303,  
0.10166782579927121,  
-0.3356073800920907,  
-0.6413954053758932,  
0.28636656044125136,  
-0.8690978212322298,  
1.166030172665772,  
-0.46365263204645707,  
-0.8505396438729699,  
2.4328989003329693,  
-1.4554443951257197,  
2.09134311034601,  
1.7695145471360614,  
1.1170184462314887,  
0.20325573406500014,  
0.34206355374635444,  
0.016804831103183593,  
-0.19882507083844791,  
1.4011478969931443,  
-0.0572616468882171,  
-1.3773340344964602,  
1.1031086912886459,  
0.47433623341773395,  
-0.037679845343088075,  
0.7450954028512253,  
1.3114871459373192,  
-0.18651966717154955,  
1.0750199871192778,  
0.48905379729033566,  
-0.6281827821606347,  
1.322074656325554,  
-1.4761484868509396,  
0.2859918816514792,  
-1.0033541595176405,  
0.8264053813863532,  
0.622010811103528,  
1.1636747207646185,  
-0.31883271288389914,  
-0.0013981850979601159,  
-0.09999405171802342,  
1.3085280853238759,  
-1.3727969089464465,  
-0.08341159264840771,  
1.6249369276484606,  
-0.28082331570516694,  
1.863294400254821,  
2.2932652495309953,  
1.4849536675442596,

0.6811668802751195,  
1.5380110980874968,  
-0.6615225065895972,  
0.4000828281024264,  
0.33932121588009856,  
0.48855764825038867,  
2.5371111232777053,  
-0.7260430040504564,  
0.09005940379987407,  
-0.8762980817992282,  
-0.23800314057977784,  
0.9728027685352436,  
-0.20857834368009137,  
0.6148333457084475,  
-1.5171898336040224,  
0.8658542069129427,  
-1.6478287868490311,  
0.5770049367106069,  
0.134497700004433,  
-0.11612046371881249,  
1.5826352840237945,  
1.6045820840261675,  
-0.08805669980595342,  
-1.507745125921201,  
-0.11276651576435986,  
0.07206005105970639,  
-1.7788122679933258,  
-0.002988765738482436,  
0.7255804452314191,  
2.7661804504965604,  
-3.1943627011957507,  
-0.07088434770936546,  
0.10949711075632612],  
[ 0.27654223573266234,  
0.27654223573266246,  
0.27654223573266246,  
0.4643738922966213,  
0.6582164862517121,  
0.6582164862517121,  
0.6582164862517121,  
1.3424523496852623,  
1.47635793598756,  
1.47635793598756,  
3.385550316280557,  
3.385550316280557,  
3.385550316280557,  
4.494062371253785,  
4.494062371253785,  
5.0204758683966135,  
5.023404188660082,  
7.05704094573064,  
7.087391629397132,  
7.533802135057517,  
8.245970909352765,  
8.390887842007308,  
8.390887842007308,  
8.703391612007538,  
8.703391612007538,  
9.485545381639698,  
9.485545381639698,  
9.849437794456351,  
9.849437794456351,  
10.799155842585746,  
-0.12708089143278917,  
1.4168148977025445,  
-0.13519536748631492,  
-0.32308714516775877,  
0.06981336221044306,  
-0.034321895006426455,  
-0.18209443759399158,  
-0.024858958594746107,  
0.664488174834645,  
0.6897317665852637,  
-0.008774731192519907,  
0.625642551337688,

0.6862410821653743,  
-0.7670419540542446,  
-0.48055390132433673,  
1.573964677292243,  
-1.0555745677813198,  
1.3159721165631335,  
-0.9138502497993347,  
-0.4641566084568084,  
-0.06966564000847691,  
0.039012746519005555,  
1.0827641697579717,  
1.2190093772283843,  
1.5391150382377632,  
-0.6675581491933664,  
0.09104662559232415,  
0.5283818781579022,  
0.04478118244404365,  
1.5836075485651113,  
0.251932560991488,  
-0.3949560381811925,  
0.8854639388207172,  
-0.8611267164776638,  
1.566928747241295,  
-0.15445151319573347,  
-0.01396050433941564,  
0.8172620115356718,  
-0.014658132241289147,  
-0.6623010385304499,  
0.6299284572753584,  
-0.15026947869759505,  
-1.2293112897827836,  
-0.5768656731979434,  
1.231557922062332,  
-1.447872926116422,  
1.4918722706131171,  
0.31945486783385635,  
0.43870804207253483,  
1.3582636256308331,  
-0.8478398442626237,  
0.799518029891469,  
0.5539369896048497,  
0.13453197415145846,  
0.7167498104862234,  
-0.06589109804263343,  
0.041038724923082276,  
1.151975756926885,  
-0.052026838729968425,  
0.3952978000808587,  
-1.1754748970457833,  
-0.01965607042871015,  
-0.2456324144680547,  
-0.01136184217607491,  
0.022503168314325715,  
1.1777923723104653,  
0.14554117253938412,  
-1.2287946167385297,  
-0.9683737383161766,  
1.073329622962756,  
-0.7143583802799215,  
-0.3545002682598469,  
-0.31906110571926777,  
-0.9597094503848127,  
0.8825903987559673,  
-0.08273415521500459,  
0.2895039435279609,  
-0.3388594197258312,  
0.2406459434933063,  
0.3824128671502841,  
-0.5390555829405563,  
0.3757684495816124,  
-0.5015719636333678,  
0.3958257688275076,  
-0.6428354095046468,  
-0.9178624992467067,  
0.29327306512581747,

-0.09193285724698198,  
0.1770091195095364,  
0.6803523512851801,  
1.05525770275555,  
-0.4646437845139076,  
2.2560908642344026,  
-0.7500939262299234,  
1.92959092052175,  
-0.36895777993274226,  
-0.04538283416771957,  
1.2529586558275392,  
-0.57805717638909,  
0.3080585810325818,  
0.031910210614104206,  
0.18519950010488512,  
1.3888566879174211,  
1.087260914864616,  
0.15259355623633358,  
-0.08810167996863522,  
0.07467874103808375,  
1.4444893382870363,  
-1.446220680213735,  
0.8215180856176293,  
2.0151723649306295,  
0.13454991965456886,  
0.21923381008732426,  
0.31112145477192793,  
-0.8977876743954992,  
0.10239876571985529,  
-1.0132922278363503,  
-0.3794863035801566,  
0.8437803973608401,  
1.111671691788496],  
[ 0.3463233138801294,  
0.34632331388012944,  
0.3463233138801294,  
0.3463233138801293,  
1.2403205490491955,  
1.38033446895038,  
3.6939218351946623,  
3.6939218351946623,  
3.693921835194662,  
3.693921835194662,  
3.9412089126587,  
3.9412089126587,  
3.9412089126587007,  
3.9412089126587007,  
4.8310999601027795,  
4.870844593548848,  
4.900228671797898,  
4.9002286717978984,  
4.9002286717978984,  
4.900228671797898,  
5.70167657474683,  
6.21188441483336,  
6.21188441483336,  
6.686419232103557,  
6.723504371727371,  
7.618130890836856,  
7.618130890836856,  
9.420364260644014,  
9.420364260644014,  
10.775132222422771,  
-0.3525750090684208,  
1.2748976558430758,  
-0.16146998454247521,  
1.3224575871686013,  
0.0349265192498484,  
0.36138711032415904,  
-0.5043488106619078,  
0.7634801084306476,  
-0.3536814593617201,  
0.9606809354246906,  
-1.1143894720984433,  
-0.45289061390722213,



-0.1605333784989486,  
-1.594210268458609,  
-0.09465166736510336,  
0.11132251138190599,  
1.004235666711761,  
-0.23115493220428254,  
0.9451761882751959,  
-0.3707284170975133,  
-0.17782948231634454,  
-0.18433417990028922,  
-0.06421460341189031,  
-1.155489001827845,  
-0.2074908306187579,  
-0.036360325422879626,  
0.5283181819327893,  
0.3603171208434518,  
0.6819349944270952,  
-0.2733083993242672,  
0.7075879191324372,  
-0.042779623335368125,  
0.7032435595714176,  
-0.7363942983542189,  
0.9583235184546098,  
-0.5892472427173001,  
-0.7139877518112785,  
-0.12446625268371646,  
-0.439646171766664,  
0.7129808957109575,  
0.3373075268097138,  
0.3345550414369601,  
-0.38068761370203624,  
0.07864964370676188,  
-0.3383553862900091,  
0.6633419895127639,  
-0.578720703894673,  
0.486162302530746,  
-0.06112668401522289,  
0.34417654454775265,  
-0.09182266750822224,  
0.012215000731405658,  
0.5658291917160285,  
-0.16728488191683846,  
0.3754616489195623,  
-0.30497315054621493,  
-0.7559846133933803,  
0.9474959005813702,  
-0.5904076686561035,  
-0.2620011537974264,  
0.1328515248519479,  
-0.44066408562446224,  
-0.7849425610737308,  
0.44059474279745625,  
-0.04646983134951628,  
0.27897770882356554,  
0.36838349877106535,  
1.1610009997739648,  
0.9058411506824863,  
0.3119955912029684,  
-0.5265683545543336,  
1.0661822357546584,  
0.8560044406571757,  
0.5004409227892788,  
0.5192086876555008,  
-0.0019665558968806392,  
-0.23949800878404184,  
0.32563956832297103,  
0.795323960796817,  
1.5213873243487468,  
0.8637563634588281,  
0.07945031145196896,  
1.7583315097859118,  
0.5335864884320034,  
-0.1366270407456156,  
-0.9111102828185913,  
-0.41650979281126865,

0.20926691692934202,  
0.2776061293997892,  
1.4257231544028384,  
-0.10754544247245298,  
1.0035199546983695,  
1.1162390986419686,  
1.7211522778091677,  
-1.4332245925979028,  
1.4417595659646931,  
-2.106784537892007,  
-0.6878309432904478,  
-0.20360639354575213,  
0.6373705186717347,  
0.051333236332203484,  
-0.35868991955772395,  
-0.24365907607080922,  
1.619736185871098,  
0.5895182658245096,  
-0.6086170057348131,  
0.39774539931448055,  
1.409837948786624,  
0.17438880158294706,  
-0.0415548590378924,  
0.1413623732119859,  
-0.8192475896231625,  
0.5823982141653503,  
-0.8462302367353051,  
-0.60454163385331,  
1.8216629921858374,  
1.2634551976945552,  
-0.40200420270308274,  
-1.5954759495917508,  
-1.7732438129518737],  
[ 0.23818326834520384,  
0.242015507589488,  
0.5292100600091615,  
0.5598196968290768,  
0.5598196968290768,  
2.3451854381830244,  
2.3451854381830244,  
3.8453025861748578,  
3.8453025861748578,  
4.395137112369032,  
4.408833101975425,  
4.829585475162733,  
4.867115107997544,  
5.058958687371625,  
5.058958687371625,  
5.058958687371625,  
5.581243202757385,  
6.011433944644334,  
6.011433944644334,  
8.358003932454157,  
8.358003932454157,  
8.358003932454157,  
8.371420896509267,  
8.783744346022278,  
8.783744346022278,  
9.34189587380724,  
9.34189587380724,  
9.39608576624051,  
9.726727464435275,  
10.95102910414735,  
0.14721560345391302,  
1.0205767628001141,  
0.40564926087548847,  
-1.9238321605823567,  
-0.04729505851188324,  
0.482541600628026,  
0.1152155677775581,  
0.8524320040134185,  
0.42380767990264745,  
-0.6219665889019169,  
-0.05759638705357143,  
0.8161328242190486,

0.7425402472775383,  
0.7535392998290764,  
1.8314745216576223,  
1.3334023135030668,  
0.05552193989453376,  
0.9691374289368472,  
-0.07338372949421543,  
-0.6690664310785921,  
1.168533104165511,  
-0.01962836639606316,  
0.6576122461884292,  
-0.037637936325233226,  
-0.0009647519828692927,  
0.4524839512418326,  
-0.013115244288784337,  
1.6270372625341938,  
1.182284078721198,  
0.9533845712158122,  
1.0956662941001023,  
-0.9647918240366662,  
0.1897778948773928,  
-0.04047520420354409,  
0.5790278460715794,  
0.631719469583885,  
-0.3335418357294817,  
1.0603186443819097,  
-0.7449471003423949,  
0.1630231005006795,  
-0.07563007210422526,  
-1.1009042311153838,  
-0.34587951137957407,  
-0.22408475871037167,  
-0.6364303490666092,  
-0.5245531829065874,  
-0.7807390048523051,  
-0.7767575864285188,  
-0.9679768325508518,  
-1.8691843526791756,  
0.4783530568164554,  
0.6133546874260105,  
-0.20020986269221935,  
-0.41532071148562183,  
-0.8557118152516873,  
-0.16985308585729458,  
0.8428338023785568,  
0.6750667051632169,  
1.2795031602880573,  
-0.41384224674171627,  
0.3213362409234008,  
1.2340309605381181,  
1.0506369357289735,  
-0.6415500741723684,  
-0.9628453188140567,  
1.935214357876566,  
1.4159154638103797,  
-2.0864443113151867,  
-0.07426020994129089,  
-1.0538315394110076,  
0.2589745455351295,  
-0.2955978932252484,  
-0.030644528099012087,  
-0.8602288471584197,  
-0.09490606960216369,  
0.4190622694749842,  
-1.5667390101922392,  
-0.7804920738383083,  
0.1255849265457167,  
0.5884338319364165,  
-0.46028089859616994,  
0.2488277677353687,  
-0.7513271615815256,  
-1.0561258734551267,  
0.3697237180501531,  
-0.7108432439071602,  
0.5137418203820399,

0.946767478727941,  
1.619957961978311,  
1.2944079622561346,  
0.21625880379379211,  
0.007168703139473973,  
-0.334764182643075,  
-0.9086121674985949,  
-0.8247776105092918,  
-0.5734460393428641,  
-0.4381826298821608,  
-0.44306191141826123,  
-0.23860269421390362,  
-0.03343496826073402,  
-0.008972211649351379,  
1.2196121588758198,  
1.5985131140815898,  
0.060325450296581484,  
-0.7312434635304047,  
0.9413542695101463,  
-0.6701271691421761,  
-1.0680925542186157,  
-0.5192506372311365,  
1.5594784335685845,  
0.17928043514789443,  
0.2455246384495121,  
-0.053106843359071614,  
0.7488220810664211,  
1.3030207698426615,  
-1.787387332504871,  
-1.1184519607509558,  
-0.2511275398302805,  
1.445676213762956,  
1.5991220174606833],  
[ 0.32980400918867037,  
0.7818596814437996,  
0.9680306497310072,  
1.0586432954274991,  
1.7663116348413028,  
1.8956491295658664,  
2.0436116769319477,  
2.0436116769319477,  
2.0436116769319477,  
2.1846619555479685,  
2.1846619555479685,  
4.516997836642403,  
4.516997836642403,  
5.3166564351730035,  
5.320130741320412,  
5.399447086770547,  
5.400046100307029,  
5.400046100307029,  
5.400046100307029,  
5.400046100307029,  
7.097750404951498,  
7.618222769006738,  
7.956666567531361,  
7.956666567531361,  
8.961109688308255,  
8.961109688308255,  
11.028500695271937,  
11.5809418583784,  
11.5809418583784,  
11.5809418583784,  
0.24114173221382337,  
1.3754512844042854,  
0.9720111739434927,  
-0.29877116871955545,  
-0.029737313498699618,  
0.3185153459444675,  
-0.31840745367437817,  
0.6801602139502809,  
-0.015407845998522466,  
-1.114484654283524,  
0.22997676136047449,  
1.5201821520192487,

0.3217486942799661,  
0.43678760134757944,  
0.17618749246228715,  
0.7010359103792874,  
0.3446701255696699,  
1.4700166379981474,  
0.3471333265905846,  
-0.968444017764766,  
-1.1485269521507444,  
0.3282504398407059,  
-0.7898554413193151,  
-0.22157985789400653,  
0.4570931682042821,  
-0.22158635023930806,  
-0.36549836384277606,  
-0.2366283880333898,  
0.4114765778384287,  
-0.7694643480660831,  
-0.40507000819737765,  
-0.6576468499882752,  
0.2023600853039859,  
-1.2917280200640486,  
0.32702771491506877,  
-0.07546137553843744,  
-0.7713328193108817,  
-0.8163562225239717,  
-0.07772489804090182,  
-0.32841576637855896,  
-0.05728139293162625,  
0.8564947637293437,  
0.15384434981345546,  
0.41944080031994563,  
0.16884394015055976,  
-0.010490661309829376,  
-1.3198249528292274,  
0.07128101806419536,  
0.03515395872296211,  
-0.09826644736389979,  
-0.06882299183557238,  
-0.7062443088386591,  
-0.5280915567870916,  
0.14860690208212682,  
0.338235073517239,  
0.012130023587481156,  
-0.037483081002571056,  
0.8881056862099682,  
0.06312673968269537,  
-0.44738898868242327,  
-0.2463284936792685,  
1.1708672891281489,  
0.5297819270424092,  
-0.5463182826640249,  
-1.667403353493104,  
1.3713545814180228,  
0.9413366263710182,  
-0.021951472934173096,  
1.0345046397029698,  
-0.8002739446090432,  
1.076242700462428,  
0.04994674089563993,  
-1.446235170371471,  
-0.3268246709561185,  
0.6264234635598642,  
-1.2465048991503196,  
0.1169092097763034,  
1.2453937722962254,  
0.7220287063888942,  
0.8114212311039525,  
0.18333674920471413,  
0.7345776889004225,  
0.9807678368065545,  
0.8703572591074042,  
0.28720991162605214,  
-0.9085817320602367,  
1.1216621938695932,

1.1327477502874412,  
-1.8285395156530388,  
1.4231155243966302,  
0.08156271721069372,  
0.18027327076782884,  
-0.10302960773112253,  
-0.5560482514096969,  
-0.09484541903718098,  
0.5886430341587933,  
-1.1674014904638685,  
-0.03940950630369794,  
0.2792515765657198,  
0.08214125135098017,  
0.04344924016389119,  
-0.7787970529711157,  
0.07887586110139429,  
0.7532574519080738,  
0.17107625040009872,  
-0.4128415687827808,  
1.3723943620028143,  
1.4278581324344195,  
0.5879977529754344,  
0.28910810409117477,  
-1.4412046993697643,  
1.624844367134446,  
0.19366683662945536,  
0.3179841250458877,  
0.5357240606734743,  
1.5680682524509713,  
0.04418323830986127,  
0.2311137213204739,  
2.8741283660232546,  
0.9612408402592636],  
[ 0.46756606893882113,  
0.46983859896604685,  
0.5133985927484581,  
0.5133985927484581,  
0.5133985927484581,  
1.4016794842576101,  
1.6914116785996751,  
1.691411678599675,  
1.6941756924801525,  
1.6941756924801528,  
3.749864451084885,  
3.749864451084885,  
3.749864451084885,  
3.749864451084885,  
4.969636107010246,  
4.969636107010246,  
4.969636107010246,  
4.969636107010246,  
5.983107385388112,  
5.983107385388112,  
8.378949246097575,  
8.378949246097575,  
8.635680633753974,  
8.635680633753974,  
9.108807770997622,  
9.108807770997622,  
9.108807770997622,  
9.960036411132767,  
10.436643041587223,  
10.716533289695375,  
0.5466515694267952,  
3.318518267704871,  
0.40678728382369284,  
0.6290091030083763,  
-0.4770983795300032,  
-0.7455483390932742,  
0.1630064768968011,  
0.4889724943271746,  
0.10596004146863507,  
-1.4759536729524354,  
0.957604974713893,  
0.6004514101153323,

0.0725728265044025,  
1.4994700617905987,  
0.15508641282397265,  
-0.15494303336158094,  
-0.5663845144966579,  
2.6663065398173496,  
-0.27086336898318036,  
-1.1828784814640632,  
-0.295045685212881,  
0.6236994649007899,  
1.1769360493970402,  
1.7159795997719172,  
-0.3019600780315931,  
0.651545330446025,  
-2.0782382222089724,  
0.3186344830290561,  
-0.2815476257680432,  
0.4067635126151388,  
-0.8228051832090519,  
-0.4154478828430832,  
2.3723163321732827,  
0.931436930203099,  
0.9804374423714106,  
0.058895326584719035,  
0.3167253661454302,  
0.3390503539155689,  
-0.5024758650485814,  
-0.2425872659725522,  
-0.6703364135359525,  
-0.147558399690948,  
1.1644296968010859,  
0.5475507579506065,  
0.1736068872874216,  
0.30547527216138975,  
0.5300773267023443,  
0.7722201656261689,  
-0.6858549484151734,  
-0.16073113081558088,  
-1.197458252004488,  
-0.507307082981415,  
-0.16437738354723153,  
0.2647407403580543,  
-0.45930133674563567,  
-0.22673992276266391,  
1.8127715449849986,  
-1.4334128748253496,  
-0.759404859696163,  
1.2431110601081345,  
0.8953271645792334,  
0.6963251389999259,  
-0.23147129445607595,  
0.3638861144885483,  
2.2394622330281906,  
1.543816783446588,  
1.7535830084845025,  
-0.3169637330795974,  
0.2453194636587019,  
2.0076391670843647,  
0.286017506499548,  
0.6600449842625801,  
0.19782118041633945,  
0.05463577684798935,  
0.4755005320975566,  
0.055207215781380096,  
0.06969685609102444,  
0.2645328829673777,  
-0.01235845210357445,  
1.01982876424508,  
2.262492417600915,  
1.3443784687440867,  
0.10698144982242018,  
0.428081928456963,  
-1.5494921893757727,  
1.0701294130786736,  
0.39987519173641656,

0.06301738855484718,  
-1.6711192593807125,  
0.26920159401030147,  
-0.08358711295948693,  
0.4054786916979446,  
-0.5013194648307361,  
2.126550690771933,  
0.10959959792145137,  
0.4205360694942305,  
-0.586878230803869,  
-0.3381608637889511,  
-0.5055401953468239,  
-0.45995744817477163,  
0.07999668782445096,  
-0.4269018063306222,  
0.9588276598807326,  
1.042187521522261,  
0.07821502449201799,  
0.6777167152964713,  
0.4177387822172794,  
-0.18721284346239236,  
-0.8064458441104513,  
2.8712851588196218,  
0.7141862154478698,  
-0.9976723444987857,  
-0.8529435737233043,  
1.9602636639541733,  
1.2634521849205176,  
-0.7170870121313951,  
0.31227949023655405,  
-1.0451293221946831,  
-0.6787852158143914,  
1.8581833428208436],  
[ 0.4319322451408806,  
0.4441934852523559,  
0.5878315575931067,  
0.5878315575931067,  
0.5912427958750637,  
0.5947187380620651,  
0.5947187380620652,  
1.5628074958209335,  
1.568718083448373,  
2.013035808837258,  
2.013035808837258,  
2.013035808837258,  
2.0277481086167364,  
4.114573484042011,  
4.1154343976538055,  
5.358852938788934,  
5.358852938788934,  
5.549639110185835,  
5.667644288942511,  
5.6706149635077026,  
7.063797010237488,  
7.658675772413245,  
8.123010743902626,  
8.633070512181217,  
8.7849794748515,  
8.7849794748515,  
10.749769122252356,  
10.89899813672382,  
11.413879450074099,  
11.413879450074099,  
-0.04151001581527148,  
-2.751209241920508,  
-0.5056705094410174,  
-0.406548832581749,  
0.8633340895103881,  
0.17259893989954428,  
-0.21235924407313156,  
-0.5485334561985523,  
0.2012951527025238,  
-0.23858034563229433,  
2.1364176057207223,  
0.7817014982866842,



-0.1108899918027214,  
0.6048531661014985,  
1.809261328558185,  
-1.1786415575821785,  
-1.0827170099436865,  
0.4109384498547832,  
0.8090945308822337,  
-0.9356585252219308,  
0.28697429006677655,  
-0.15332459566133277,  
1.2998079093160566,  
0.3870967504567973,  
-0.2413465423953762,  
1.001771196320206,  
0.1138394509020578,  
1.3220786271535379,  
-1.1806565063083097,  
2.2789659185869464,  
0.11875741943281123,  
-0.15631084464392242,  
-2.14680662310284,  
0.18035127914430246,  
-0.260880073181003,  
0.21031876899961,  
0.7641152777599183,  
1.203568210035907,  
1.2767673297334832,  
1.2585129786889195,  
0.24752046596725819,  
0.7203551788145919,  
-0.17420447991641552,  
-1.3486030918499698,  
0.2145369555808404,  
0.8896874485404291,  
-1.6470089821954121,  
-0.37928143051952584,  
-0.29903232984244293,  
0.6984471945997809,  
0.14906235834494008,  
0.054873949093549826,  
1.3877615433857144,  
0.04193983551007985,  
1.2014028569521673,  
-0.02338341588216991,  
-0.05255422822816251,  
-0.1905875093002492,  
0.16425167437144692,  
0.2542835721118732,  
1.1822299841866795,  
1.2032222480152739,  
0.30142488752060526,  
0.09125464470109583,  
-0.45638140154025475,  
0.050260497156630585,  
-0.04000614529085093,  
0.9096133936431033,  
-0.03555378439095736,  
0.4405325841695877,  
-0.48129885373423525,  
-0.3617221403442356,  
-2.5216506086368518,  
-0.5081934521569421,  
0.041332600726076626,  
0.7413771443671474,  
0.2204029987501584,  
-0.7517920276590782,  
-0.21022249714251526,  
1.5607830526955413,  
0.16615947769508344,  
-0.17023919527139658,  
-0.4295619963603494,  
-1.1838803442651602,  
0.6319564057885301,  
-0.3935277768061919,  
0.005550337258741166,

-0.4226065324972882,  
-0.3715846249960284,  
-0.48395498614671884,  
-0.4790957128536121,  
1.4427293239187895,  
0.5875094653073935,  
1.404722056846091,  
0.6973465258635152,  
0.8623508528879442,  
-0.5460563718875903,  
0.8326491581513842,  
-2.4015389244466907,  
-0.04583861440999851,  
-0.36265388938085896,  
-0.5347868312224912,  
0.49674658852292397,  
-0.6488379607428911,  
1.1568053403721041,  
0.30662269781395407,  
-2.013151608263867,  
-0.17383275003878457,  
0.5036662539248705,  
1.9638910157847163,  
3.118155075975211,  
0.8117246453310248,  
-1.4517859264576565,  
-1.4946803709676548,  
-2.7792982516572895,  
1.1174424252005506,  
2.333430423546859,  
0.6903927508165344,  
-0.2883899927957993,  
-0.8542826896862586],  
[ 0.4349098035102067,  
0.5281397824211302,  
0.6402833431740305,  
0.701719039924861,  
0.8953768954552646,  
1.4118719346144908,  
2.230113621742168,  
2.6548053250922607,  
3.10433397641996,  
3.1043339764199596,  
4.146783795497047,  
4.146783795497047,  
4.149760661232294,  
4.149760661232294,  
4.223539194779984,  
4.223539194779984,  
6.7727886487081435,  
6.7727886487081435,  
7.243551717080481,  
7.282491880183138,  
7.282491880183137,  
7.282491880183138,  
8.806989173945695,  
8.80698917394569,  
9.706285648296737,  
9.809777023075187,  
9.837118725166619,  
10.701586770517197,  
11.185931122995514,  
11.185931122995514,  
0.39919688039300266,  
1.4533249104921768,  
0.7852252158845567,  
-0.4957764525834907,  
-0.3354719566017423,  
0.16097458435951068,  
-0.21971891747261646,  
1.5370438656668401,  
0.26531517225969137,  
-0.6386119707402834,  
0.37748437574064975,  
1.2333814560270282,

0.5934062959304571,  
1.633059089666515,  
0.31170790405459564,  
0.3995146629536743,  
-0.11155094016301184,  
0.8138063699882787,  
0.019467271717771087,  
-0.38186317682975884,  
-2.778803401027002,  
0.7887082829537533,  
-3.1348050840084074,  
-1.5109224736536222,  
-0.38589710406642097,  
-1.105927053527023,  
0.3451707237315739,  
0.6290043291617069,  
-1.834722402137916,  
-1.0551446159380258,  
-1.3581260193610523,  
0.9666180881078981,  
-0.05759676522292653,  
1.1866392284178628,  
-1.1308471740259582,  
0.34327443183487805,  
0.17662613760194443,  
-0.043135596735193626,  
-0.03667546733606037,  
-0.4901895513664937,  
-1.0399227541005371,  
0.4880459765792483,  
0.053089003166299456,  
-0.6259966396796703,  
0.03159579372412852,  
-0.09798805529491862,  
0.052872660107769434,  
1.490194875693949,  
0.22167423812356596,  
-0.33497064714209324,  
1.0144679614160885,  
0.01608415027143934,  
0.49167899744128424,  
0.12491439548600353,  
-0.1329609067962543,  
0.8639852596635488,  
-1.6607871811173882,  
0.2801513494447602,  
0.3908501333463579,  
0.6044891435983025,  
0.08637544621327581,  
1.2270127042754213,  
0.11860545946003472,  
-0.13066468162372125,  
-0.998222267933649,  
-1.2643438207146234,  
0.7835210648968657,  
0.8370312354478452,  
0.06527740704106412,  
-1.0235950282739155,  
-0.705070781232052,  
0.037682760290170314,  
1.4778132318704873,  
1.7053977225841355,  
-0.1291331271719845,  
0.1648924115529835,  
2.208642048449397,  
1.1885953055185114,  
-0.8138037079028133,  
0.6715189891287302,  
0.7819572861394978,  
-0.4022064636590845,  
-0.3927127310055937,  
-0.4118784323717791,  
1.3463239978578432,  
-0.3323606385924751,  
0.6664683657180488,

1.58852177854836,  
-1.212203169826861,  
-0.031436536468697034,  
0.5094262403458202,  
-0.0616688967239856,  
-0.0666169691754888,  
-0.7277012125404719,  
-0.12684196683036533,  
0.5325519345188151,  
2.2778420441533447,  
0.8735933622003313,  
0.9907279467768721,  
1.1448787224294625,  
0.4291077507842401,  
-0.21356701746617238,  
1.7174041100732933,  
0.1885112766205208,  
0.3630143936992631,  
0.6395640633025061,  
-0.2937369198596852,  
-0.18128670495631546,  
0.9504587478277511,  
-0.6241293783488098,  
1.8733903679237267,  
0.4875344831143031,  
-0.9182747577406853,  
0.850791268752179,  
-0.46183623376516114,  
-0.634145646812118,  
-0.9165900492445601,  
-0.8973746003077631,  
-0.879107286657044,  
0.15645801311276636],  
[ 0.48023040681030116,  
0.7029544315470944,  
0.722671987246733,  
0.9307929858945541,  
0.9307929858945543,  
2.546598088688794,  
2.546598088688794,  
2.546598088688794,  
2.546598088688794,  
2.546598088688794,  
5.184334435330857,  
5.195111458618343,  
5.47436411399969,  
5.47436411399969,  
5.47436411399969,  
5.47436411399969,  
5.47436411399969,  
6.068336244524409,  
6.068336244524409,  
7.838605251840715,  
7.912250316107233,  
7.912250316107233,  
8.562517202814183,  
9.063385768597811,  
9.216218862905647,  
9.216218862905647,  
10.84047371877396,  
10.84047371877396,  
11.044358714867027,  
11.375406566932424,  
11.375406566932424,  
0.18886549713610382,  
0.6040291443391601,  
-0.9727809979878402,  
3.008209947509642,  
0.3239743149147096,  
-0.643987619924633,  
1.0739882269552894,  
0.4935103262912805,  
-1.1713673989643745,  
0.32339055167680386,  
-0.8254170399860232,  
3.387204293956005,

0.5437302598099015,  
-0.6585961721148387,  
1.0903163929414719,  
-1.5261906384818182,  
1.102349928722959,  
-0.7373436929054379,  
0.1712635196093208,  
1.2086697581514199,  
-0.4977298668106944,  
-0.8828019932256734,  
-0.13051782426094366,  
0.048744185631251574,  
-1.0535030780910155,  
0.5224555306604155,  
-0.9502111367985572,  
-0.2573420205933925,  
1.5833039752620888,  
1.3806480812363842,  
0.3864833677006273,  
-0.0006284730712113316,  
0.6487740408134013,  
1.697829570896293,  
-0.20023867528920775,  
-0.32438662287273723,  
1.3674639807988553,  
-1.5592347723565667,  
-0.6294582959326964,  
1.111157394071659,  
1.4895912958038178,  
-0.7203901402661329,  
-0.027076706863032294,  
0.009574786781832467,  
1.1437695218822916,  
0.11720143179507149,  
1.0973549625545624,  
-1.0756168303605034,  
-1.5785125289756954,  
-0.42999007233668873,  
0.7592603373612552,  
0.7357293999316703,  
0.03766014972468404,  
1.450035910180884,  
-0.08978031589044846,  
0.7176267391661779,  
-2.3377280976646966,  
0.3878354316208249,  
-0.8070070584177742,  
0.07084117333557359,  
-0.008998168433091903,  
0.6612796195456235,  
0.6287929626789847,  
0.8601333603228948,  
-0.7786354708155643,  
-0.144476679155352,  
0.39492950957300044,  
-0.20012968159779548,  
0.01326107241550192,  
-0.5649340596325207,  
-0.020398755490040426,  
0.6333499066300691,  
0.400844220606507,  
0.5954749034740784,  
0.8700413681534388,  
1.315868035063538,  
0.9914334712755634,  
0.10418309057983809,  
1.1095991500751576,  
-0.1712743534684691,  
-0.2730581386141925,  
0.1453142903679217,  
-0.3813955795194703,  
0.1280814941289577,  
-0.5627986213807415,  
-1.0576722394029623,  
-1.98721560251358,

0.519862592148374,  
1.03695228961559,  
0.21101375663462807,  
-1.750252459751414,  
-1.1450993785481438,  
-2.2517541986316916,  
-1.5456964825715331,  
0.6026638989139771,  
0.47561448130168205,  
0.08201672609434518,  
0.47464262797792917,  
-0.14585857152212733,  
0.08636040211648545,  
0.7388192170680543,  
1.071366965639021,  
2.5115163876343742,  
-0.4286872636197954,  
-0.2977998181526895,  
0.46569070003689333,  
0.2115019986130443,  
-0.5123638542481742,  
0.09024611293676764,  
-0.3380729423866059,  
1.6314769884628497,  
1.3338027138849353,  
-0.7442166070564612,  
1.2186722356710948,  
1.584709484399307,  
-0.6554175978902271,  
0.36887213174672207,  
-1.365021965092438,  
-0.4623126041921459,  
0.4869420326570461],  
[ 0.5118290521669792,  
0.9034573591840084,  
1.0514460879099101,  
1.1283814725964603,  
1.1293980629167455,  
1.6874068541059999,  
1.8362001710030256,  
2.594529848453243,  
2.5949023258749775,  
4.384420392533986,  
4.804388533064279,  
4.8044974726668155,  
4.925049921883437,  
4.925049921883437,  
6.055903002618935,  
6.0650337145794,  
6.06510024924717,  
6.06510024924717,  
7.719643893437192,  
7.719643893437192,  
8.110116534451196,  
8.374448879129652,  
8.374448879129652,  
9.29045698473019,  
9.2929923765699,  
9.977025927736127,  
9.977025927736127,  
9.977438303479875,  
11.277250876863835,  
11.588901828478656,  
-0.5970483257864091,  
1.048395642841534,  
0.3563299433581316,  
2.04182497417867,  
-1.0659189653240388,  
-1.5711224255679066,  
-0.6854026923334804,  
1.3002799990574343,  
0.334979527312172,  
-0.41771661057992626,  
-0.5255960701407614,  
0.9200835209290303,

0.5840294212204432,  
0.4309612994747514,  
0.010788324288593443,  
0.8398650983618882,  
0.35555521736822654,  
0.33383672576306345,  
-0.03972798241435421,  
-0.5808926346218187,  
-0.6217506829607715,  
-0.022449055124049946,  
-0.4671428723737863,  
1.3840583406465645,  
3.321823997583478,  
1.9516123562000514,  
2.109430068020724,  
0.17138900458361278,  
1.0734765554988877,  
1.1591682463434823,  
-1.5085197494005436,  
0.3709514368460093,  
-0.08354812013321816,  
-0.6849414455501801,  
-1.1807064172516142,  
0.1889544406654655,  
0.45125852432694835,  
0.40946867023093825,  
0.9591749175330944,  
0.862406962512403,  
-0.47565451021668054,  
0.14791469386649075,  
0.012323642821740255,  
-0.3613715829994197,  
-0.6520104899254531,  
1.1500641632479522,  
0.11480411675389499,  
0.37929728325133344,  
-0.12818017639377846,  
1.5548403554359806,  
-0.08803696907532751,  
0.16058007713541472,  
-0.2835300528775952,  
1.4317946638041426,  
0.04218231832431045,  
0.6164913379423986,  
-0.5546192578057587,  
-0.0016176435191898148,  
0.3455446109244303,  
-0.7983090776945799,  
0.06548494602750325,  
0.09601011255154575,  
-1.274882751616874,  
-0.6639296860891427,  
0.08468574728059233,  
0.09178155492125434,  
-1.9746588496307496,  
1.363083624655819,  
-0.11754172722968637,  
-1.7454296260872237,  
0.689437867548643,  
0.09536601432398076,  
2.1875690275532618,  
1.9737367040865754,  
0.19623670188051764,  
1.3618525198389628,  
-1.6551377680800423,  
-1.2796187335858575,  
-0.02979150349567955,  
0.3655877448114123,  
-1.339933806945279,  
-1.6131280858420662,  
1.1268021774842836,  
0.7853899025443938,  
-1.214954346638235,  
1.881374469676006,  
-2.2108375055617597,





8.635680633753974,  
9.108807770997622,  
9.108807770997622,  
9.108807770997622,  
9.960036411132767,  
10.436643041587223,  
10.716533289695375,  
0.5466515694267952,  
3.318518267704871,  
0.40678728382369284,  
0.6290091030083763,  
-0.4770983795300032,  
-0.7455483390932742,  
0.1630064768968011,  
0.4889724943271746,  
0.10596004146863507,  
-1.4759536729524354,  
0.957604974713893,  
0.6004514101153323,  
0.0725728265044025,  
1.4994700617905987,  
0.15508641282397265,  
-0.15494303336158094,  
-0.5663845144966579,  
2.6663065398173496,  
-0.27086336898318036,  
-1.1828784814640632,  
-0.295045685212881,  
0.6236994649007899,  
1.1769360493970402,  
1.7159795997719172,  
-0.3019600780315931,  
0.651545330446025,  
-2.0782382222089724,  
0.3186344830290561,  
-0.2815476257680432,  
0.4067635126151388,  
-0.8228051832090519,  
-0.4154478828430832,  
2.3723163321732827,  
0.931436930203099,  
0.9804374423714106,  
0.058895326584719035,  
0.3167253661454302,  
0.3390503539155689,  
-0.5024758650485814,  
-0.2425872659725522,  
-0.6703364135359525,  
-0.147558399690948,  
1.1644296968010859,  
0.5475507579506065,  
0.1736068872874216,  
0.30547527216138975,  
0.5300773267023443,  
0.7722201656261689,  
-0.6858549484151734,  
-0.16073113081558088,  
-1.197458252004488,  
-0.507307082981415,  
-0.16437738354723153,  
0.2647407403580543,  
-0.45930133674563567,  
-0.22673992276266391,  
1.8127715449849986,  
-1.4334128748253496,  
-0.759404859696163,  
1.2431110601081345,  
0.8953271645792334,  
0.6963251389999259,  
-0.23147129445607595,  
0.3638861144885483,  
2.2394622330281906,  
1.543816783446588,  
1.7535830084845025,  
-0.3169637330795974,

```

0.2453194636587019,
2.0076391670843647,
0.286017506499548,
0.6600449842625801,
0.19782118041633945,
0.05463577684798935,
0.4755005320975566,
0.055207215781380096,
0.06969685609102444,
0.2645328829673777,
-0.01235845210357445,
1.01982876424508,
2.262492417600915,
1.3443784687440867,
0.10698144982242018,
0.428081928456963,
-1.5494921893757727,
1.0701294130786736,
0.39987519173641656,
0.06301738855484718,
-1.6711192593807125,
0.26920159401030147,
-0.08358711295948693,
0.4054786916979446,
-0.5013194648307361,
2.126550690771933,
0.10959959792145137,
0.4205360694942305,
-0.586878230803869,
-0.3381608637889511,
-0.5055401953468239,
-0.45995744817477163,
0.07999668782445096,
-0.4269018063306222,
0.9588276598807326,
1.042187521522261,
0.07821502449201799,
0.6777167152964713,
0.4177387822172794,
-0.18721284346239236,
-0.8064458441104513,
2.8712851588196218,
0.7141862154478698,
-0.9976723444987857,
-0.8529435737233043,
1.9602636639541733,
1.2634521849205176,
-0.7170870121313951,
0.31227949023655405,
-1.0451293221946831,
-0.6787852158143914,
1.8581833428208436]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,

```



3.385550316280557,  
3.385550316280557,  
3.385550316280557,  
4.494062371253785,  
4.494062371253785,  
5.0204758683966135,  
5.023404188660082,  
7.05704094573064,  
7.087391629397132,  
7.533802135057517,  
8.245970909352765,  
8.390887842007308,  
8.390887842007308,  
8.703391612007538,  
8.703391612007538,  
9.485545381639698,  
9.485545381639698,  
9.849437794456351,  
9.849437794456351,  
10.799155842585746,  
-0.12708089143278917,  
1.4168148977025445,  
-0.13519536748631492,  
-0.32308714516775877,  
0.06981336221044306,  
-0.034321895006426455,  
-0.18209443759399158,  
-0.024858958594746107,  
0.664488174834645,  
0.6897317665852637,  
-0.008774731192519907,  
0.625642551337688,  
0.6862410821653743,  
-0.7670419540542446,  
-0.48055390132433673,  
1.573964677292243,  
-1.0555745677813198,  
1.3159721165631335,  
-0.9138502497993347,  
-0.4641566084568084,  
-0.06966564000847691,  
0.039012746519005555,  
1.0827641697579717,  
1.2190093772283843,  
1.5391150382377632,  
-0.6675581491933664,  
0.09104662559232415,  
0.5283818781579022,  
0.04478118244404365,  
1.5836075485651113,  
0.251932560991488,  
-0.3949560381811925,  
0.8854639388207172,  
-0.8611267164776638,  
1.566928747241295,  
-0.15445151319573347,  
-0.01396050433941564,  
0.8172620115356718,  
-0.014658132241289147,  
-0.6623010385304499,  
0.6299284572753584,  
-0.15026947869759505,  
-1.2293112897827836,  
-0.5768656731979434,  
1.231557922062332,  
-1.447872926116422,  
1.4918722706131171,  
0.31945486783385635,  
0.43870804207253483,  
1.3582636256308331,  
-0.8478398442626237,  
0.799518029891469,  
0.5539369896048497,  
0.13453197415145846,  
0.7167498104862234,

```
-0.06589109804263343,  
0.041038724923082276,  
1.151975756926885,  
-0.052026838729968425,  
0.3952978000808587,  
-1.1754748970457833,  
-0.01965607042871015,  
-0.2456324144680547,  
-0.01136184217607491,  
0.022503168314325715,  
1.1777923723104653,  
0.14554117253938412,  
-1.2287946167385297,  
-0.9683737383161766,  
1.073329622962756,  
-0.7143583802799215,  
-0.3545002682598469,  
-0.31906110571926777,  
-0.9597094503848127,  
0.8825903987559673,  
-0.08273415521500459,  
0.2895039435279609,  
-0.3388594197258312,  
0.2406459434933063,  
0.3824128671502841,  
-0.5390555829405563,  
0.3757684495816124,  
-0.5015719636333678,  
0.3958257688275076,  
-0.6428354095046468,  
-0.9178624992467067,  
0.29327306512581747,  
-0.09193285724698198,  
0.1770091195095364,  
0.6803523512851801,  
1.05525770275555,  
-0.4646437845139076,  
2.2560908642344026,  
-0.7500939262299234,  
1.92959092052175,  
-0.36895777993274226,  
-0.04538283416771957,  
1.2529586558275392,  
-0.57805717638909,  
0.3080585810325818,  
0.031910210614104206,  
0.18519950010488512,  
1.3888566879174211,  
1.087260914864616,  
0.15259355623633358,  
-0.08810167996863522,  
0.07467874103808375,  
1.4444893382870363,  
-1.446220680213735,  
0.8215180856176293,  
2.0151723649306295,  
0.13454991965456886,  
0.21923381008732426,  
0.31112145477192793,  
-0.8977876743954992,  
0.10239876571985529,  
-1.0132922278363503,  
-0.3794863035801566,  
0.8437803973608401,  
1.111671691788496}},  
'noise_profile': { 'noise_on_init_param': { 'status': False,  
                                              'value': 0},  
                    'noise_prob': [0.001, 0.001, 0, 0],  
                    'status': True,  
                    'type': 'depolarizing'}},  
'nqubits': 7,  
'observable': { 'coefficients': { 'bn': [ 1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,
```

```

1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#2'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.514930884689279],
[12, 6, 0, 0, -5.310706408751285],
[20, 10, 0, 0, -4.328532484009807]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.647804260253906e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -7.200312079356969,
'others': { 'beta_coeffieicients': [ 1.875,
-1.25,
0.375],
'cost_richardson_zne': 5.21875,
'sorted_expectation_vals': [
-6.514930884689279,
-5.310706408751285,
-4.328532484009807],
'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
2,
0,
0,
-6.514930884689279],
[ 12,
6,
0,
0,
-5.310706408751285],
[ 20,
10,
0,
0,
-4.328532484009807]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],

```

```
        'r': 0},
        'time': {'max': 10.0, 'min': 0.0},
        'type': 'ising'}},
'init_param': { 'value': [ 0.48023040681030116,
                             0.7029544315470944,
                             0.722671987246733,
                             0.9307929858945541,
                             0.9307929858945543,
                             2.546598088688794,
                             2.546598088688794,
                             2.546598088688794,
                             2.546598088688794,
                             2.546598088688794,
                             5.184334435330857,
                             5.195111458618343,
                             5.47436411399969,
                             5.47436411399969,
                             5.47436411399969,
                             5.47436411399969,
                             5.47436411399969,
                             5.47436411399969,
                             6.068336244524409,
                             6.068336244524409,
                             7.838605251840715,
                             7.912250316107233,
                             7.912250316107233,
                             8.562517202814183,
                             9.063385768597811,
                             9.216218862905647,
                             9.216218862905647,
                             10.84047371877396,
                             10.84047371877396,
                             11.044358714867027,
                             11.375406566932424,
                             11.375406566932424,
                             0.18886549713610382,
                             0.6040291443391601,
                             -0.9727809979878402,
                             3.008209947509642,
                             0.3239743149147096,
                             -0.643987619924633,
                             1.0739882269552894,
                             0.4935103262912805,
                             -1.1713673989643745,
                             0.32339055167680386,
                             -0.8254170399860232,
                             3.387204293956005,
                             0.5437302598099015,
                             -0.6585961721148387,
                             1.0903163929414719,
                             -1.5261906384818182,
                             1.102349928722959,
                             -0.7373436929054379,
                             0.1712635196093208,
                             1.2086697581514199,
                             -0.4977298668106944,
                             -0.8828019932256734,
                             -0.13051782426094366,
                             0.048744185631251574,
                             -1.0535030780910155,
                             0.5224555306604155,
                             -0.9502111367985572,
                             -0.2573420205933925,
                             1.5833039752620888,
                             1.3806480812363842,
                             0.3864833677006273,
                             -0.0006284730712113316,
                             0.6487740408134013,
                             1.697829570896293,
                             -0.20023867528920775,
                             -0.32438662287273723,
                             1.3674639807988553,
                             -1.5592347723565667,
                             -0.6294582959326964,
                             1.111157394071659,
                             1.4895912958038178,
                             -0.7203901402661329,
```

-0.027076706863032294,  
0.009574786781832467,  
1.1437695218822916,  
0.11720143179507149,  
1.0973549625545624,  
-1.0756168303605034,  
-1.5785125289756954,  
-0.42999007233668873,  
0.7592603373612552,  
0.7357293999316703,  
0.03766014972468404,  
1.450035910180884,  
-0.08978031589044846,  
0.7176267391661779,  
-2.3377280976646966,  
0.3878354316208249,  
-0.8070070584177742,  
0.07084117333557359,  
-0.008998168433091903,  
0.6612796195456235,  
0.6287929626789847,  
0.8601333603228948,  
-0.7786354708155643,  
-0.144476679155352,  
0.39492950957300044,  
-0.20012968159779548,  
0.01326107241550192,  
-0.5649340596325207,  
-0.020398755490040426,  
0.6333499066300691,  
0.400844220606507,  
0.5954749034740784,  
0.8700413681534388,  
1.315868035063538,  
0.9914334712755634,  
0.10418309057983809,  
1.1095991500751576,  
-0.1712743534684691,  
-0.2730581386141925,  
0.1453142903679217,  
-0.3813955795194703,  
0.1280814941289577,  
-0.5627986213807415,  
-1.0576722394029623,  
-1.98721560251358,  
0.519862592148374,  
1.03695228961559,  
0.21101375663462807,  
-1.750252459751414,  
-1.1450993785481438,  
-2.2517541986316916,  
-1.5456964825715331,  
0.6026638989139771,  
0.47561448130168205,  
0.08201672609434518,  
0.47464262797792917,  
-0.14585857152212733,  
0.08636040211648545,  
0.7388192170680543,  
1.071366965639021,  
2.5115163876343742,  
-0.4286872636197954,  
-0.2977998181526895,  
0.46569070003689333,  
0.2115019986130443,  
-0.5123638542481742,  
0.09024611293676764,  
-0.3380729423866059,  
1.6314769884628497,  
1.3338027138849353,  
-0.7442166070564612,  
1.2186722356710948,  
1.584709484399307,  
-0.6554175978902271,  
0.36887213174672207,



```

-1.365021965092438,
-0.4623126041921459,
0.4869420326570461]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.75124151968758],
                          [12, 6, 0, 0, -5.5757781087309555],
                          [20, 10, 0, 0, -4.6095181057209125]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.9577484130859375e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -7.417424503145861,
                           'others': { 'beta_coeffieicients': [ 1.875,
                                                                -1.25,
                                                                0.375],
                                       'cost_richardson_zne': 5.21875,
                                       'sorted_expectation_vals': [
-6.75124151968758,
-5.5757781087309555,
-4.6095181057209125],

'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -6.75124151968758],
                  [ 12,
                    6,
                    0,
                    0,
                    -5.5757781087309555],
                  [ 20,
                    10,
                    0,
                    0,
                    -4.6095181057209125]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,

```

```
'ugate': { 'coefficients': { 'bn': [ 0,
                                     0,
                                     0,
                                     0,
                                     0,
                                     0,
                                     0],
                                'cn': [ 0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5],
                                'r': 0},
            'time': {'max': 10.0, 'min': 0.0},
            'type': 'ising'}},
'init_param': { 'value': [ 0.5118290521669792,
                           0.9034573591840084,
                           1.0514460879099101,
                           1.1283814725964603,
                           1.1293980629167455,
                           1.6874068541059999,
                           1.8362001710030256,
                           2.594529848453243,
                           2.5949023258749775,
                           4.384420392533986,
                           4.804388533064279,
                           4.8044974726668155,
                           4.925049921883437,
                           4.925049921883437,
                           6.055903002618935,
                           6.0650337145794,
                           6.06510024924717,
                           6.06510024924717,
                           7.719643893437192,
                           7.719643893437192,
                           8.110116534451196,
                           8.374448879129652,
                           8.374448879129652,
                           9.29045698473019,
                           9.2929923765699,
                           9.977025927736127,
                           9.977025927736127,
                           9.977438303479875,
                           11.277250876863835,
                           11.588901828478656,
                           -0.5970483257864091,
                           1.048395642841534,
                           0.3563299433581316,
                           2.04182497417867,
                           -1.0659189653240388,
                           -1.5711224255679066,
                           -0.6854026923334804,
                           1.3002799990574343,
                           0.334979527312172,
                           -0.41771661057992626,
                           -0.5255960701407614,
                           0.9200835209290303,
                           0.5840294212204432,
                           0.4309612994747514,
                           0.010788324288593443,
                           0.8398650983618882,
                           0.35555521736822654,
                           0.33383672576306345,
                           -0.03972798241435421,
                           -0.5808926346218187,
                           -0.6217506829607715,
                           -0.022449055124049946,
                           -0.4671428723737863,
                           1.3840583406465645,
                           3.321823997583478,
                           1.9516123562000514,
                           2.109430068020724,
                           0.17138900458361278,
                           1.0734765554988877,
```

1.1591682463434823,  
-1.5085197494005436,  
0.3709514368460093,  
-0.08354812013321816,  
-0.6849414455501801,  
-1.1807064172516142,  
0.1889544406654655,  
0.45125852432694835,  
0.40946867023093825,  
0.9591749175330944,  
0.862406962512403,  
-0.47565451021668054,  
0.14791469386649075,  
0.012323642821740255,  
-0.3613715829994197,  
-0.6520104899254531,  
1.1500641632479522,  
0.11480411675389499,  
0.37929728325133344,  
-0.12818017639377846,  
1.5548403554359806,  
-0.08803696907532751,  
0.16058007713541472,  
-0.2835300528775952,  
1.4317946638041426,  
0.04218231832431045,  
0.6164913379423986,  
-0.5546192578057587,  
-0.0016176435191898148,  
0.3455446109244303,  
-0.7983090776945799,  
0.06548494602750325,  
0.09601011255154575,  
-1.274882751616874,  
-0.6639296860891427,  
0.08468574728059233,  
0.09178155492125434,  
-1.9746588496307496,  
1.363083624655819,  
-0.11754172722968637,  
-1.7454296260872237,  
0.689437867548643,  
0.09536601432398076,  
2.1875690275532618,  
1.9737367040865754,  
0.19623670188051764,  
1.3618525198389628,  
-1.6551377680800423,  
-1.2796187335858575,  
-0.02979150349567955,  
0.3655877448114123,  
-1.339933806945279,  
-1.6131280858420662,  
1.1268021774842836,  
0.7853899025443938,  
-1.214954346638235,  
1.881374469676006,  
-2.2108375055617597,  
0.38299461206746305,  
-0.062378913993248956,  
-1.0812916442950207,  
0.19113842494911862,  
0.43947065709017896,  
1.4340329690981122,  
-2.1914706359927933,  
1.683520172253517,  
-0.4151753501170658,  
0.2652280013518245,  
-0.09829123134965576,  
-0.4033858255054015,  
-0.09488290407421365,  
1.1087820722198931,  
1.3758250784849964,  
0.3693308876448478,  
-1.4774754586810708,

```

0.45790576106810227,
-1.318961759734687,
1.2898775251023542,
0.5291693857421421,
-0.7225860054677886,
-0.6024865845145562,
1.1258609582335735,
1.4545810101615688,
0.4988359655120556,
0.39968483637691726,
1.4778005154845164,
1.6358502222921723,
0.07081811420225437,
1.5336807499569445,
-0.7595143926860392,
0.07947795439670366}],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noiseefree_time_evo_ric3_unifrom_scaling_sample#10'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.406033238196167],
                          [12, 6, 0, 0, -5.14768368077025],
                          [20, 10, 0, 0, -4.13060369641699]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 5.459785461425781e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -7.12568410681137,
                           'others': { 'beta_coefiecients': [ 1.875,
                                                                -1.25,
                                                                0.375],
                                         'cost_richardson_zne': 5.21875,
                                         'sorted_expectation_vals': [
-6.406033238196167,
-5.14768368077025,
-4.13060369641699],
'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -6.406033238196167],

```

```

[ 12,
  6,
  0,
  0,
  -5.14768368077025],
[ 20,
  10,
  0,
  0,
  -4.13060369641699]],
'sampling': 'default']]],
{ 'config': { 'ansatz': { 'gateset': 1,
  'layer': 30,
  'ugate': { 'coefficients': { 'bn': [ 0,
    0,
    0,
    0,
    0,
    0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 0},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'ising'}},
  'init_param': { 'value': [ -4.1290471568429383e-17,
    0.028387941050870547,
    0.028387941050870516,
    0.028387941050870544,
    0.4764187545019148,
    0.485154879376271,
    0.7094706976105217,
    2.998376901501724,
    3.486264965503922,
    3.487775573446841,
    4.058897205630428,
    5.020552086463093,
    5.02158492362958,
    5.02158492362958,
    5.0846878698400815,
    5.0846878698400815,
    6.794704827143902,
    6.794704827143902,
    6.794704827143902,
    8.013356083289752,
    8.21076169573117,
    8.21076169573117,
    8.633075344303478,
    8.633075344303478,
    8.930018414781724,
    8.930018414781724,
    8.930018414781724,
    9.990329186240457,
    9.990329186240457,
    12.915390927357043,
    0.8289215528981712,
    0.6465354442587259,
    -0.06922368073773534,
    -2.0853926237797484,
    0.25605409461249207,
    -0.765586831155604,
    0.9589723041272441,
    0.27455658215646966,
    -0.07189982532198122,
    -0.3449139525561357,
    -0.46800027418386986,
    1.016480689947782,
    -0.9706976058410632,
    -0.9556868223128826,
    0.9323574793538898,
    -0.4376613900889883,

```

0.44138701419965265,  
1.4418520162063444,  
0.8420619129497768,  
-0.025530845682239494,  
-2.3076344184440156,  
0.37458463155346333,  
-0.47031338116346383,  
0.07338001085955462,  
-0.869249007732584,  
1.6824786550253577,  
1.719346297136726,  
-0.9622509832303179,  
0.5779076253870294,  
0.4760527439731688,  
-0.2451715046346434,  
1.5906513054768954,  
0.35918458386075697,  
-0.44817294000256097,  
-0.37416377940751877,  
0.37048554789855764,  
0.693137718643464,  
2.288219219235325,  
-0.26501198620577204,  
0.3689053264668303,  
0.10166782579927121,  
-0.3356073800920907,  
-0.6413954053758932,  
0.28636656044125136,  
-0.8690978212322298,  
1.166030172665772,  
-0.46365263204645707,  
-0.8505396438729699,  
2.4328989003329693,  
-1.4554443951257197,  
2.09134311034601,  
1.7695145471360614,  
1.1170184462314887,  
0.20325573406500014,  
0.34206355374635444,  
0.016804831103183593,  
-0.19882507083844791,  
1.4011478969931443,  
-0.0572616468882171,  
-1.3773340344964602,  
1.1031086912886459,  
0.47433623341773395,  
-0.037679845343088075,  
0.7450954028512253,  
1.3114871459373192,  
-0.18651966717154955,  
1.0750199871192778,  
0.48905379729033566,  
-0.6281827821606347,  
1.322074656325554,  
-1.4761484868509396,  
0.2859918816514792,  
-1.0033541595176405,  
0.8264053813863532,  
0.622010811103528,  
1.1636747207646185,  
-0.31883271288389914,  
-0.0013981850979601159,  
-0.09999405171802342,  
1.3085280853238759,  
-1.3727969089464465,  
-0.08341159264840771,  
1.6249369276484606,  
-0.28082331570516694,  
1.863294400254821,  
2.2932652495309953,  
1.4849536675442596,  
0.6811668802751195,  
1.5380110980874968,  
-0.6615225065895972,  
0.4000828281024264,

```

0.33932121588009856,
0.48855764825038867,
2.5371111232777053,
-0.7260430040504564,
0.09005940379987407,
-0.8762980817992282,
-0.23800314057977784,
0.9728027685352436,
-0.20857834368009137,
0.6148333457084475,
-1.5171898336040224,
0.8658542069129427,
-1.6478287868490311,
0.5770049367106069,
0.134497700004433,
-0.11612046371881249,
1.5826352840237945,
1.6045820840261675,
-0.08805669980595342,
-1.507745125921201,
-0.11276651576435986,
0.07206005105970639,
-1.7788122679933258,
-0.002988765738482436,
0.7255804452314191,
2.7661804504965604,
-3.1943627011957507,
-0.07088434770936546,
0.10949711075632612}},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1}},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#1'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.833109640228284],
                          [12, 6, 0, 0, -5.610198560557999],
                          [20, 10, 0, 0, -4.609901567200479]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.62396240234375e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -7.528045462430714,
                           'others': { 'beta_coefficients': [ 1.875,

```

-6.833109640228284,  
-5.610198560557999,  
-4.609901567200479],

-1.25,  
0.375],  
'cost\_richardson\_zne': 5.21875,  
'sorted\_expectation\_vals': [

'sorted\_noise': [6, 18, 30]],  
'sampled data': [ [ 4,  
2,  
0,  
0,  
-6.833109640228284],  
[ 12,  
6,  
0,  
0,  
-5.610198560557999],  
[ 20,  
10,  
0,  
0,  
-4.609901567200479]],  
'sampling': 'default']},  
{ 'config': { 'ansatz': { 'gateset': 1,  
'layer': 30,  
'ugate': { 'coefficients': { 'bn': [ 0,  
0,  
0,  
0,  
0,  
0],  
'cn': [ 0.5,  
0.5,  
0.5,  
0.5,  
0.5,  
0.5],  
'r': 0},  
'time': {'max': 10.0, 'min': 0.0},  
'type': 'ising'}},  
'init\_param': { 'value': [ 0.4319322451408806,  
0.4441934852523559,  
0.5878315575931067,  
0.5878315575931067,  
0.5912427958750637,  
0.5947187380620651,  
0.5947187380620652,  
1.5628074958209335,  
1.568718083448373,  
2.013035808837258,  
2.013035808837258,  
2.013035808837258,  
2.0277481086167364,  
4.114573484042011,  
4.1154343976538055,  
5.358852938788934,  
5.358852938788934,  
5.549639110185835,  
5.667644288942511,  
5.6706149635077026,  
7.063797010237488,  
7.658675772413245,  
8.123010743902626,  
8.633070512181217,  
8.7849794748515,  
8.7849794748515,  
10.749769122252356,  
10.89899813672382,  
11.413879450074099,  
11.413879450074099,  
-0.04151001581527148,  
-2.751209241920508,  
-0.5056705094410174,



-0.406548832581749,  
0.8633340895103881,  
0.17259893989954428,  
-0.21235924407313156,  
-0.5485334561985523,  
0.2012951527025238,  
-0.23858034563229433,  
2.1364176057207223,  
0.7817014982866842,  
-0.1108899918027214,  
0.6048531661014985,  
1.809261328558185,  
-1.1786415575821785,  
-1.0827170099436865,  
0.4109384498547832,  
0.8090945308822337,  
-0.9356585252219308,  
0.28697429006677655,  
-0.15332459566133277,  
1.2998079093160566,  
0.3870967504567973,  
-0.2413465423953762,  
1.001771196320206,  
0.1138394509020578,  
1.3220786271535379,  
-1.1806565063083097,  
2.2789659185869464,  
0.11875741943281123,  
-0.15631084464392242,  
-2.14680662310284,  
0.18035127914430246,  
-0.260880073181003,  
0.21031876899961,  
0.7641152777599183,  
1.203568210035907,  
1.2767673297334832,  
1.2585129786889195,  
0.24752046596725819,  
0.7203551788145919,  
-0.17420447991641552,  
-1.3486030918499698,  
0.2145369555808404,  
0.8896874485404291,  
-1.6470089821954121,  
-0.37928143051952584,  
-0.29903232984244293,  
0.6984471945997809,  
0.14906235834494008,  
0.054873949093549826,  
1.3877615433857144,  
0.04193983551007985,  
1.2014028569521673,  
-0.02338341588216991,  
-0.05255422822816251,  
-0.1905875093002492,  
0.16425167437144692,  
0.2542835721118732,  
1.1822299841866795,  
1.2032222480152739,  
0.30142488752060526,  
0.09125464470109583,  
-0.45638140154025475,  
0.050260497156630585,  
-0.04000614529085093,  
0.9096133936431033,  
-0.03555378439095736,  
0.4405325841695877,  
-0.48129885373423525,  
-0.3617221403442356,  
-2.5216506086368518,  
-0.5081934521569421,  
0.041332600726076626,  
0.7413771443671474,  
0.2204029987501584,  
-0.7517920276590782,

```

-0.21022249714251526,
1.5607830526955413,
0.16615947769508344,
-0.17023919527139658,
-0.4295619963603494,
-1.1838803442651602,
0.6319564057885301,
-0.3935277768061919,
0.005550337258741166,
-0.4226065324972882,
-0.3715846249960284,
-0.48395498614671884,
-0.4790957128536121,
1.4427293239187895,
0.5875094653073935,
1.404722056846091,
0.6973465258635152,
0.8623508528879442,
-0.5460563718875903,
0.8326491581513842,
-2.4015389244466907,
-0.04583861440999851,
-0.36265388938085896,
-0.5347868312224912,
0.49674658852292397,
-0.6488379607428911,
1.1568053403721041,
0.30662269781395407,
-2.013151608263867,
-0.17383275003878457,
0.5036662539248705,
1.9638910157847163,
3.118155075975211,
0.8117246453310248,
-1.4517859264576565,
-1.4946803709676548,
-2.7792982516572895,
1.1174424252005506,
2.333430423546859,
0.6903927508165344,
-0.2883899927957993,
-0.8542826896862586]},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#7'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',

```

-6.662379321078876,  
-5.394498644176583,  
-4.374551061230002],

-6.662379321078876,  
-5.394498644176583,  
-4.374551061230002],

7.097750404951498,  
7.618222769006738,  
7.956666567531361,  
7.956666567531361,  
8.961109688308255,  
8.961109688308255,  
11.028500695271937,  
11.5809418583784,  
11.5809418583784,  
11.5809418583784,  
0.24114173221382337,  
1.3754512844042854,  
0.9720111739434927,  
-0.29877116871955545,  
-0.029737313498699618,  
0.3185153459444675,  
-0.31840745367437817,  
0.6801602139502809,  
-0.015407845998522466,  
-1.114484654283524,  
0.22997676136047449,  
1.5201821520192487,  
0.3217486942799661,  
0.43678760134757944,  
0.17618749246228715,  
0.7010359103792874,  
0.3446701255696699,  
1.4700166379981474,  
0.3471333265905846,  
-0.968444017764766,  
-1.1485269521507444,  
0.3282504398407059,  
-0.7898554413193151,  
-0.22157985789400653,  
0.4570931682042821,  
-0.22158635023930806,  
-0.36549836384277606,  
-0.2366283880333898,  
0.4114765778384287,  
-0.7694643480660831,  
-0.40507000819737765,  
-0.6576468499882752,  
0.2023600853039859,  
-1.2917280200640486,  
0.32702771491506877,  
-0.07546137553843744,  
-0.7713328193108817,  
-0.8163562225239717,  
-0.07772489804090182,  
-0.32841576637855896,  
-0.05728139293162625,  
0.8564947637293437,  
0.15384434981345546,  
0.41944080031994563,  
0.16884394015055976,  
-0.010490661309829376,  
-1.3198249528292274,  
0.07128101806419536,  
0.03515395872296211,  
-0.09826644736389979,  
-0.06882299183557238,  
-0.7062443088386591,  
-0.5280915567870916,  
0.14860690208212682,  
0.338235073517239,  
0.012130023587481156,  
-0.037483081002571056,  
0.8881056862099682,  
0.06312673968269537,  
-0.44738898868242327,  
-0.2463284936792685,  
1.1708672891281489,  
0.5297819270424092,  
-0.5463182826640249,  
-1.667403353493104,

```

1.3713545814180228,
0.9413366263710182,
-0.021951472934173096,
1.0345046397029698,
-0.8002739446090432,
1.076242700462428,
0.04994674089563993,
-1.446235170371471,
-0.3268246709561185,
0.6264234635598642,
-1.2465048991503196,
0.1169092097763034,
1.2453937722962254,
0.7220287063888942,
0.8114212311039525,
0.18333674920471413,
0.7345776889004225,
0.9807678368065545,
0.8703572591074042,
0.28720991162605214,
-0.9085817320602367,
1.1216621938695932,
1.1327477502874412,
-1.8285395156530388,
1.4231155243966302,
0.08156271721069372,
0.18027327076782884,
-0.10302960773112253,
-0.5560482514096969,
-0.09484541903718098,
0.5886430341587933,
-1.1674014904638685,
-0.03940950630369794,
0.2792515765657198,
0.08214125135098017,
0.04344924016389119,
-0.7787970529711157,
0.07887586110139429,
0.7532574519080738,
0.17107625040009872,
-0.4128415687827808,
1.3723943620028143,
1.4278581324344195,
0.5879977529754344,
0.28910810409117477,
-1.4412046993697643,
1.624844367134446,
0.19366683662945536,
0.3179841250458877,
0.5357240606734743,
1.5680682524509713,
0.04418323830986127,
0.2311137213204739,
2.8741283660232546,
0.9612408402592636}},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},

```

```

        'def': 'ising'},
    'output': { 'draw': { 'fig_dpi': 100,
        'status': False,
        'type': 'png'},
        'file_name_prefix':

'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#5'},
        'redundant': { 'identity_factors': [ [0, 0, 0, 0],
            [1, 1, 0, 0],
            [2, 2, 0, 0]]},

    'run': 'zne',
    'state': 'dmatrix',
    'vqe': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
            'constraint': True,
            'status': False}},
    'zne': { 'data_points': [ [4, 2, 0, 0, -6.720969040841222],
        [12, 6, 0, 0, -5.577003279994282],
        [20, 10, 0, 0, -4.626982768162376]],

        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
    'output': { 'exact_sol': -8.566772233505624,
        'run_time_sec': 5.435943603515625e-05,
        'zne_values': { 'degree': 0,
            'extrapolated_value': -7.365681389645329,
            'others': { 'beta_coefficients': [ 1.875,
                -1.25,
                0.375],
            'cost_richardson_zne': 5.21875,
            'sorted_expectation_vals': [

-6.720969040841222,
-5.577003279994282,
-4.626982768162376],

                'sorted_noise': [6, 18, 30]}},
            'sampled data': [ [ 4,
                2,
                0,
                0,
                -6.720969040841222],
                [ 12,
                6,
                0,
                0,
                -5.577003279994282],
                [ 20,
                10,
                0,
                0,
                -4.626982768162376]],
            'sampling': 'default'}}},
    { 'config': { 'ansatz': { 'gateset': 1,
        'layer': 30,
        'ugate': { 'coefficients': { 'bn': [ 0,
            0,
            0,
            0,
            0,
            0,
            0],
            'cn': [ 0.5,
                0.5,
                0.5,
                0.5,
                0.5,
                0.5],
            'r': 0},
        'time': {'max': 10.0, 'min': 0.0},
        'type': 'ising'}},
        'init_param': { 'value': [ 0.3463233138801294,
            0.34632331388012944,
            0.3463233138801294,
            0.3463233138801293,
            1.2403205490491955,
            1.38033446895038,
            3.6939218351946623,

```

3.6939218351946623,  
3.693921835194662,  
3.693921835194662,  
3.9412089126587,  
3.9412089126587,  
3.9412089126587007,  
3.9412089126587007,  
4.8310999601027795,  
4.870844593548848,  
4.900228671797898,  
4.9002286717978984,  
4.9002286717978984,  
4.9002286717978984,  
4.900228671797898,  
5.70167657474683,  
6.21188441483336,  
6.21188441483336,  
6.686419232103557,  
6.723504371727371,  
7.618130890836856,  
7.618130890836856,  
9.420364260644014,  
9.420364260644014,  
10.77513222422771,  
-0.3525750090684208,  
1.2748976558430758,  
-0.16146998454247521,  
1.3224575871686013,  
0.0349265192498484,  
0.36138711032415904,  
-0.5043488106619078,  
0.7634801084306476,  
-0.3536814593617201,  
0.9606809354246906,  
-1.1143894720984433,  
-0.45289061390722213,  
-0.1605333784989486,  
-1.594210268458609,  
-0.09465166736510336,  
0.11132251138190599,  
1.004235666711761,  
-0.23115493220428254,  
0.9451761882751959,  
-0.3707284170975133,  
-0.17782948231634454,  
-0.18433417990028922,  
-0.06421460341189031,  
-1.155489001827845,  
-0.2074908306187579,  
-0.036360325422879626,  
0.5283181819327893,  
0.3603171208434518,  
0.6819349944270952,  
-0.2733083993242672,  
0.7075879191324372,  
-0.042779623335368125,  
0.7032435595714176,  
-0.7363942983542189,  
0.9583235184546098,  
-0.5892472427173001,  
-0.7139877518112785,  
-0.12446625268371646,  
-0.439646171766664,  
0.7129808957109575,  
0.3373075268097138,  
0.3345550414369601,  
-0.38068761370203624,  
0.07864964370676188,  
-0.3383553862900091,  
0.6633419895127639,  
-0.578720703894673,  
0.486162302530746,  
-0.06112668401522289,  
0.34417654454775265,  
-0.09182266750822224,  
0.012215000731405658,

```

0.5658291917160285,
-0.16728488191683846,
0.3754616489195623,
-0.30497315054621493,
-0.7559846133933803,
0.9474959005813702,
-0.5904076686561035,
-0.2620011537974264,
0.1328515248519479,
-0.44066408562446224,
-0.7849425610737308,
0.44059474279745625,
-0.04646983134951628,
0.27897770882356554,
0.36838349877106535,
1.1610009997739648,
0.9058411506824863,
0.3119955912029684,
-0.5265683545543336,
1.0661822357546584,
0.8560044406571757,
0.5004409227892788,
0.5192086876555008,
-0.0019665558968806392,
-0.23949800878404184,
0.32563956832297103,
0.795323960796817,
1.5213873243487468,
0.8637563634588281,
0.07945031145196896,
1.7583315097859118,
0.5335864884320034,
-0.1366270407456156,
-0.9111102828185913,
-0.41650979281126865,
0.20926691692934202,
0.2776061293997892,
1.4257231544028384,
-0.10754544247245298,
1.0035199546983695,
1.1162390986419686,
1.7211522778091677,
-1.4332245925979028,
1.4417595659646931,
-2.106784537892007,
-0.6878309432904478,
-0.20360639354575213,
0.6373705186717347,
0.051333236332203484,
-0.35868991955772395,
-0.24365907607080922,
1.619736185871098,
0.5895182658245096,
-0.6086170057348131,
0.39774539931448055,
1.409837948786624,
0.17438880158294706,
-0.0415548590378924,
0.1413623732119859,
-0.8192475896231625,
0.5823982141653503,
-0.8462302367353051,
-0.60454163385331,
1.8216629921858374,
1.2634551976945552,
-0.40200420270308274,
-1.5954759495917508,
-1.7732438129518737}},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,

```



```

1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#3'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.1514222647937595],
[12, 6, 0, 0, -4.906882414400225],
[20, 10, 0, 0, -3.911546483229528]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 4.076957702636719e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -6.8671436596990905,
'others': { 'beta_coefficients': [ 1.875,
-1.25,
0.375],
'cost_richardson_zne': 5.21875,
'sorted_expectation_vals': [
-6.1514222647937595,
-4.906882414400225,
-3.911546483229528],
'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
2,
0,
0,
-6.1514222647937595],
[ 12,
6,
0,
0,
-4.906882414400225],
[ 20,
10,
0,
0,
-3.911546483229528]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],

```

```
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.4349098035102067,
0.5281397824211302,
0.6402833431740305,
0.701719039924861,
0.8953768954552646,
1.4118719346144908,
2.230113621742168,
2.6548053250922607,
3.10433397641996,
3.1043339764199596,
4.146783795497047,
4.146783795497047,
4.149760661232294,
4.149760661232294,
4.223539194779984,
4.223539194779984,
6.7727886487081435,
6.7727886487081435,
7.243551717080481,
7.282491880183138,
7.282491880183137,
7.282491880183138,
8.806989173945695,
8.80698917394569,
9.706285648296737,
9.809777023075187,
9.837118725166619,
10.701586770517197,
11.185931122995514,
11.185931122995514,
0.39919688039300266,
1.4533249104921768,
0.7852252158845567,
-0.4957764525834907,
-0.3354719566017423,
0.16097458435951068,
-0.21971891747261646,
1.5370438656668401,
0.26531517225969137,
-0.6386119707402834,
0.37748437574064975,
1.2333814560270282,
0.5934062959304571,
1.633059089666515,
0.31170790405459564,
0.3995146629536743,
-0.11155094016301184,
0.8138063699882787,
0.019467271717771087,
-0.38186317682975884,
-2.778803401027002,
0.7887082829537533,
-3.1348050840084074,
-1.5109224736536222,
-0.38589710406642097,
-1.105927053527023,
0.3451707237315739,
0.6290043291617069,
-1.834722402137916,
-1.0551446159380258,
-1.3581260193610523,
0.9666180881078981,
-0.05759676522292653,
1.1866392284178628,
-1.1308471740259582,
0.34327443183487805,
0.17662613760194443,
-0.043135596735193626,
-0.03667546733606037,
```

-0.4901895513664937,  
-1.0399227541005371,  
0.4880459765792483,  
0.053089003166299456,  
-0.6259966396796703,  
0.03159579372412852,  
-0.09798805529491862,  
0.052872660107769434,  
1.490194875693949,  
0.22167423812356596,  
-0.33497064714209324,  
1.0144679614160885,  
0.01608415027143934,  
0.49167899744128424,  
0.12491439548600353,  
-0.1329609067962543,  
0.8639852596635488,  
-1.6607871811173882,  
0.2801513494447602,  
0.3908501333463579,  
0.6044891435983025,  
0.08637544621327581,  
1.2270127042754213,  
0.11860545946003472,  
-0.13066468162372125,  
-0.998222267933649,  
-1.2643438207146234,  
0.7835210648968657,  
0.8370312354478452,  
0.06527740704106412,  
-1.0235950282739155,  
-0.705070781232052,  
0.037682760290170314,  
1.4778132318704873,  
1.7053977225841355,  
-0.1291331271719845,  
0.1648924115529835,  
2.208642048449397,  
1.1885953055185114,  
-0.8138037079028133,  
0.6715189891287302,  
0.7819572861394978,  
-0.4022064636590845,  
-0.3927127310055937,  
-0.4118784323717791,  
1.3463239978578432,  
-0.3323606385924751,  
0.6664683657180488,  
1.58852177854836,  
-1.212203169826861,  
-0.031436536468697034,  
0.5094262403458202,  
-0.0616688967239856,  
-0.0666169691754888,  
-0.7277012125404719,  
-0.12684196683036533,  
0.5325519345188151,  
2.2778420441533447,  
0.8735933622003313,  
0.9907279467768721,  
1.1448787224294625,  
0.4291077507842401,  
-0.21356701746617238,  
1.7174041100732933,  
0.1885112766205208,  
0.3630143936992631,  
0.6395640633025061,  
-0.2937369198596852,  
-0.18128670495631546,  
0.9504587478277511,  
-0.6241293783488098,  
1.8733903679237267,  
0.4875344831143031,  
-0.9182747577406853,  
0.850791268752179,

```

-0.46183623376516114,
-0.634145646812118,
-0.9165900492445601,
-0.8973746003077631,
-0.879107286657044,
0.15645801311276636]},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.672780190342767],
                          [12, 6, 0, 0, -5.522238922989663],
                          [20, 10, 0, 0, -4.5712287338679385]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.719329833984375e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -7.322874978356086,
                           'others': { 'beta_coeffieicients': [ 1.875,
                                                                -1.25,
                                                                0.375],
                                       'cost_richardson_zne': 5.21875,
                                       'sorted_expectation_vals': [
-6.672780190342767,
-5.522238922989663,
-4.5712287338679385],

'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -6.672780190342767],
                  [ 12,
                    6,
                    0,
                    0,
                    -5.522238922989663],
                  [ 20,
                    10,
                    0,
                    0,
                    -4.5712287338679385]],

```

```

        'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'ising'}}},
  'init_param': { 'value': [ 0.23818326834520384,
                              0.242015507589488,
                              0.5292100600091615,
                              0.5598196968290768,
                              0.5598196968290768,
                              2.3451854381830244,
                              2.3451854381830244,
                              3.8453025861748578,
                              3.8453025861748578,
                              4.395137112369032,
                              4.408833101975425,
                              4.829585475162733,
                              4.867115107997544,
                              5.058958687371625,
                              5.058958687371625,
                              5.058958687371625,
                              5.581243202757385,
                              6.011433944644334,
                              6.011433944644334,
                              8.358003932454157,
                              8.358003932454157,
                              8.358003932454157,
                              8.371420896509267,
                              8.783744346022278,
                              8.783744346022278,
                              9.34189587380724,
                              9.34189587380724,
                              9.39608576624051,
                              9.726727464435275,
                              10.95102910414735,
                              0.14721560345391302,
                              1.0205767628001141,
                              0.40564926087548847,
                              -1.9238321605823567,
                              -0.04729505851188324,
                              0.482541600628026,
                              0.1152155677775581,
                              0.8524320040134185,
                              0.42380767990264745,
                              -0.6219665889019169,
                              -0.05759638705357143,
                              0.8161328242190486,
                              0.7425402472775383,
                              0.7535392998290764,
                              1.8314745216576223,
                              1.3334023135030668,
                              0.05552193989453376,
                              0.9691374289368472,
                              -0.07338372949421543,
                              -0.6690664310785921,
                              1.168533104165511,
                              -0.01962836639606316,
                              0.6576122461884292,
                              -0.037637936325233226,
                              -0.0009647519828692927,
                              0.4524839512418326,

```

-0.013115244288784337,  
1.6270372625341938,  
1.182284078721198,  
0.9533845712158122,  
1.0956662941001023,  
-0.9647918240366662,  
0.1897778948773928,  
-0.04047520420354409,  
0.5790278460715794,  
0.631719469583885,  
-0.3335418357294817,  
1.0603186443819097,  
-0.7449471003423949,  
0.1630231005006795,  
-0.07563007210422526,  
-1.1009042311153838,  
-0.34587951137957407,  
-0.22408475871037167,  
-0.6364303490666092,  
-0.5245531829065874,  
-0.7807390048523051,  
-0.7767575864285188,  
-0.9679768325508518,  
-1.8691843526791756,  
0.4783530568164554,  
0.6133546874260105,  
-0.20020986269221935,  
-0.41532071148562183,  
-0.8557118152516873,  
-0.16985308585729458,  
0.8428338023785568,  
0.6750667051632169,  
1.2795031602880573,  
-0.41384224674171627,  
0.3213362409234008,  
1.2340309605381181,  
1.0506369357289735,  
-0.6415500741723684,  
-0.9628453188140567,  
1.935214357876566,  
1.4159154638103797,  
-2.0864443113151867,  
-0.07426020994129089,  
-1.0538315394110076,  
0.2589745455351295,  
-0.2955978932252484,  
-0.030644528099012087,  
-0.8602288471584197,  
-0.09490606960216369,  
0.4190622694749842,  
-1.5667390101922392,  
-0.7804920738383083,  
0.1255849265457167,  
0.5884338319364165,  
-0.46028089859616994,  
0.2488277677353687,  
-0.7513271615815256,  
-1.0561258734551267,  
0.3697237180501531,  
-0.7108432439071602,  
0.5137418203820399,  
0.946767478727941,  
1.619957961978311,  
1.2944079622561346,  
0.21625880379379211,  
0.007168703139473973,  
-0.334764182643075,  
-0.9086121674985949,  
-0.8247776105092918,  
-0.5734460393428641,  
-0.4381826298821608,  
-0.44306191141826123,  
-0.23860269421390362,  
-0.03343496826073402,  
-0.008972211649351379,

```

1.2196121588758198,
1.5985131140815898,
0.060325450296581484,
-0.7312434635304047,
0.9413542695101463,
-0.6701271691421761,
-1.0680925542186157,
-0.5192506372311365,
1.5594784335685845,
0.17928043514789443,
0.2455246384495121,
-0.053106843359071614,
0.7488220810664211,
1.3030207698426615,
-1.787387332504871,
-1.1184519607509558,
-0.2511275398302805,
1.445676213762956,
1.5991220174606833}},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1}},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric3_unifrom_scaling_sample#4'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.630764461698827],
                          [12, 6, 0, 0, -5.461578440310042],
                          [20, 10, 0, 0, -4.498507346043123]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 7.033348083496094e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -7.292650570063918,
                           'others': { 'beta_coeffieicients': [ 1.875,
                                                                -1.25,
                                                                0.375],
                           'cost_richardson_zne': 5.21875,
                           'sorted_expectation_vals': [
-6.630764461698827,
-5.461578440310042,
-4.498507346043123],
'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
                    2,
```

```

0,
0,
-6.630764461698827],
[ 12,
6,
0,
0,
-5.461578440310042],
[ 20,
10,
0,
0,
-4.498507346043123]],
'sampling': 'default']]],
'ising-ric4-uniform-scaling': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': {'value': 'random'},
'noise_profile': { 'noise_on_init_param': { 'status':
'value': 0},
'noise_prob': [ 0.001,
0.001,
0.001,
0.001],
'status': False,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': True,
'type': 'png'},
'file_name_prefix': 'ising_noise_off'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0]]},
'run': 'vqe',
'state': 'dmatrix',
'vqe': { 'iteration': 10,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': True}},
'zne': { 'data_points': None,
'degree': 1,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '

```



```

'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + '
'1 Z 0 + 1 X '
'1 X 2 + 1 Z '
'1 + 1 X 2 X '
'3 + 1 Z 2 + '
'1 X 3 X 4 + '
'1 Z 3 + 1 X '
'4 X 5 + 1 Z '
'4 + 1 X 5 X '
'6 + 1 Z 5 + '
'1 Z 6']],
'output': { 'exact_sol': -8.56677223350563,
'initial_cost_history': [ 3.7901552515724086,
3.396779462430669,
3.6416626483897634,
5.191980344851134,
3.300383519902229,
4.2302694452267025,
5.5832854157035126,
3.424340408479732,
4.575860085354091,
3.843028199719871],
'noise_details': { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [0, 0, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,
0.001,
0.001],
'status': False,
'type':
'depolarizing'},
'odd_wires': 4},
'optimized_minimum_cost': [ -7.3566708947935595,
-7.585318923493526,
-7.222021821934782,
-7.637732542535524,
-6.9717347656162385,
-7.183899566070664,
-7.312238847468353,
-7.55546648538883,
-6.871387778407254,
-7.103750879845002],
'optimized_parameters': [ [ -8.981486547411966e-18,
0.2355269100006643,
0.6734351680867104,
0.7281872519006076,
0.8287057436356319,
0.9968962697957876,
0.9968962697957877,
0.9968962697957875,
0.9968962697957875,
1.6732799868313266,
1.9939389913716405,
1.9939389913716405,
1.9939389913716405,
2.7786795690350794,
2.7786795690350794,
4.834741825646661,
4.843194997300159,
5.442664851556481,
6.006041306704694,
6.006041306704694,
6.42159854018659,
6.42159854018659,
7.172079495244572,
7.835006027334925,
7.835006027334925,
```

7.835006027334926,  
9.27390458565848,  
10.142272229921797,  
10.547148172870333,  
11.945646083493756,  
0.30631338507375855,  
0.950240081652421,  
0.3197394260348401,  
-0.8989315334324052,  
-0.19972246213391193,  
1.1515465399564957,  
0.5794269610995502,  
0.029234461946744308,  
-0.3033609133811924,  
-0.5068802243159589,  
0.41891242044729254,  
1.2272962791271989,  
0.3217023759538914,  
-0.0389595358377685,  
-0.2818159573379153,  
0.40344301100056285,  
0.012601476380185236,  
-0.7249227034698249,  
-0.28859136632269766,  
0.9177183017829931,  
0.3192674751581855,  
-0.6960323093564068,  
0.9954617266198262,  
-0.0960673339612117,  
0.30357952531427623,  
0.9148253966896076,  
-0.41157308092318357,  
-0.2244725515886058,  
0.900815469140735,  
-0.8704821270800919,  
-0.2201886465573435,  
-0.058451834208670006,  
-0.5564504264806815,  
1.0028418241392123,  
0.6862825176439941,  
-0.07515432929364027,  
-0.132716959754057,  
0.3156193912732197,  
-0.5571752224261073,  
-1.1266280252389607,  
-0.2496012410462972,  
0.4568813812573679,  
0.5040642955504137,  
-0.27382094178370653,  
0.738802930675346,  
-2.1017467172452315,  
1.7134969759675782,  
0.19045289169065632,  
0.4959480509883087,  
0.2725041426894662,  
-0.020113534287112555,  
-0.27730132318570966,  
0.9121222342974794,  
0.7771919661145833,  
1.2410984938270941,  
0.698373852916785,  
0.049079898076347495,  
0.4715079446630061,  
-0.0012225173391828686,  
1.2380103358912495,  
0.18126256323161893,  
0.02822806167971892,  
0.9624172506978782,  
-0.1017646649934255,  
0.10712069411267353,  
0.11059700546555196,  
0.1764728469149672,  
1.0536625920020957,  
-0.43614672067179516,  
1.1290800077402758,

-0.7544321351970764,  
0.20178203991689547,  
0.545960403958859,  
-1.271331788368515,  
0.3827893670869708,  
0.514944994226915,  
0.9987612988518954,  
0.9130737051848579,  
-0.33354580533033523,  
0.4110572637290035,  
-1.0065548546569214,  
0.05504586363332423,  
-0.8123464439408392,  
0.9622209015425294,  
-1.7981345279534349,  
0.8489846299822246,  
1.9191971402543575,  
-2.019266402915899,  
-1.6151954323496909,  
1.693158829823371,  
0.8368996699819713,  
-0.7925788637806501,  
-1.416264150106769,  
-0.7484853165625206,  
-1.026066230288144,  
0.2591646216069995,  
0.9485984853376032,  
1.624644962520762,  
0.1389264160191751,  
1.7901079295930897,  
0.28173803525757823,  
-0.06727915670909099,  
-0.39998196135024877,  
-0.911581975644718,  
-0.8802717995009537,  
-0.6496644186002655,  
0.9474433579476823,  
0.5810351318438188,  
-0.5928504020318089,  
0.40429180463166087,  
0.19955746243713188,  
0.14940534343654552,  
1.148493268597809,  
-0.6171972430901704,  
2.358530954611547,  
1.6132804954395525,  
1.5230819806307347,  
0.07100911239249047,  
-0.9821849785093056,  
-1.2186503325370892],  
[ 0.43242608326371745,  
0.47036005705701023,  
0.6035896599876003,  
0.6406575109863006,  
1.589410377648682,  
1.589410377648682,  
1.589410377648682,  
1.9902163938334159,  
1.9902163938334156,  
2.6096176446013035,  
2.6096176446013035,  
3.039961339509649,  
3.039961339509649,  
3.0408788822093955,  
3.0408788822093955,  
4.1325863285768,  
4.1325863285768,  
4.801738885893826,  
5.558430388585627,  
5.558430388585628,  
6.48703427557745,  
6.599293033589678,  
7.119130597501129,  
7.119130597501129,  
8.096879981584715,

8.096879981584715,  
11.989689272176165,  
12.289334556064002,  
12.289334556064002,  
12.695171119049377,  
-2.1320303145314323,  
1.164574641976517,  
0.2281426394568994,  
0.5098216286601104,  
-0.15959745874570574,  
-0.06246168319786304,  
-1.335183444898994,  
1.1253611654826523,  
-2.453373641849758,  
1.542670605477509,  
-0.23459513075014657,  
0.7629240608803527,  
0.7066862387679962,  
0.023354672976759586,  
-0.26545157517882206,  
0.8070755399487665,  
0.621829996842247,  
-0.8206657495436546,  
-0.6456938685697818,  
-0.8432536462697657,  
1.5481421634749726,  
0.030458967225015475,  
-0.6362611752642527,  
-0.5779049484598997,  
0.15136987691256515,  
0.37940285865801,  
-0.13025289482332936,  
-0.6088352960517447,  
1.0137338691570092,  
0.9312563664781934,  
-0.06260332826127091,  
0.16422266217724538,  
-0.44919022316429513,  
0.7120810093352475,  
-0.045811140982536094,  
1.4693096124875311,  
1.3068674578470139,  
0.3099696428239748,  
0.05726716998373588,  
1.4138231816748696,  
1.3251150202531472,  
2.4661338582136705,  
-1.9221360663147242,  
1.6309773912120944,  
1.012572768899168,  
1.1304323717308846,  
-0.10014704960087417,  
1.2138621646932324,  
0.9150507542177275,  
-0.1931179153053463,  
-0.19983886142442753,  
-0.37113288193216537,  
1.0783926703777422,  
0.7626802083907843,  
-0.5396621733108105,  
-1.0558614970998554,  
-0.5031372556139323,  
-0.1733591918410679,  
-0.05810492443974475,  
0.15252588011535415,  
-1.3613790038949474,  
0.14268023162896296,  
2.1247307661901087,  
-0.2996908036461345,  
0.2682896527620792,  
-0.6487468384363545,  
0.0174900962257196,  
0.7865320417875226,  
-0.4365770411878935,  
0.12280152026315115,

0.2668485276831852,  
1.0055493052017264,  
-0.13783144983938653,  
0.16428177903351826,  
-0.4107244428852575,  
-0.5006989958309392,  
0.4728442136126457,  
-0.5756228808846314,  
-0.2555605201147205,  
-0.6655897533222209,  
0.27354627255859315,  
1.056546145946755,  
-1.0108463744632321,  
0.8570822622523233,  
1.1003650202540056,  
-0.13364446072464353,  
0.19686136380997882,  
-2.015333107317771,  
-0.3474605408709381,  
0.5127772990877489,  
0.8873132714146144,  
-0.1538651896386833,  
-0.49691154598038334,  
2.4337764506921564,  
0.11687121421819974,  
0.2637773919076603,  
1.1119719051108947,  
-1.1407171454187541,  
0.293218856784229,  
0.9089141681578352,  
1.0587297353590328,  
0.41354403585027527,  
0.26331197174432663,  
0.04763876798960274,  
2.8376965303594455,  
0.038400591301352385,  
0.732378529151854,  
1.259237861002353,  
-0.09371603030550141,  
-2.6524545055620123,  
0.166545686266708,  
0.8383948517861464,  
0.5625425863873136,  
0.6352389159281269,  
-0.3793199251622615,  
1.4353166704457385,  
-0.06088962240819872,  
0.5575840323453971,  
-0.4370866693930651,  
-1.3477496560670819],  
[ 0.5485274765250757,  
0.6924497584354614,  
0.77926902254116,  
1.4968846113254817,  
1.4968846113254817,  
1.617988193716464,  
1.617988193716464,  
2.3157329555892914,  
2.3157329555892914,  
2.3157329555892914,  
2.6599448622122046,  
2.6599448622122046,  
3.198693955827293,  
3.198693955827293,  
4.93646112072991,  
5.0183990860356085,  
5.166530398168251,  
5.732062846348599,  
6.452081956191476,  
6.950653712152026,  
6.950653712152026,  
7.527182443059662,  
8.141470761550243,  
8.141470761550243,  
8.23161566953153,

8.23161566953153,  
8.263835107953264,  
9.693553204732913,  
9.696078071259171,  
10.987802073160276,  
0.31236348113638823,  
-1.370738548013981,  
-0.19640846640845944,  
-1.409184053738275,  
-0.00366718677866519,  
0.6361615892126344,  
-0.6796219270984741,  
-1.7803162192131878,  
-1.2406782697025376,  
-0.17521451360574944,  
-0.2890470362486656,  
-0.7870591534070972,  
0.6214527622340972,  
-0.5055171901576345,  
0.3099897895999387,  
0.6495941239175653,  
0.4137491249725721,  
0.292781258130194,  
-0.18467758047440086,  
-0.2764099099100952,  
-0.12795113266111025,  
0.14328500307003156,  
0.1623766240720685,  
0.09884205682735484,  
0.07093196196575538,  
0.17766773916349385,  
0.1810420204025737,  
-0.037056767883675096,  
-0.38325428434024456,  
-1.808138895166064,  
-1.2174086587283277,  
0.2723541238647832,  
0.0911451526301191,  
0.829454165789877,  
-0.7076888645983359,  
-1.1582847892183987,  
-0.2789235155040628,  
-0.1868914176693055,  
-0.03618003850886602,  
1.0797789643516258,  
0.010710633626313776,  
0.3041103423483441,  
0.027606917069623423,  
0.09715752300035431,  
-0.025081467189021912,  
0.7307804473426243,  
-0.028312324696826655,  
-0.5439567135695698,  
1.0353579775860826,  
0.03274794094556986,  
0.338229999884877,  
0.003923288912346083,  
0.011059712392702849,  
-0.24419721784886275,  
0.0538500196620971,  
-0.29704802197132957,  
-0.9714959737951582,  
-1.3776571886055275,  
-0.4387141762272093,  
-0.9013896619503009,  
-0.2890811474761574,  
-0.5664350037938545,  
-1.265940570830118,  
-0.36500389888052437,  
-0.11634811830012508,  
-1.0092353619257808,  
-0.6849489189933503,  
0.9856942680495377,  
0.8277230147066852,  
0.2903619348614201,

-0.3836733140597432,  
-0.530059482018533,  
0.8169168177018395,  
0.5323656053240163,  
0.649672850550592,  
-0.3032256260984974,  
-0.8829469814645045,  
-0.00635052379210004,  
0.35535568318583244,  
-0.06185634463022188,  
0.10533559478429602,  
1.2902435643868964,  
0.8825397316379378,  
0.3070411861797082,  
-0.07934132673084492,  
0.09844318572655962,  
0.7695889603351249,  
0.14399374014816757,  
1.8827194490661865,  
0.013305728022345127,  
1.2201617371808122,  
0.13458781619262966,  
-0.42760236848753097,  
1.3132997483594182,  
0.29586095969137777,  
0.14782133458354627,  
1.1539512755729704,  
0.8255769419022573,  
2.1284509830181357,  
1.5067425074661367,  
1.2286171121451426,  
0.8625402575232176,  
0.5254367589291086,  
0.8683165111711829,  
0.35804094605055825,  
-1.3678290318224675,  
-0.3952095755717416,  
2.8373763512718595,  
-1.2381307915304474,  
0.21836664096244152,  
-1.0373469190584237,  
0.35616351546904684,  
-0.48865262743063154,  
0.5395297676370602,  
-0.0068350558769426075,  
-1.6240423184716037,  
-1.005087252746991,  
-0.324331708942255,  
1.56936745287968,  
1.3955283874562228],  
[ 0.3026146462879133,  
0.3869510743764029,  
0.3869510743764029,  
0.5382374643481795,  
0.7459322218289088,  
0.7459322218289088,  
0.8083924716224152,  
0.8083924716224152,  
3.219627607910341,  
3.2253302931763046,  
3.9244184219369176,  
4.114742178023509,  
4.115220647252454,  
4.115220647252454,  
4.115220647252454,  
4.65196408394345,  
5.196968879903224,  
5.736027504566688,  
5.736027504566688,  
6.321573696596394,  
6.7009287553652,  
6.7009287553652,  
6.7009287553652,  
8.383675014305652,  
8.383675014305652,

8.383675014305652,  
8.383675014305652,  
9.235844817182018,  
9.235844817182018,  
12.415877726713473,  
1.4636821166030158,  
0.8436356038076634,  
-0.6467230542935267,  
0.2472607630354758,  
0.028721536942984512,  
0.5720112007049558,  
-0.179388461505878,  
0.6605644899444229,  
-0.2997484495809327,  
-0.5848737649454969,  
0.7567373384637915,  
-0.3113371232415861,  
1.5925608798994126,  
0.15551153490893768,  
1.144256524486279,  
-1.0086304067563407,  
0.4692085043130235,  
-0.5289416707772752,  
0.6895537558918402,  
-0.9023920029674053,  
0.6687255575647186,  
1.3626463195064957,  
0.18435277462186048,  
0.04101567185284027,  
1.2334404589145347,  
-0.8099334611041354,  
0.47217953762833137,  
-0.19021445340255347,  
-0.47126223762254077,  
0.21535783789089086,  
-0.13160146544027274,  
-0.14745399432080403,  
-0.2131109368071074,  
0.6116235033000932,  
0.7187755412423116,  
-0.7690585507561546,  
0.333613273647484,  
0.29688326543860977,  
0.022443242058892903,  
-0.12904022561026712,  
1.1137507228270036,  
-0.1754869613868649,  
0.6791619259450926,  
0.2688019369707634,  
-0.33561997076117317,  
-0.4910450017308718,  
-0.2921449581476723,  
0.07017675650466139,  
-0.5628878746231101,  
0.23633646017547374,  
-0.4408658192483561,  
0.6337746650828207,  
-0.5275874765915898,  
-0.11397090424872018,  
0.7713694979315344,  
-0.24077591679338844,  
0.7998056369050096,  
0.5449521212196076,  
0.6440774810386566,  
0.0012540722532346088,  
0.4406697804838639,  
-0.4697708168210915,  
-0.38183296272166767,  
0.4926783027265995,  
0.012102728676941394,  
0.9995268367701109,  
-0.489600116502774,  
-0.9378926015671718,  
0.7538025600192173,  
-0.9270581698564858,



0.23395173940139535,  
-1.5047568644302813,  
-0.6335501933328295,  
-0.1851947866597326,  
-0.18416301345971506,  
-0.15010118329037675,  
-0.30085163208099847,  
-0.030658108221894752,  
0.48141025496380413,  
1.2807653372993688,  
-0.27688172784497056,  
-0.9404124429777033,  
0.07772158149530461,  
1.2206520244647234,  
0.07167829739929571,  
1.5514296753518346,  
-0.22739832257997444,  
-0.5457307695824859,  
-0.05085143495318925,  
1.4086504148457157,  
-0.02595768387677813,  
1.2057536466860386,  
-0.5009834455732999,  
1.0234750156328314,  
-0.34572346527257924,  
1.4975050133157242,  
0.6424858734227697,  
-0.5412025600486546,  
-0.965195784498948,  
0.8078930733387817,  
-0.8747920106317195,  
1.6444412493640082,  
-1.3120143788008718,  
0.7469227938848356,  
0.7428309989793587,  
0.25043937013438866,  
-0.7176977899841391,  
1.6961228018637329,  
0.8286720852002186,  
-0.08923208660690117,  
-0.4564959840968765,  
-0.10389957398275913,  
-0.04652285532782134,  
0.6308845069083873,  
-0.025008046054888575,  
-1.0109619026173717,  
0.31698532529812806,  
-0.07816069204265776,  
2.517427548138029,  
1.300984357739734],  
[ 0.48696254731677435,  
0.9433356258260287,  
1.8515151481415904,  
3.298386332934612,  
3.298386332934612,  
3.298386332934612,  
3.298386332934612,  
3.298386332934612,  
3.374346159341203,  
3.374346159341203,  
5.043620376468771,  
5.043620376468771,  
5.218159502227583,  
5.683079438253876,  
5.683079438253876,  
5.902572186502105,  
5.902572186502105,  
5.902572186502105,  
6.17408053545979,  
6.17408053545979,  
6.17408053545979,  
6.17408053545979,  
8.600010985810668,  
8.600010985810668,  
9.424738936566825,

9.424738936566825,  
9.43568443936613,  
10.707654072137746,  
10.707654072137748,  
11.243950101093004,  
0.30560526927017156,  
-0.6023681078531374,  
-0.5052271452160477,  
-1.0944465846035194,  
0.24881605409968105,  
1.5229622975948298,  
1.730509331816328,  
-1.3834281548913137,  
-0.8373914729231547,  
-1.186133470726964,  
-0.983750614650609,  
1.3432121337567746,  
1.6569377678026054,  
0.14131844528439758,  
2.9464329846729154,  
1.3448953312948555,  
0.7896925151532842,  
-0.22765810177877452,  
-1.6238177025568765,  
1.1679097532601286,  
1.5429785141845107,  
0.44641536771583223,  
-0.4990561654458825,  
0.2890079097559007,  
0.07664205286689205,  
1.0463374337388847,  
1.0582154531020835,  
-0.7032713068941808,  
-0.5914102053027229,  
0.4481794192989112,  
-0.597054072340342,  
0.6503285491619032,  
-1.3548677382206493,  
0.3073247134537545,  
-0.42900928099090013,  
0.8290869769130189,  
0.25661934620723303,  
-0.41883276922189405,  
-0.25409113110415216,  
-0.2750324278847333,  
1.8535327289298686,  
0.7375047938415388,  
0.21982546706442144,  
0.3355829615333414,  
-0.18885187042138774,  
-0.09263125664317409,  
0.8768150768205386,  
-0.31105067773622297,  
0.11882768143806702,  
0.007542537022557154,  
0.6689687664434811,  
0.7431113887615772,  
0.9447406593038509,  
1.0052341467989638,  
1.4439497926806117,  
0.4202121214316228,  
0.3604666875525164,  
-1.6888556500060994,  
0.1396130584965534,  
0.10094819946612499,  
0.5021137054548022,  
0.3961649599525077,  
0.4932381662816783,  
1.3418440833635417,  
0.09854079710503719,  
-0.9989986964474209,  
1.2672439763832217,  
-0.07601477770236317,  
0.46767000685442095,  
0.3227070865546575,

-0.7175096141500144,  
0.2758047915288214,  
-0.24095833900456404,  
0.058134638501602325,  
0.6051082814423787,  
0.5442716652871094,  
0.3025208071236723,  
-0.6679934596266708,  
0.8499265434495678,  
0.1803663678751026,  
-0.3707988225819567,  
0.6812577092957876,  
1.2284831501706344,  
0.20883808756632122,  
0.03358446867125293,  
0.026609877934757803,  
-0.40919242519291843,  
-0.07640273708110212,  
-1.1643751408115468,  
-0.16769301556045021,  
-1.2911947285322207,  
0.037223344859154565,  
-0.05786091979914895,  
-1.8047938425602224,  
0.014158596153457605,  
0.534864509903787,  
0.006329420481561668,  
1.239578876475735,  
0.2639865904342132,  
1.2160651224901187,  
-0.2035728984920286,  
0.6511657116444571,  
0.3064364057804899,  
2.45196454382623,  
0.8340823063941794,  
1.113505687918428,  
0.049528306503774544,  
0.12947314602533921,  
-0.5399313265794791,  
-1.2647403981540062,  
-0.3482737106911781,  
0.09697429466359891,  
2.20804968215061,  
-0.15489516431237316,  
0.1250815357650574,  
-0.13157603031624435,  
-1.2324441762654297,  
-0.4179909399666764,  
0.3779753490492196,  
1.6472121643813018],  
[ -1.1990978117137884e-16,  
0.0939706539344674,  
0.583570497583306,  
0.583570497583306,  
1.7474308983833136,  
1.7474308983833136,  
2.435631059267761,  
2.4356310592677604,  
2.435631059267761,  
2.4356310592677612,  
2.9757043839921162,  
2.975704383992116,  
4.1141402268542535,  
4.1141402268542535,  
4.889622687428616,  
5.085553065152385,  
5.14502423979873,  
6.38608549233117,  
6.405094454380333,  
6.807050165246778,  
6.807050165246778,  
6.997225211250308,  
7.82493752524197,  
8.419597935808826,  
8.419597935808826,

8.756502393683652,  
9.514795580339912,  
10.006329694888725,  
10.008671195739254,  
10.582332645019955,  
-0.18325409339400697,  
-1.8356335907661927,  
-0.6014425812689169,  
1.272854521157504,  
0.38561099010389943,  
-1.3354103698578268,  
1.2089446007576305,  
-0.16684037696101606,  
1.5272415494549387,  
-0.21803857489548387,  
0.659293576456549,  
-0.7629850988015884,  
-2.0880787600158244,  
-0.2200967935369742,  
-0.21257917133409554,  
0.05335328813343252,  
0.740881120097457,  
0.002552459203101907,  
2.0381278489789163,  
0.07009602349011958,  
-0.027486349535234322,  
-0.5162309983105858,  
-0.018107734929441965,  
0.3459554204227654,  
1.1337361200247116,  
0.6158218713410994,  
-0.5251391279578093,  
0.2758552924607382,  
1.227089028823027,  
-0.16405595633516176,  
0.7587337472599636,  
-1.1046949665522132,  
0.7157795020690486,  
-0.9666557350608269,  
0.5941166908158014,  
-0.3035426485157296,  
-1.1713314559961463,  
-0.3285214016177699,  
0.15201600725182188,  
1.158582769628082,  
-0.2335509332665805,  
0.021624313631101504,  
-0.7981749327134954,  
0.12400359670343174,  
-0.00041124409742626503,  
0.10665347356443583,  
-0.030437347790731137,  
-0.22360998336164295,  
0.21313944649575595,  
0.08788738041696632,  
-1.2878790640853577,  
-0.028446563531964782,  
-0.12898316604526575,  
-0.29469285393680966,  
-0.07114900510733681,  
-0.8104482788171727,  
0.6394923422746198,  
0.6811407094584414,  
0.15127654478155184,  
0.5799864823630293,  
-0.55116978803857,  
-0.5805840448115108,  
0.9630930231089359,  
0.9222833564508055,  
-0.28733988453131243,  
2.645322235680672,  
0.02138581028992107,  
-0.12421624460779133,  
-1.4608772192659922,  
-1.289711141721096,

-1.433469567857053,  
-0.01041716118532159,  
0.3377052351749707,  
-1.74263853738129,  
-0.6445874089376945,  
0.6790378089998735,  
0.0019732068694448615,  
0.6260241949545162,  
-1.3812938119718974,  
0.06110738334511842,  
0.919936405723882,  
-2.761538990972181,  
0.01773377957551518,  
0.6041489324828,  
-0.281847147959406,  
0.36931104439326196,  
0.14008962906529285,  
1.0402771661903438,  
0.40062198057764514,  
-0.03775531840468896,  
-0.4974133017905023,  
0.5298490799692606,  
-1.7184458207495306,  
-0.7561470763062167,  
-0.5888363413103725,  
-0.9669502040570058,  
1.3911426640670486,  
-1.922807929753264,  
-0.7347523142785206,  
-0.6976214468215837,  
-0.9022103009000106,  
-0.17554401086360705,  
-0.7004215075729389,  
-1.1648825394224225,  
-1.1285064327861984,  
1.3794410327712907,  
0.7524041737227146,  
-0.600926776988818,  
0.724704963452131,  
0.24574404734520428,  
1.3856850730269805,  
0.505698953761027,  
-0.030535393994814766,  
-0.4836980977841504,  
0.6166564120021005,  
2.4235804988343936,  
0.6827837636480912,  
0.3673788389460804,  
0.11748797515103059,  
1.4924513209248702],  
[ 1.112287766890805e-16,  
0.11579095179987547,  
1.7588846075757274,  
1.7588846075757274,  
1.998030831219005,  
3.2454648629288743,  
3.248106797240174,  
3.248106797240174,  
4.259596531772135,  
4.958175754196259,  
5.7210454174100525,  
5.861260496697951,  
5.861260496697951,  
6.7588095170100075,  
6.7588095170100075,  
6.758809517010007,  
7.044198424034494,  
7.044198424034494,  
7.044198424034494,  
7.044198424034494,  
8.232813771743604,  
8.791432218349115,  
8.791432218349115,  
8.791432218349115,  
9.616347292478379,

9.616347292478379,  
9.869492613451865,  
9.869492613451865,  
10.182429226961672,  
13.25758469112181,  
0.5705572906646224,  
0.09014038635403764,  
0.1263845657016112,  
1.0203985977202104,  
-1.095649826264738,  
0.019398597884167954,  
-1.3544747652103108,  
0.8866931148929111,  
-0.18940184666069662,  
1.0130589658671383,  
0.15424354259331335,  
-0.8117851912876255,  
0.28413415623416743,  
1.542699745821886,  
1.836477396464815,  
0.7160099188075301,  
-0.9589348876176362,  
0.00854407549207699,  
0.36750908199249616,  
0.7288091138524155,  
0.9748756553152056,  
0.7257579234395075,  
-1.9128288506616224,  
0.515489770530508,  
-0.8485176532957428,  
0.21376115901922352,  
1.0834633235702664,  
0.404913552038143,  
-0.12863840971929708,  
0.8333794222571905,  
2.496813054711946,  
-0.7354302042700512,  
0.27199375272502646,  
-1.0107781002238316,  
-1.201703662816619,  
-0.3331724830549245,  
1.3030593505928814,  
-0.8138384777541797,  
1.9586180892259586,  
1.1713603302631173,  
1.0819642334098143,  
-1.1784039537689197,  
-0.12146178641002908,  
-0.1717950232658355,  
0.13833462928205204,  
-0.8697724612180706,  
0.7515471411202548,  
1.166125613326729,  
0.37941686042382794,  
0.17074885851048915,  
-0.33600856179263133,  
-0.13669943521352546,  
0.548834657399268,  
-0.2522233718783481,  
0.009665778262181637,  
-0.5020120590858954,  
0.16617168999240312,  
-0.46390045473242114,  
-0.05573261329441784,  
1.1182956755615927,  
0.0937037366596967,  
-0.4441962997721035,  
-0.21050297984767188,  
-1.0381458298882043,  
0.830180513233935,  
-0.8157309834659043,  
-0.5833742339287631,  
-1.5354704640903527,  
0.44493118131447734,  
0.13057382050598434,

-0.7034976447329113,  
0.6218444459919024,  
-0.2420386731361673,  
-0.7867967091164098,  
-0.168935029173583,  
-1.6928247400206122,  
0.22571922404505704,  
0.1126763335131705,  
-0.22160264498444046,  
2.299575126838168,  
2.5415010654218975,  
-0.5449604787415219,  
-1.005432959888493,  
-1.722931012111005,  
-0.6732620373630841,  
-0.0004890899721480893,  
1.492586488782192,  
-0.9055437852306896,  
1.1298576359465664,  
-0.5182549439372126,  
0.6586606791613716,  
0.7929632788713356,  
0.08462141435268096,  
0.5066414628201175,  
0.6503902510816232,  
0.06456835392989443,  
-1.687283870544211,  
-0.2816102525113523,  
0.9601910446201565,  
-1.0364808528540121,  
0.32603884641661884,  
-0.37671408634672476,  
-0.16068551007585027,  
0.6157148912247653,  
2.0105220675930333,  
1.7580796652062145,  
1.7229426093703843,  
-0.5199627188331776,  
-1.3760925920420213,  
0.8290526991464299,  
-0.08765267414283408,  
-0.456659399307068,  
1.4313668535261046,  
0.635052489001378,  
2.136142869643981,  
-1.5755126698917075,  
-0.40116032394931217,  
-0.004321541181387126,  
3.301925406547275,  
0.7673504276272846],  
[ 0.49826187507447023,  
0.6110785201427625,  
0.6558173388435118,  
1.2433731466916595,  
1.2468055416987345,  
1.9464512542038723,  
2.109950686395802,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
3.7879039161756585,  
5.054414830549875,  
5.106961698737131,  
5.488040579082762,  
5.488040579082762,  
6.832391146999917,  
6.967864562238176,  
6.967864562238176,  
7.490508971727458,  
8.20118277218113,  
8.612503180124596,  
9.093659709060372,  
9.807153774862888,

10.372385504551621,  
10.372385504551621,  
11.272736556325881,  
11.767303580595307,  
11.767303580595307,  
0.035679258194077725,  
-0.8723307875716305,  
-1.7560663493087938,  
1.9629136553479551,  
1.9120807210302333,  
-0.39357388790453784,  
0.036182026687196715,  
-0.21816401975370772,  
0.8090968256508778,  
0.22775227657680963,  
-0.9402388060640036,  
1.9199330583190146,  
-0.6293921442826633,  
-0.37521158500092616,  
-2.4122776248196542,  
0.47614923103710605,  
-0.2356719275662886,  
0.5930119757607211,  
-0.08067436637158562,  
-0.6975308853470512,  
-0.1533962892581602,  
0.6838091266999453,  
0.243129377869582,  
0.5896632240559074,  
0.12048284254834898,  
1.186903891075025,  
0.22948374273850122,  
-0.9592798973456383,  
1.431786126792839,  
1.099938502501145,  
-0.6421065764259075,  
-0.4570128400176702,  
-0.40361390122591434,  
-0.030699975686000303,  
0.5709596867047622,  
0.8129177753256275,  
0.0978347154858261,  
-0.1791413540365364,  
1.316347643480991,  
1.0669242344323897,  
0.9542637314281797,  
0.2732710750226029,  
-0.24925074976969727,  
0.14351675204102743,  
-2.058043419369877,  
-0.5772495977232713,  
0.4759355346590471,  
-0.3040209890415461,  
0.07360159687611288,  
0.11769956200453384,  
0.01709491725825118,  
1.1325236656251834,  
0.008658928128351846,  
-0.21852721169551936,  
-0.1826844911726131,  
0.39535377862993026,  
0.035729500082236576,  
-1.0747644579938396,  
-0.15992271631488378,  
0.8234408989300128,  
2.679077704708449,  
0.2559692131167249,  
1.5592174030452497,  
0.3453465662341248,  
-0.24046357809578378,  
-0.6876498012434461,  
-0.01750342347144341,  
0.34704200676536884,  
0.2033679229118891,  
-1.5920113668255755,



-0.5283783493172445,  
0.4351355192977228,  
-0.8281455342425702,  
0.2974457926897622,  
-1.336557258227178,  
0.2885982325597283,  
-1.2111847441179915,  
0.698629224522434,  
-1.072563817644129,  
-1.2092878769637225,  
-0.33153669598628793,  
-0.2558676939050336,  
-0.039300685015777354,  
0.5730206646846686,  
0.6772024906875076,  
-0.5431857921175166,  
-0.32242263836861185,  
-1.2435651530921474,  
0.6447338068594848,  
-1.1796614873773261,  
-0.5517178991847818,  
-0.9950127711245446,  
-0.750107619545704,  
1.546476758712725,  
0.7798072495873917,  
-1.3969546244577882,  
-1.3869625997614359,  
-0.5499269608373658,  
-2.0698482195340895,  
-0.31472418351029113,  
1.3858906356684872,  
-2.3234389152233144,  
0.8580050890595776,  
0.5574876161662472,  
0.12663545081840322,  
0.0024286165622580055,  
1.4351555562364873,  
-0.018100010671135307,  
-1.4466701603237728,  
1.0091335554802272,  
-0.25739419705547106,  
0.8584486110461004,  
-1.6353613496727522,  
1.3481381905015994,  
1.664215570319441,  
-1.4688501218242656,  
0.6630999772073086,  
-1.3598408860414706,  
-0.9086993193406631,  
-0.7720609621308895],  
[ 0.03916643192220903,  
0.09260151508853934,  
0.5125042140553085,  
0.5342494495137248,  
1.4070055183169814,  
1.4076098722130033,  
1.4080234932826805,  
1.9886432369288551,  
1.988643236970097,  
2.4501760969485846,  
2.4501760969572235,  
2.6141080657383133,  
2.614108094671839,  
2.6141080978874367,  
2.614108199851818,  
2.614108200075538,  
2.6141082008692407,  
4.121207830152765,  
4.126135109264967,  
4.126137501750553,  
4.129417665319773,  
4.731890053629371,  
4.734221022017094,  
4.783748744413943,  
6.888546551790504,

7.435120796142169,  
9.27338967383107,  
9.884598996480708,  
9.884598996488108,  
10.57466535326793,  
0.042050619766987055,  
1.2200437115279086,  
-0.1897539908832087,  
0.3883222993215419,  
-0.3953259161886337,  
0.9433481261689909,  
0.03976732857871137,  
0.380475950476648,  
-1.6480061036631655,  
0.19200671798130073,  
1.8964236385178486,  
0.5825466621902844,  
-0.7017933974726621,  
0.46167134168781887,  
1.3455780978346443,  
1.000341055668334,  
0.3220859397336833,  
0.4901021103591929,  
1.7507755726531005,  
0.22815940378303187,  
-0.27415827045663116,  
-0.06669089502017891,  
-1.2681856141960832,  
-1.4186851222947996,  
-0.7484212831710693,  
-0.2624358161393499,  
0.22137315279362701,  
0.8266616228870926,  
-0.28382763940078026,  
0.4526868734709094,  
-0.03876262869445461,  
0.028933904781200354,  
0.2124235174903725,  
0.5275601102845284,  
-0.035224229477880745,  
-0.11459385773709553,  
0.4537223625267385,  
1.3135706165796082,  
-0.4103066311241145,  
-0.06740865621875465,  
0.07865262902016133,  
-0.8220672300227196,  
0.05131914396597353,  
-0.012779296277522511,  
1.6650491211728184,  
-0.5271258879235212,  
-0.2286028431320702,  
0.9810985313826684,  
0.5796827949136435,  
-1.4216581678953852,  
0.908254540613963,  
0.7809397666182989,  
0.23060365236949015,  
-1.629683736567043,  
0.08687379015275534,  
0.5302421766128769,  
0.858319872120405,  
-1.2816124200556078,  
0.08255098737682609,  
0.49190330494839835,  
1.2241314669476433,  
-1.6043734869556,  
0.35480117328822147,  
-1.3692690448046365,  
0.08801115679730828,  
-0.3416815622800032,  
0.5349891528238044,  
0.23599371094677032,  
-0.2955967206364773,  
0.7351110566185237,

-0.1358629473726594,  
-0.2538927978152746,  
-0.18822579896800806,  
0.023625415865148318,  
-0.47104955898400697,  
0.3192033261234258,  
1.3512870657881308,  
-0.7816632422470443,  
-1.6469850516046918,  
0.27638573599623373,  
-0.3090269715855155,  
-0.4193062343229584,  
-0.1377874030219536,  
0.0004776579492072504,  
0.08325659247733753,  
1.4611032338266408,  
0.021431340914286272,  
0.20066912699708425,  
0.29328305426482204,  
2.42997753887945,  
-0.5690256391604135,  
-1.480840559800266,  
-0.1363946771767577,  
-1.376439435407693,  
0.06387998538825271,  
-1.110029094439266,  
0.9868538484965683,  
0.962243917255456,  
-0.41126656322102295,  
-0.657103189069447,  
1.1434637843768656,  
-0.9757973897576084,  
1.448315222432508,  
1.3110742046722172,  
2.3333185683193554,  
0.7520157773640208,  
-0.20203562372486106,  
0.34414613752805073,  
0.5926366260275047,  
-1.985044802604821,  
2.6078832019778186,  
-1.6883872397325923,  
-1.6784323905215754,  
-0.4297482144956373,  
0.6572781395405978,  
0.02277885553642172,  
1.3256214503718338,  
0.25673693454286806,  
-0.6358308725577859,  
-1.6133180674191239],  
[ 0.4366123913610663,  
0.4768198412180804,  
0.9843286193666714,  
1.2674678431689148,  
1.5775702096396949,  
1.5775702096396946,  
2.2591837513222837,  
2.2591837513222837,  
3.168921311818864,  
3.1689213118188637,  
3.1689213118188637,  
3.2207076420855234,  
3.220707642085524,  
4.00024951310582,  
4.479169433031019,  
5.572620903211533,  
5.572620903211533,  
7.169574827830268,  
7.200887753316444,  
7.200887753316444,  
7.4320670533634186,  
7.4320670533634186,  
7.668889448658714,  
7.668889448658714,  
8.088052955990618,

8.127936129548912,  
8.127936129548912,  
8.129700499301142,  
8.129700499301142,  
13.234708916500516,  
-0.8409114197195183,  
0.13809956722013594,  
-1.3698910408430074,  
-0.1271619514190957,  
-1.0028759735951214,  
-0.7519751568518348,  
-1.7027753599694198,  
-0.5003000098057334,  
1.7803062126367422,  
-0.6956057702973542,  
-0.5292841478808504,  
1.3371604427134443,  
-0.6271315116651272,  
-0.9849660401714492,  
-1.0245042646602094,  
1.7746289077120558,  
0.789646250683077,  
2.3274439120303834,  
1.0250145144124314,  
0.236963759763461,  
0.6449585291401012,  
0.5302895792637682,  
-0.17332551626046228,  
0.13296008629005646,  
1.3001365941190501,  
-0.5491163203391332,  
0.8939708861040915,  
-0.1183728413911535,  
-0.27672563627574315,  
1.7953720191393387,  
-0.00825054985875676,  
-0.6170579146731886,  
1.801545679753067,  
-0.6786704865717594,  
-0.5702663839537956,  
-1.2235657195316856,  
0.059502931568887765,  
0.15944146767128192,  
-0.5445588526685949,  
1.0645821939979259,  
-0.3246614360002631,  
1.6342475668463907,  
-0.6365693512803821,  
-0.25644806680599874,  
0.9153791587574333,  
-1.5555971818784813,  
1.7626038696684259,  
0.29250830199243494,  
0.4597874603079029,  
-0.4983420660721544,  
0.22206047990995867,  
0.11089125969329257,  
1.9712857917750568,  
-0.8482820514299444,  
1.7711968287204813,  
-0.3356021753581158,  
-2.239225908466879,  
-0.021402454584719684,  
1.6641712424719513,  
0.5059308187330879,  
1.9296669762106724,  
0.7155610478862724,  
1.024294278133781,  
0.2881031759975837,  
0.06318491357276658,  
0.8308741396333285,  
0.16800005476886462,  
-0.26845892946467115,  
-0.378371667085078,  
-2.374474400887392,

```

-0.26943703763693594,
-0.698442208248677,
1.5029972614102114,
0.7682274655447995,
1.7790823677975025,
1.1233449399645796,
-0.1962677980677998,
-0.6013220679983903,
1.243366811759978,
0.23851493156650586,
-1.3516830763738037,
0.4546075088056473,
0.45461165179145885,
0.29299766155391044,
0.9768506591689141,
-1.3614782254940123,
-0.1864841683590143,
0.03417328589702677,
-0.12392810093414776,
1.4042342901901068,
0.4181387945528863,
0.6171624447156228,
0.5887687464980093,
0.07995045192475739,
0.12406497411608935,
-0.1304256749231809,
0.5172871404602656,
1.1235454838537668,
1.5976273357881063,
-0.7195312648953682,
-0.7697726746437508,
-0.1718403740134208,
0.48757574872507614,
0.7291603816887677,
1.3754811895843486,
0.06384938170591244,
0.9009847125572167,
1.0744001081352503,
1.7305303874736466,
0.491454536253661,
0.11643540469065636,
0.5925455840333324,
-1.2877724397991297,
0.052924560657905566,
-0.8760423919600488,
0.6313576901954856,
2.736167065037608,
0.029295634649204143,
2.1044233481865446,
0.6660786050345296]],
    'run_time_sec': 43335.76831364632}}]],
'redundant': [ { 'config': { 'ansatz': { 'gateset': 1,
                                         'layer': 30,
                                         'ugate': { 'coefficients': { 'bn': [ 0,
                                                                              0,
                                                                              0,
                                                                              0,
                                                                              0,
                                                                              0,
                                                                              0],
                                                                              'cn': [ 0.5,
                                                                              0.5,
                                                                              0.5,
                                                                              0.5,
                                                                              0.5,
                                                                              0.5],
                                                                              'r': 0},
                                                                              'time': {'max': 10.0, 'min': 0.0},
                                                                              'type': 'ising'}}},
                  'init_param': { 'value': [ -4.1290471568429383e-17,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.4764187545019148,
                                               0.485154879376271,
                                               0.028387941050870547,
                                               0.028387941050870516,
                                               0.028387941050870544,
                                               0.47
```

0.7094706976105217,  
2.998376901501724,  
3.486264965503922,  
3.487775573446841,  
4.058897205630428,  
5.020552086463093,  
5.02158492362958,  
5.02158492362958,  
5.0846878698400815,  
5.0846878698400815,  
6.794704827143902,  
6.794704827143902,  
6.794704827143902,  
8.013356083289752,  
8.21076169573117,  
8.21076169573117,  
8.633075344303478,  
8.633075344303478,  
8.930018414781724,  
8.930018414781724,  
8.930018414781724,  
9.990329186240457,  
9.990329186240457,  
12.915390927357043,  
0.8289215528981712,  
0.6465354442587259,  
-0.06922368073773534,  
-2.0853926237797484,  
0.25605409461249207,  
-0.765586831155604,  
0.9589723041272441,  
0.27455658215646966,  
-0.07189982532198122,  
-0.3449139525561357,  
-0.46800027418386986,  
1.016480689947782,  
-0.9706976058410632,  
-0.9556868223128826,  
0.9323574793538898,  
-0.4376613900889883,  
0.44138701419965265,  
1.4418520162063444,  
0.8420619129497768,  
-0.025530845682239494,  
-2.3076344184440156,  
0.37458463155346333,  
-0.47031338116346383,  
0.07338001085955462,  
-0.869249007732584,  
1.6824786550253577,  
1.719346297136726,  
-0.9622509832303179,  
0.5779076253870294,  
0.4760527439731688,  
-0.2451715046346434,  
1.5906513054768954,  
0.35918458386075697,  
-0.44817294000256097,  
-0.37416377940751877,  
0.37048554789855764,  
0.693137718643464,  
2.288219219235325,  
-0.26501198620577204,  
0.3689053264668303,  
0.10166782579927121,  
-0.3356073800920907,  
-0.6413954053758932,  
0.28636656044125136,  
-0.8690978212322298,  
1.166030172665772,  
-0.46365263204645707,  
-0.8505396438729699,  
2.4328989003329693,  
-1.4554443951257197,  
2.09134311034601,

1.7695145471360614,  
1.1170184462314887,  
0.20325573406500014,  
0.34206355374635444,  
0.016804831103183593,  
-0.19882507083844791,  
1.4011478969931443,  
-0.0572616468882171,  
-1.3773340344964602,  
1.1031086912886459,  
0.47433623341773395,  
-0.037679845343088075,  
0.7450954028512253,  
1.3114871459373192,  
-0.18651966717154955,  
1.0750199871192778,  
0.48905379729033566,  
-0.6281827821606347,  
1.322074656325554,  
-1.4761484868509396,  
0.2859918816514792,  
-1.0033541595176405,  
0.8264053813863532,  
0.622010811103528,  
1.1636747207646185,  
-0.31883271288389914,  
-0.0013981850979601159,  
-0.09999405171802342,  
1.3085280853238759,  
-1.3727969089464465,  
-0.08341159264840771,  
1.6249369276484606,  
-0.28082331570516694,  
1.863294400254821,  
2.2932652495309953,  
1.4849536675442596,  
0.6811668802751195,  
1.5380110980874968,  
-0.6615225065895972,  
0.4000828281024264,  
0.33932121588009856,  
0.48855764825038867,  
2.5371111232777053,  
-0.7260430040504564,  
0.09005940379987407,  
-0.8762980817992282,  
-0.23800314057977784,  
0.9728027685352436,  
-0.20857834368009137,  
0.6148333457084475,  
-1.5171898336040224,  
0.8658542069129427,  
-1.6478287868490311,  
0.5770049367106069,  
0.134497700004433,  
-0.11612046371881249,  
1.5826352840237945,  
1.6045820840261675,  
-0.08805669980595342,  
-1.507745125921201,  
-0.11276651576435986,  
0.07206005105970639,  
-1.7788122679933258,  
-0.002988765738482436,  
0.7255804452314191,  
2.7661804504965604,  
-3.1943627011957507,  
-0.07088434770936546,  
0.10949711075632612]],

'noise\_profile': { 'noise\_on\_init\_param': { 'status':

'value': 0}},

'noise\_prob': [0.001, 0.001, 0, 0],

'status': True,

'type': 'depolarizing'},

False,

```

'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#1'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
'+ 1 Z 0 + '
'1 X 1 X 2 '
'+ 1 Z 1 + '
'1 X 2 X 3 '
'+ 1 Z 2 + '
'1 X 3 X 4 '
'+ 1 Z 3 + '
'1 X 4 X 5 '
'+ 1 Z 4 + '
'1 X 5 X 6 '
'+ 1 Z 5 + '
'1 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -6.833109640228284],
[12, 6, 0, 0, -5.610198560557998],
[20, 10, 0, 0, -4.60990156720048],
[28, 14, 0, 0, -3.786810221698121]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {

```



```

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'noise_prob': [

'status': True,
'type':

'depolarizing'},

    'odd_wires': 4},
    { 'gates_num': [20, 5, 1, 0],
      'identity_factors': [2, 2, 0, 0],
      'noise_level': [20, 10, 0, 0],
      'noise_profile': {

'noise_on_init_param': { 'status': False,
    'value': 0},

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

    'odd_wires': 4},
    { 'gates_num': [28, 7, 1, 0],
      'identity_factors': [3, 3, 0, 0],
      'noise_level': [28, 14, 0, 0],
      'noise_profile': {

'noise_on_init_param': { 'status': False,
    'value': 0},

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

    'odd_wires': 4}},
    'run_time_sec': 9.735995769500732}},
{ 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [ 0,
        0,
        0,
        0,
        0,
        0,
        0],
        'cn': [ 0.5,
            0.5,
            0.5,
            0.5,
            0.5,
            0.5],
        'r': 0},
        'time': {'max': 10.0, 'min': 0.0},
        'type': 'ising'}}},
    'init_param': { 'value': [ 0.46756606893882113,
        0.46983859896604685,
        0.5133985927484581,
        0.5133985927484581,
        0.5133985927484581,
        1.4016794842576101,
        1.6914116785996751,
        1.691411678599675,
        1.6941756924801525,
        1.6941756924801528,
        3.749864451084885,
        3.749864451084885,
        3.7498644510848855,
        3.7498644510848855,
        4.969636107010246,

```

4.969636107010246,  
4.969636107010246,  
4.969636107010246,  
5.983107385388112,  
5.983107385388112,  
8.378949246097575,  
8.378949246097575,  
8.635680633753974,  
8.635680633753974,  
9.108807770997622,  
9.108807770997622,  
9.108807770997622,  
9.960036411132767,  
10.436643041587223,  
10.716533289695375,  
0.5466515694267952,  
3.318518267704871,  
0.40678728382369284,  
0.6290091030083763,  
-0.4770983795300032,  
-0.7455483390932742,  
0.1630064768968011,  
0.4889724943271746,  
0.10596004146863507,  
-1.4759536729524354,  
0.957604974713893,  
0.6004514101153323,  
0.0725728265044025,  
1.4994700617905987,  
0.15508641282397265,  
-0.15494303336158094,  
-0.5663845144966579,  
2.6663065398173496,  
-0.27086336898318036,  
-1.1828784814640632,  
-0.295045685212881,  
0.6236994649007899,  
1.1769360493970402,  
1.7159795997719172,  
-0.3019600780315931,  
0.651545330446025,  
-2.0782382222089724,  
0.3186344830290561,  
-0.2815476257680432,  
0.4067635126151388,  
-0.8228051832090519,  
-0.4154478828430832,  
2.3723163321732827,  
0.931436930203099,  
0.9804374423714106,  
0.058895326584719035,  
0.3167253661454302,  
0.3390503539155689,  
-0.5024758650485814,  
-0.2425872659725522,  
-0.6703364135359525,  
-0.147558399690948,  
1.1644296968010859,  
0.5475507579506065,  
0.1736068872874216,  
0.30547527216138975,  
0.5300773267023443,  
0.7722201656261689,  
-0.6858549484151734,  
-0.16073113081558088,  
-1.197458252004488,  
-0.507307082981415,  
-0.16437738354723153,  
0.2647407403580543,  
-0.45930133674563567,  
-0.22673992276266391,  
1.8127715449849986,  
-1.4334128748253496,  
-0.759404859696163,  
1.2431110601081345,

```

0.8953271645792334,
0.6963251389999259,
-0.23147129445607595,
0.3638861144885483,
2.2394622330281906,
1.543816783446588,
1.7535830084845025,
-0.3169637330795974,
0.2453194636587019,
2.0076391670843647,
0.286017506499548,
0.6600449842625801,
0.19782118041633945,
0.05463577684798935,
0.4755005320975566,
0.055207215781380096,
0.06969685609102444,
0.2645328829673777,
-0.01235845210357445,
1.01982876424508,
2.262492417600915,
1.3443784687440867,
0.10698144982242018,
0.428081928456963,
-1.5494921893757727,
1.0701294130786736,
0.39987519173641656,
0.06301738855484718,
-1.6711192593807125,
0.26920159401030147,
-0.08358711295948693,
0.4054786916979446,
-0.5013194648307361,
2.126550690771933,
0.10959959792145137,
0.4205360694942305,
-0.586878230803869,
-0.3381608637889511,
-0.5055401953468239,
-0.45995744817477163,
0.07999668782445096,
-0.4269018063306222,
0.9588276598807326,
1.042187521522261,
0.07821502449201799,
0.6777167152964713,
0.4177387822172794,
-0.18721284346239236,
-0.8064458441104513,
2.8712851588196218,
0.7141862154478698,
-0.9976723444987857,
-0.8529435737233043,
1.9602636639541733,
1.2634521849205176,
-0.7170870121313951,
0.31227949023655405,
-1.0451293221946831,
-0.6787852158143914,
1.8581833428208436}],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,

```

False,

```

0.5,
0.5,
0.5,
0.5,
0.5],
    'r': 1},
    'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
    'status': False,
    'type': 'png'},
    'file_name_prefix':

'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#6'},
    'redundant': { 'identity_factors': [ [0, 0, 0, 0],
    [1, 1, 0, 0],
    [2, 2, 0, 0],
    [3, 3, 0, 0]],

    'run': 'redundant',
    'state': 'dmatrix',
    'vqe': { 'iteration': 1,
    'optimization': { 'algorithm': 'SLSQP',
    'constraint': True,
    'status': False}},
    'zne': { 'data_points': None,
    'degree': 0,
    'method': 'richardson',
    'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
    'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
    '4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
    'X 5 X 6 + 1 Z 5 + 1 Z 6',
    'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
    '+ 1 Z 0 + '
    '1 X 1 X 2 '
    '+ 1 Z 1 + '
    '1 X 2 X 3 '
    '+ 1 Z 2 + '
    '1 X 3 X 4 '
    '+ 1 Z 3 + '
    '1 X 4 X 5 '
    '+ 1 Z 4 + '
    '1 X 5 X 6 '
    '+ 1 Z 5 + '
    '1 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -6.4878948983695235],
    [12, 6, 0, 0, -5.297876077058435],
    [20, 10, 0, 0, -4.3310003849914125],
    [28, 14, 0, 0, -3.539166940153787]],
    'noise_details': [ { 'gates_num': [4, 1, 1, 0],
    'identity_factors': [0, 0, 0, 0],
    'noise_level': [4, 2, 0, 0],
    'noise_profile': {

'noise_on_init_param': { 'status': False,
    'value': 0},

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

    'odd_wires': 4},
    { 'gates_num': [12, 3, 1, 0],
    'identity_factors': [1, 1, 0, 0],
    'noise_level': [12, 6, 0, 0],
    'noise_profile': {

'noise_on_init_param': { 'status': False,
    'value': 0},

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

```

```

'depolarizing'},

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {

'noise_prob': [

'status': True,
'type':

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
  'identity_factors': [3, 3, 0, 0],
  'noise_level': [28, 14, 0, 0],
  'noise_profile': {

'noise_prob': [

'status': True,
'type':

'odd_wires': 4}},
'run_time_sec': 10.259121179580688}},
{ 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [ 0,
    0,
    0,
    0,
    0,
    0,
    0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 0},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'ising'}}},
'init_param': { 'value': [ 0.27654223573266234,
    0.27654223573266246,
    0.27654223573266246,
    0.4643738922966213,
    0.6582164862517121,
    0.6582164862517121,
    0.6582164862517121,
    1.3424523496852623,
    1.47635793598756,
    1.47635793598756,
    3.385550316280557,
    3.385550316280557,
    3.385550316280557,
    4.494062371253785,
    4.494062371253785,
    5.0204758683966135,
    5.023404188660082,
    7.05704094573064,
    7.087391629397132,
    7.533802135057517,
    8.245970909352765,
    8.390887842007308,
    8.390887842007308,
    8.703391612007538,

```

8.703391612007538,  
9.485545381639698,  
9.485545381639698,  
9.849437794456351,  
9.849437794456351,  
10.799155842585746,  
-0.12708089143278917,  
1.4168148977025445,  
-0.13519536748631492,  
-0.32308714516775877,  
0.06981336221044306,  
-0.034321895006426455,  
-0.18209443759399158,  
-0.024858958594746107,  
0.664488174834645,  
0.6897317665852637,  
-0.008774731192519907,  
0.625642551337688,  
0.6862410821653743,  
-0.7670419540542446,  
-0.48055390132433673,  
1.573964677292243,  
-1.0555745677813198,  
1.3159721165631335,  
-0.9138502497993347,  
-0.4641566084568084,  
-0.06966564000847691,  
0.039012746519005555,  
1.0827641697579717,  
1.2190093772283843,  
1.5391150382377632,  
-0.6675581491933664,  
0.09104662559232415,  
0.5283818781579022,  
0.04478118244404365,  
1.5836075485651113,  
0.251932560991488,  
-0.3949560381811925,  
0.8854639388207172,  
-0.8611267164776638,  
1.566928747241295,  
-0.15445151319573347,  
-0.01396050433941564,  
0.8172620115356718,  
-0.014658132241289147,  
-0.6623010385304499,  
0.6299284572753584,  
-0.15026947869759505,  
-1.2293112897827836,  
-0.5768656731979434,  
1.231557922062332,  
-1.447872926116422,  
1.4918722706131171,  
0.31945486783385635,  
0.43870804207253483,  
1.3582636256308331,  
-0.8478398442626237,  
0.799518029891469,  
0.5539369896048497,  
0.13453197415145846,  
0.7167498104862234,  
-0.06589109804263343,  
0.041038724923082276,  
1.151975756926885,  
-0.052026838729968425,  
0.3952978000808587,  
-1.1754748970457833,  
-0.01965607042871015,  
-0.2456324144680547,  
-0.01136184217607491,  
0.022503168314325715,  
1.1777923723104653,  
0.14554117253938412,  
-1.2287946167385297,  
-0.9683737383161766,

```

1.073329622962756,
-0.7143583802799215,
-0.3545002682598469,
-0.31906110571926777,
-0.9597094503848127,
0.8825903987559673,
-0.08273415521500459,
0.2895039435279609,
-0.3388594197258312,
0.2406459434933063,
0.3824128671502841,
-0.5390555829405563,
0.3757684495816124,
-0.5015719636333678,
0.3958257688275076,
-0.6428354095046468,
-0.9178624992467067,
0.29327306512581747,
-0.09193285724698198,
0.1770091195095364,
0.6803523512851801,
1.05525770275555,
-0.4646437845139076,
2.2560908642344026,
-0.7500939262299234,
1.92959092052175,
-0.36895777993274226,
-0.04538283416771957,
1.2529586558275392,
-0.57805717638909,
0.3080585810325818,
0.031910210614104206,
0.18519950010488512,
1.3888566879174211,
1.087260914864616,
0.15259355623633358,
-0.08810167996863522,
0.07467874103808375,
1.4444893382870363,
-1.446220680213735,
0.8215180856176293,
2.0151723649306295,
0.13454991965456886,
0.21923381008732426,
0.31112145477192793,
-0.8977876743954992,
0.10239876571985529,
-1.0132922278363503,
-0.3794863035801566,
0.8437803973608401,
1.111671691788496]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [ 0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5],
                                'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,

```

False,

```

'file_name_prefix':
'AUTOMATE_ising_noise_free_time_evo_ric4_unifrom_scaling_sample#2'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
'+ 1 Z 0 + '
'1 X 1 X 2 '
'+ 1 Z 1 + '
'1 X 2 X 3 '
'+ 1 Z 2 + '
'1 X 3 X 4 '
'+ 1 Z 3 + '
'1 X 4 X 5 '
'+ 1 Z 4 + '
'1 X 5 X 6 '
'+ 1 Z 5 + '
'1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.514930884689278],
[12, 6, 0, 0, -5.310706408751286],
[20, 10, 0, 0, -4.328532484009807],
[28, 14, 0, 0, -3.520772220894083]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [

```



```

0.001,
0.001,
0,
0],

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'noise_prob': [

'status': True,
'type':

'odd_wires': 4}},
{ 'gates_num': [28, 7, 1, 0],
'identity_factors': [3, 3, 0, 0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {

'run_time_sec': 9.931480884552002}},
{ 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': { 'value': [ 0.5118290521669792,
0.9034573591840084,
1.0514460879099101,
1.1283814725964603,
1.1293980629167455,
1.6874068541059999,
1.8362001710030256,
2.594529848453243,
2.5949023258749775,
4.384420392533986,
4.804388533064279,
4.8044974726668155,
4.925049921883437,
4.925049921883437,
6.055903002618935,
6.0650337145794,
6.06510024924717,
6.06510024924717,
7.719643893437192,
7.719643893437192,
8.110116534451196,
8.374448879129652,
8.374448879129652,
9.29045698473019,
9.2929923765699,
9.977025927736127,
9.977025927736127,
9.977438303479875,
11.277250876863835,
11.588901828478656,
-0.5970483257864091,
1.048395642841534,
0.3563299433581316,

```

2.04182497417867,  
-1.0659189653240388,  
-1.5711224255679066,  
-0.6854026923334804,  
1.3002799990574343,  
0.334979527312172,  
-0.41771661057992626,  
-0.5255960701407614,  
0.9200835209290303,  
0.5840294212204432,  
0.4309612994747514,  
0.010788324288593443,  
0.8398650983618882,  
0.35555521736822654,  
0.33383672576306345,  
-0.03972798241435421,  
-0.5808926346218187,  
-0.6217506829607715,  
-0.022449055124049946,  
-0.4671428723737863,  
1.3840583406465645,  
3.321823997583478,  
1.9516123562000514,  
2.109430068020724,  
0.17138900458361278,  
1.0734765554988877,  
1.1591682463434823,  
-1.5085197494005436,  
0.3709514368460093,  
-0.08354812013321816,  
-0.6849414455501801,  
-1.1807064172516142,  
0.1889544406654655,  
0.45125852432694835,  
0.40946867023093825,  
0.9591749175330944,  
0.862406962512403,  
-0.47565451021668054,  
0.14791469386649075,  
0.012323642821740255,  
-0.3613715829994197,  
-0.6520104899254531,  
1.1500641632479522,  
0.11480411675389499,  
0.37929728325133344,  
-0.12818017639377846,  
1.5548403554359806,  
-0.08803696907532751,  
0.16058007713541472,  
-0.2835300528775952,  
1.4317946638041426,  
0.04218231832431045,  
0.6164913379423986,  
-0.5546192578057587,  
-0.0016176435191898148,  
0.3455446109244303,  
-0.7983090776945799,  
0.06548494602750325,  
0.09601011255154575,  
-1.274882751616874,  
-0.6639296860891427,  
0.08468574728059233,  
0.09178155492125434,  
-1.9746588496307496,  
1.363083624655819,  
-0.11754172722968637,  
-1.7454296260872237,  
0.689437867548643,  
0.09536601432398076,  
2.1875690275532618,  
1.9737367040865754,  
0.19623670188051764,  
1.3618525198389628,  
-1.6551377680800423,  
-1.2796187335858575,

```

-0.02979150349567955,
0.3655877448114123,
-1.339933806945279,
-1.6131280858420662,
1.1268021774842836,
0.7853899025443938,
-1.214954346638235,
1.881374469676006,
-2.2108375055617597,
0.38299461206746305,
-0.062378913993248956,
-1.0812916442950207,
0.19113842494911862,
0.43947065709017896,
1.4340329690981122,
-2.1914706359927933,
1.683520172253517,
-0.4151753501170658,
0.2652280013518245,
-0.09829123134965576,
-0.4033858255054015,
-0.09488290407421365,
1.1087820722198931,
1.3758250784849964,
0.3693308876448478,
-1.4774754586810708,
0.45790576106810227,
-1.318961759734687,
1.2898775251023542,
0.5291693857421421,
-0.7225860054677886,
-0.6024865845145562,
1.1258609582335735,
1.4545810101615688,
0.4988359655120556,
0.39968483637691726,
1.4778005154845164,
1.6358502222921723,
0.07081811420225437,
1.5336807499569445,
-0.7595143926860392,
0.07947795439670366]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#10'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
False,

```

```

'vqe': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
                          'constraint': True,
                          'status': False}},
'zne': { 'data_points': None,
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
                                'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
                                '4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
                                'X 5 X 6 + 1 Z 5 + 1 Z 6',
        'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
                                                    '+ 1 Z 0 + '
                                                    '1 X 1 X 2 '
                                                    '+ 1 Z 1 + '
                                                    '1 X 2 X 3 '
                                                    '+ 1 Z 2 + '
                                                    '1 X 3 X 4 '
                                                    '+ 1 Z 3 + '
                                                    '1 X 4 X 5 '
                                                    '+ 1 Z 4 + '
                                                    '1 X 5 X 6 '
                                                    '+ 1 Z 5 + '
                                                    '1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.4060332381961675],
                             [12, 6, 0, 0, -5.147683680770249],
                             [20, 10, 0, 0, -4.13060369641699],
                             [28, 14, 0, 0, -3.301960374777364]],
        'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                              'identity_factors': [0, 0, 0, 0],
                              'noise_level': [4, 2, 0, 0],
                              'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},

                                'noise_prob': [

0.001,
0.001,
0,
0],

                                'status': True,
                                'type':

'depolarizing'},

                                'odd_wires': 4},
                                { 'gates_num': [12, 3, 1, 0],
                                  'identity_factors': [1, 1, 0, 0],
                                  'noise_level': [12, 6, 0, 0],
                                  'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},

                                'noise_prob': [

0.001,
0.001,
0,
0],

                                'status': True,
                                'type':

'depolarizing'},

                                'odd_wires': 4},
                                { 'gates_num': [20, 5, 1, 0],
                                  'identity_factors': [2, 2, 0, 0],
                                  'noise_level': [20, 10, 0, 0],
                                  'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},

                                'noise_prob': [

0.001,
0.001,
0,
0],

                                'status': True,
                                'type':

'depolarizing'},

                                'odd_wires': 4},
                                { 'gates_num': [28, 7, 1, 0],
                                  'identity_factors': [4, 4, 0, 0],
                                  'noise_level': [28, 14, 0, 0],
                                  'noise_profile': {

```

```

'identity_factors': [3, 3, 0, 0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 10.12569546699524}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': { 'value': [ 0.4349098035102067,
0.5281397824211302,
0.6402833431740305,
0.701719039924861,
0.8953768954552646,
1.4118719346144908,
2.230113621742168,
2.6548053250922607,
3.10433397641996,
3.1043339764199596,
4.146783795497047,
4.146783795497047,
4.149760661232294,
4.149760661232294,
4.223539194779984,
4.223539194779984,
6.7727886487081435,
6.7727886487081435,
7.243551717080481,
7.282491880183138,
7.282491880183137,
7.282491880183138,
8.806989173945695,
8.80698917394569,
9.706285648296737,
9.809777023075187,
9.837118725166619,
10.701586770517197,
11.185931122995514,
11.185931122995514,
0.39919688039300266,
1.4533249104921768,
0.7852252158845567,
-0.4957764525834907,
-0.3354719566017423,
0.16097458435951068,
-0.21971891747261646,
1.5370438656668401,
0.26531517225969137,
-0.6386119707402834,
0.37748437574064975,
1.2333814560270282,

```

0.5934062959304571,  
1.633059089666515,  
0.31170790405459564,  
0.3995146629536743,  
-0.11155094016301184,  
0.8138063699882787,  
0.019467271717771087,  
-0.38186317682975884,  
-2.778803401027002,  
0.7887082829537533,  
-3.1348050840084074,  
-1.5109224736536222,  
-0.38589710406642097,  
-1.105927053527023,  
0.3451707237315739,  
0.6290043291617069,  
-1.834722402137916,  
-1.0551446159380258,  
-1.3581260193610523,  
0.9666180881078981,  
-0.05759676522292653,  
1.1866392284178628,  
-1.1308471740259582,  
0.34327443183487805,  
0.17662613760194443,  
-0.043135596735193626,  
-0.03667546733606037,  
-0.4901895513664937,  
-1.0399227541005371,  
0.4880459765792483,  
0.053089003166299456,  
-0.6259966396796703,  
0.03159579372412852,  
-0.09798805529491862,  
0.052872660107769434,  
1.490194875693949,  
0.22167423812356596,  
-0.33497064714209324,  
1.0144679614160885,  
0.01608415027143934,  
0.49167899744128424,  
0.12491439548600353,  
-0.1329609067962543,  
0.8639852596635488,  
-1.6607871811173882,  
0.2801513494447602,  
0.3908501333463579,  
0.6044891435983025,  
0.08637544621327581,  
1.2270127042754213,  
0.11860545946003472,  
-0.13066468162372125,  
-0.998222267933649,  
-1.2643438207146234,  
0.7835210648968657,  
0.8370312354478452,  
0.06527740704106412,  
-1.0235950282739155,  
-0.705070781232052,  
0.037682760290170314,  
1.4778132318704873,  
1.7053977225841355,  
-0.1291331271719845,  
0.1648924115529835,  
2.208642048449397,  
1.1885953055185114,  
-0.8138037079028133,  
0.6715189891287302,  
0.7819572861394978,  
-0.4022064636590845,  
-0.3927127310055937,  
-0.4118784323717791,  
1.3463239978578432,  
-0.3323606385924751,  
0.6664683657180488,

```

1.58852177854836,
-1.212203169826861,
-0.031436536468697034,
0.5094262403458202,
-0.0616688967239856,
-0.0666169691754888,
-0.7277012125404719,
-0.12684196683036533,
0.5325519345188151,
2.2778420441533447,
0.8735933622003313,
0.9907279467768721,
1.1448787224294625,
0.4291077507842401,
-0.21356701746617238,
1.7174041100732933,
0.1885112766205208,
0.3630143936992631,
0.6395640633025061,
-0.2937369198596852,
-0.18128670495631546,
0.9504587478277511,
-0.6241293783488098,
1.8733903679237267,
0.4875344831143031,
-0.9182747577406853,
0.850791268752179,
-0.46183623376516114,
-0.634145646812118,
-0.9165900492445601,
-0.8973746003077631,
-0.879107286657044,
0.15645801311276636]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '

```

```

'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
                                             '+ 1 Z 0 + '
                                             '1 X 1 X 2 '
                                             '+ 1 Z 1 + '
                                             '1 X 2 X 3 '
                                             '+ 1 Z 2 + '
                                             '1 X 3 X 4 '
                                             '+ 1 Z 3 + '
                                             '1 X 4 X 5 '
                                             '+ 1 Z 4 + '
                                             '1 X 5 X 6 '
                                             '+ 1 Z 5 + '
                                             '1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.672780190342767],
                              [12, 6, 0, 0, -5.522238922989663],
                              [20, 10, 0, 0, -4.5712287338679385],
                              [28, 14, 0, 0, -3.7801844878377153]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                     'identity_factors': [0, 0, 0, 0],
                     'noise_level': [4, 2, 0, 0],
                     'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
  'identity_factors': [3, 3, 0, 0],
  'noise_level': [28, 14, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,
0,
0],

```



0],

'depolarizing'},

'status': True,  
'type':

```
                                'odd_wires': 4]],  
                                'run_time_sec': 9.87885570526123}},  
{ 'config': { 'ansatz': { 'gateset': 1,  
                            'layer': 30,  
                            'ugate': { 'coefficients': { 'bn': [ 0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0],  
                                                                'cn': [ 0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5],  
                                                                'r': 0},  
                            'time': {'max': 10.0, 'min': 0.0},  
                            'type': 'ising'}}},  
  'init_param': { 'value': [ 0.48023040681030116,  
                              0.7029544315470944,  
                              0.722671987246733,  
                              0.9307929858945541,  
                              0.9307929858945543,  
                              2.546598088688794,  
                              2.546598088688794,  
                              2.546598088688794,  
                              2.546598088688794,  
                              5.184334435330857,  
                              5.195111458618343,  
                              5.47436411399969,  
                              5.47436411399969,  
                              5.47436411399969,  
                              5.47436411399969,  
                              5.47436411399969,  
                              6.068336244524409,  
                              6.068336244524409,  
                              7.838605251840715,  
                              7.912250316107233,  
                              7.912250316107233,  
                              8.562517202814183,  
                              9.063385768597811,  
                              9.216218862905647,  
                              9.216218862905647,  
                              10.84047371877396,  
                              10.84047371877396,  
                              11.044358714867027,  
                              11.375406566932424,  
                              11.375406566932424,  
                              0.18886549713610382,  
                              0.6040291443391601,  
                              -0.9727809979878402,  
                              3.008209947509642,  
                              0.3239743149147096,  
                              -0.643987619924633,  
                              1.0739882269552894,  
                              0.4935103262912805,  
                              -1.1713673989643745,  
                              0.32339055167680386,  
                              -0.8254170399860232,  
                              3.387204293956005,  
                              0.5437302598099015,  
                              -0.6585961721148387,  
                              1.0903163929414719,  
                              -1.5261906384818182,  
                              1.102349928722959,  
                              -0.7373436929054379,  
                              0.1712635196093208,  
                              1.2086697581514199,  
                              -0.4977298668106944,
```

-0.8828019932256734,  
-0.13051782426094366,  
0.048744185631251574,  
-1.0535030780910155,  
0.5224555306604155,  
-0.9502111367985572,  
-0.2573420205933925,  
1.5833039752620888,  
1.3806480812363842,  
0.3864833677006273,  
-0.0006284730712113316,  
0.6487740408134013,  
1.697829570896293,  
-0.20023867528920775,  
-0.32438662287273723,  
1.3674639807988553,  
-1.5592347723565667,  
-0.6294582959326964,  
1.111157394071659,  
1.4895912958038178,  
-0.7203901402661329,  
-0.027076706863032294,  
0.009574786781832467,  
1.1437695218822916,  
0.11720143179507149,  
1.0973549625545624,  
-1.0756168303605034,  
-1.5785125289756954,  
-0.42999007233668873,  
0.7592603373612552,  
0.7357293999316703,  
0.03766014972468404,  
1.450035910180884,  
-0.08978031589044846,  
0.7176267391661779,  
-2.3377280976646966,  
0.3878354316208249,  
-0.8070070584177742,  
0.07084117333557359,  
-0.008998168433091903,  
0.6612796195456235,  
0.6287929626789847,  
0.8601333603228948,  
-0.7786354708155643,  
-0.144476679155352,  
0.39492950957300044,  
-0.20012968159779548,  
0.01326107241550192,  
-0.5649340596325207,  
-0.020398755490040426,  
0.6333499066300691,  
0.400844220606507,  
0.5954749034740784,  
0.8700413681534388,  
1.315868035063538,  
0.9914334712755634,  
0.10418309057983809,  
1.1095991500751576,  
-0.1712743534684691,  
-0.2730581386141925,  
0.1453142903679217,  
-0.3813955795194703,  
0.1280814941289577,  
-0.5627986213807415,  
-1.0576722394029623,  
-1.98721560251358,  
0.519862592148374,  
1.03695228961559,  
0.21101375663462807,  
-1.750252459751414,  
-1.1450993785481438,  
-2.2517541986316916,  
-1.5456964825715331,  
0.6026638989139771,  
0.47561448130168205,

```

0.08201672609434518,
0.47464262797792917,
-0.14585857152212733,
0.08636040211648545,
0.7388192170680543,
1.071366965639021,
2.5115163876343742,
-0.4286872636197954,
-0.2977998181526895,
0.46569070003689333,
0.2115019986130443,
-0.5123638542481742,
0.09024611293676764,
-0.3380729423866059,
1.6314769884628497,
1.3338027138849353,
-0.7442166070564612,
1.2186722356710948,
1.584709484399307,
-0.6554175978902271,
0.36887213174672207,
-1.365021965092438,
-0.4623126041921459,
0.4869420326570461}],
'noise_profile': { 'noise_on_init_param': { 'status':
                                'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                1.0,
                                1.0,
                                1.0,
                                1.0,
                                1.0,
                                1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
'+ 1 Z 0 + '
'1 X 1 X 2 '
'+ 1 Z 1 + '
'1 X 2 X 3 '
'+ 1 Z 2 + '

```

```

'1 X 3 X 4 '
'+ 1 Z 3 + '
'1 X 4 X 5 '
'+ 1 Z 4 + '
'1 X 5 X 6 '
'+ 1 Z 5 + '
'1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.75124151968758],
                              [12, 6, 0, 0, -5.575778108730956],
                              [20, 10, 0, 0, -4.6095181057209125],
                              [28, 14, 0, 0, -3.8092488284193005]],
  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                      'identity_factors': [0, 0, 0, 0],
                      'noise_level': [4, 2, 0, 0],
                      'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,
0,
0],

'status': True,
'type':
'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,
0,
0],

'status': True,
'type':
'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,
0,
0],

'status': True,
'type':
'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
  'identity_factors': [3, 3, 0, 0],
  'noise_level': [28, 14, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,
0,
0],

'status': True,
'type':
'depolarizing'},

'odd_wires': 4}],
'run_time_sec': 10.669064044952393}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,

```

```
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.3463233138801294,
0.34632331388012944,
0.3463233138801294,
0.3463233138801293,
1.2403205490491955,
1.38033446895038,
3.6939218351946623,
3.6939218351946623,
3.693921835194662,
3.693921835194662,
3.9412089126587,
3.9412089126587,
3.9412089126587007,
3.9412089126587007,
4.8310999601027795,
4.870844593548848,
4.900228671797898,
4.9002286717978984,
4.9002286717978984,
4.900228671797898,
5.70167657474683,
6.21188441483336,
6.21188441483336,
6.686419232103557,
6.723504371727371,
7.618130890836856,
7.618130890836856,
9.420364260644014,
9.420364260644014,
10.775132222422771,
-0.3525750090684208,
1.2748976558430758,
-0.16146998454247521,
1.3224575871686013,
0.0349265192498484,
0.36138711032415904,
-0.5043488106619078,
0.7634801084306476,
-0.3536814593617201,
0.9606809354246906,
-1.1143894720984433,
-0.45289061390722213,
-0.1605333784989486,
-1.594210268458609,
-0.09465166736510336,
0.11132251138190599,
1.004235666711761,
-0.23115493220428254,
0.9451761882751959,
-0.3707284170975133,
-0.17782948231634454,
-0.18433417990028922,
-0.06421460341189031,
-1.155489001827845,
-0.2074908306187579,
-0.036360325422879626,
0.5283181819327893,
0.3603171208434518,
0.6819349944270952,
-0.2733083993242672,
```

0.7075879191324372,  
-0.042779623335368125,  
0.7032435595714176,  
-0.7363942983542189,  
0.9583235184546098,  
-0.5892472427173001,  
-0.7139877518112785,  
-0.12446625268371646,  
-0.439646171766664,  
0.7129808957109575,  
0.3373075268097138,  
0.3345550414369601,  
-0.38068761370203624,  
0.07864964370676188,  
-0.3383553862900091,  
0.6633419895127639,  
-0.578720703894673,  
0.486162302530746,  
-0.06112668401522289,  
0.34417654454775265,  
-0.09182266750822224,  
0.012215000731405658,  
0.5658291917160285,  
-0.16728488191683846,  
0.3754616489195623,  
-0.30497315054621493,  
-0.7559846133933803,  
0.9474959005813702,  
-0.5904076686561035,  
-0.2620011537974264,  
0.1328515248519479,  
-0.44066408562446224,  
-0.7849425610737308,  
0.44059474279745625,  
-0.04646983134951628,  
0.27897770882356554,  
0.36838349877106535,  
1.1610009997739648,  
0.9058411506824863,  
0.3119955912029684,  
-0.5265683545543336,  
1.0661822357546584,  
0.8560044406571757,  
0.5004409227892788,  
0.5192086876555008,  
-0.0019665558968806392,  
-0.23949800878404184,  
0.32563956832297103,  
0.795323960796817,  
1.5213873243487468,  
0.8637563634588281,  
0.07945031145196896,  
1.7583315097859118,  
0.5335864884320034,  
-0.1366270407456156,  
-0.9111102828185913,  
-0.41650979281126865,  
0.20926691692934202,  
0.2776061293997892,  
1.4257231544028384,  
-0.10754544247245298,  
1.0035199546983695,  
1.1162390986419686,  
1.7211522778091677,  
-1.4332245925979028,  
1.4417595659646931,  
-2.106784537892007,  
-0.6878309432904478,  
-0.20360639354575213,  
0.6373705186717347,  
0.051333236332203484,  
-0.35868991955772395,  
-0.24365907607080922,  
1.619736185871098,  
0.5895182658245096,

False,

```

-0.6086170057348131,
0.39774539931448055,
1.409837948786624,
0.17438880158294706,
-0.0415548590378924,
0.1413623732119859,
-0.8192475896231625,
0.5823982141653503,
-0.8462302367353051,
-0.60454163385331,
1.8216629921858374,
1.2634551976945552,
-0.40200420270308274,
-1.5954759495917508,
-1.7732438129518737}],
'noise_profile': { 'noise_on_init_param': { 'status':
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1}},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#3'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
'+ 1 Z 0 + '
'1 X 1 X 2 '
'+ 1 Z 1 + '
'1 X 2 X 3 '
'+ 1 Z 2 + '
'1 X 3 X 4 '
'+ 1 Z 3 + '
'1 X 4 X 5 '
'+ 1 Z 4 + '
'1 X 5 X 6 '
'+ 1 Z 5 + '
'1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.1514222647937595],
[12, 6, 0, 0, -4.906882414400226],

```

```

[20, 10, 0, 0, -3.9115464832295284],
[28, 14, 0, 0, -3.109560049319937]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'noise_on_init_param': { 'status': False,
'value': 0},

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
'identity_factors': [3, 3, 0, 0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'noise_on_init_param': { 'status': False,
'value': 0},

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 9.89258074760437}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5]
}}
}}

```



```
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': { 'value': [ 0.23818326834520384,
0.242015507589488,
0.5292100600091615,
0.5598196968290768,
0.5598196968290768,
2.3451854381830244,
2.3451854381830244,
3.8453025861748578,
3.8453025861748578,
4.395137112369032,
4.408833101975425,
4.829585475162733,
4.867115107997544,
5.058958687371625,
5.058958687371625,
5.058958687371625,
5.581243202757385,
6.011433944644334,
6.011433944644334,
8.358003932454157,
8.358003932454157,
8.358003932454157,
8.371420896509267,
8.783744346022278,
8.783744346022278,
9.34189587380724,
9.34189587380724,
9.39608576624051,
9.726727464435275,
10.95102910414735,
0.14721560345391302,
1.0205767628001141,
0.40564926087548847,
-1.9238321605823567,
-0.04729505851188324,
0.482541600628026,
0.1152155677775581,
0.8524320040134185,
0.42380767990264745,
-0.6219665889019169,
-0.05759638705357143,
0.8161328242190486,
0.7425402472775383,
0.7535392998290764,
1.8314745216576223,
1.3334023135030668,
0.05552193989453376,
0.9691374289368472,
-0.07338372949421543,
-0.6690664310785921,
1.168533104165511,
-0.01962836639606316,
0.6576122461884292,
-0.037637936325233226,
-0.0009647519828692927,
0.4524839512418326,
-0.013115244288784337,
1.6270372625341938,
1.182284078721198,
0.9533845712158122,
1.0956662941001023,
-0.9647918240366662,
0.1897778948773928,
-0.04047520420354409,
0.5790278460715794,
0.631719469583885,
-0.3335418357294817,
1.0603186443819097,
-0.7449471003423949,
```

0.1630231005006795,  
-0.07563007210422526,  
-1.1009042311153838,  
-0.34587951137957407,  
-0.22408475871037167,  
-0.6364303490666092,  
-0.5245531829065874,  
-0.7807390048523051,  
-0.7767575864285188,  
-0.9679768325508518,  
-1.8691843526791756,  
0.4783530568164554,  
0.6133546874260105,  
-0.20020986269221935,  
-0.41532071148562183,  
-0.8557118152516873,  
-0.16985308585729458,  
0.8428338023785568,  
0.6750667051632169,  
1.2795031602880573,  
-0.41384224674171627,  
0.3213362409234008,  
1.2340309605381181,  
1.0506369357289735,  
-0.6415500741723684,  
-0.9628453188140567,  
1.935214357876566,  
1.4159154638103797,  
-2.0864443113151867,  
-0.07426020994129089,  
-1.0538315394110076,  
0.2589745455351295,  
-0.2955978932252484,  
-0.030644528099012087,  
-0.8602288471584197,  
-0.09490606960216369,  
0.4190622694749842,  
-1.5667390101922392,  
-0.7804920738383083,  
0.1255849265457167,  
0.5884338319364165,  
-0.46028089859616994,  
0.2488277677353687,  
-0.7513271615815256,  
-1.0561258734551267,  
0.3697237180501531,  
-0.7108432439071602,  
0.5137418203820399,  
0.946767478727941,  
1.619957961978311,  
1.2944079622561346,  
0.21625880379379211,  
0.007168703139473973,  
-0.334764182643075,  
-0.9086121674985949,  
-0.8247776105092918,  
-0.5734460393428641,  
-0.4381826298821608,  
-0.44306191141826123,  
-0.23860269421390362,  
-0.03343496826073402,  
-0.008972211649351379,  
1.2196121588758198,  
1.5985131140815898,  
0.060325450296581484,  
-0.7312434635304047,  
0.9413542695101463,  
-0.6701271691421761,  
-1.0680925542186157,  
-0.5192506372311365,  
1.5594784335685845,  
0.17928043514789443,  
0.2455246384495121,  
-0.053106843359071614,  
0.7488220810664211,

False,

```
1.3030207698426615,
-1.787387332504871,
-1.1184519607509558,
-0.2511275398302805,
1.445676213762956,
1.5991220174606833]],
'noise_profile': { 'noise_on_init_param': { 'status':
                                                'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [ 0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5],
                                'r': 1},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
           'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#4'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
                                'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
                                '4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
                                'X 5 X 6 + 1 Z 5 + 1 Z 6',
          'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
                                                       '+ 1 Z 0 + '
                                                       '1 X 1 X 2 '
                                                       '+ 1 Z 1 + '
                                                       '1 X 2 X 3 '
                                                       '+ 1 Z 2 + '
                                                       '1 X 3 X 4 '
                                                       '+ 1 Z 3 + '
                                                       '1 X 4 X 5 '
                                                       '+ 1 Z 4 + '
                                                       '1 X 5 X 6 '
                                                       '+ 1 Z 5 + '
                                                       '1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.630764461698827],
                             [12, 6, 0, 0, -5.461578440310042],
                             [20, 10, 0, 0, -4.498507346043123],
                             [28, 14, 0, 0, -3.699540169020614]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                    'identity_factors': [0, 0, 0, 0],
                    'noise_level': [4, 2, 0, 0],
                    'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
                        'noise_prob': [
```

```

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
'identity_factors': [3, 3, 0, 0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {

'noise_prob': [

0.001,
0.001,
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4}],
'run_time_sec': 10.73041558265686}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': { 'value': [ 0.32980400918867037,
0.7818596814437996,
0.9680306497310072,

```

1.0586432954274991,  
1.7663116348413028,  
1.8956491295658664,  
2.0436116769319477,  
2.0436116769319477,  
2.0436116769319477,  
2.1846619555479685,  
2.1846619555479685,  
4.516997836642403,  
4.516997836642403,  
5.3166564351730035,  
5.320130741320412,  
5.399447086770547,  
5.400046100307029,  
5.400046100307029,  
5.400046100307029,  
5.400046100307029,  
7.097750404951498,  
7.618222769006738,  
7.956666567531361,  
7.956666567531361,  
8.961109688308255,  
8.961109688308255,  
11.028500695271937,  
11.5809418583784,  
11.5809418583784,  
11.5809418583784,  
0.24114173221382337,  
1.3754512844042854,  
0.9720111739434927,  
-0.29877116871955545,  
-0.029737313498699618,  
0.3185153459444675,  
-0.31840745367437817,  
0.6801602139502809,  
-0.015407845998522466,  
-1.114484654283524,  
0.22997676136047449,  
1.5201821520192487,  
0.3217486942799661,  
0.43678760134757944,  
0.17618749246228715,  
0.7010359103792874,  
0.3446701255696699,  
1.4700166379981474,  
0.3471333265905846,  
-0.968444017764766,  
-1.1485269521507444,  
0.3282504398407059,  
-0.7898554413193151,  
-0.22157985789400653,  
0.4570931682042821,  
-0.22158635023930806,  
-0.36549836384277606,  
-0.2366283880333898,  
0.4114765778384287,  
-0.7694643480660831,  
-0.40507000819737765,  
-0.6576468499882752,  
0.2023600853039859,  
-1.2917280200640486,  
0.32702771491506877,  
-0.07546137553843744,  
-0.7713328193108817,  
-0.8163562225239717,  
-0.07772489804090182,  
-0.32841576637855896,  
-0.05728139293162625,  
0.8564947637293437,  
0.15384434981345546,  
0.41944080031994563,  
0.16884394015055976,  
-0.010490661309829376,  
-1.3198249528292274,  
0.07128101806419536,

0.03515395872296211,  
-0.09826644736389979,  
-0.06882299183557238,  
-0.7062443088386591,  
-0.5280915567870916,  
0.14860690208212682,  
0.338235073517239,  
0.012130023587481156,  
-0.037483081002571056,  
0.8881056862099682,  
0.06312673968269537,  
-0.44738898868242327,  
-0.2463284936792685,  
1.1708672891281489,  
0.5297819270424092,  
-0.5463182826640249,  
-1.667403353493104,  
1.3713545814180228,  
0.9413366263710182,  
-0.021951472934173096,  
1.0345046397029698,  
-0.8002739446090432,  
1.076242700462428,  
0.04994674089563993,  
-1.446235170371471,  
-0.3268246709561185,  
0.6264234635598642,  
-1.2465048991503196,  
0.1169092097763034,  
1.2453937722962254,  
0.7220287063888942,  
0.8114212311039525,  
0.18333674920471413,  
0.7345776889004225,  
0.9807678368065545,  
0.8703572591074042,  
0.28720991162605214,  
-0.9085817320602367,  
1.1216621938695932,  
1.1327477502874412,  
-1.8285395156530388,  
1.4231155243966302,  
0.08156271721069372,  
0.18027327076782884,  
-0.10302960773112253,  
-0.5560482514096969,  
-0.09484541903718098,  
0.5886430341587933,  
-1.1674014904638685,  
-0.03940950630369794,  
0.2792515765657198,  
0.08214125135098017,  
0.04344924016389119,  
-0.7787970529711157,  
0.07887586110139429,  
0.7532574519080738,  
0.17107625040009872,  
-0.4128415687827808,  
1.3723943620028143,  
1.4278581324344195,  
0.5879977529754344,  
0.28910810409117477,  
-1.4412046993697643,  
1.624844367134446,  
0.19366683662945536,  
0.3179841250458877,  
0.5357240606734743,  
1.5680682524509713,  
0.04418323830986127,  
0.2311137213204739,  
2.8741283660232546,  
0.9612408402592636}],

'noise\_profile': { 'noise\_on\_init\_param': { 'status':

False,

'value': 0},

```

'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#5'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
'+ 1 Z 0 + '
'1 X 1 X 2 '
'+ 1 Z 1 + '
'1 X 2 X 3 '
'+ 1 Z 2 + '
'1 X 3 X 4 '
'+ 1 Z 3 + '
'1 X 4 X 5 '
'+ 1 Z 4 + '
'1 X 5 X 6 '
'+ 1 Z 5 + '
'1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.720969040841222],
[12, 6, 0, 0, -5.577003279994282],
[20, 10, 0, 0, -4.626982768162378],
[28, 14, 0, 0, -3.833723359776359]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],

```

```

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {

'noise_prob': [

'status': True,
'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'noise_prob': [

'status': True,
'type':

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
'identity_factors': [3, 3, 0, 0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {

'noise_prob': [

'status': True,
'type':

'odd_wires': 4}},
'run_time_sec': 9.778919696807861}},
{ 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [ 0,
        0,
        0,
        0,
        0,
        0,
        0],
        'cn': [ 0.5,
            0.5,
            0.5,
            0.5,
            0.5,
            0.5],
        'r': 0},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'ising'}}},
'init_param': { 'value': [ 0.4319322451408806,
    0.4441934852523559,
    0.5878315575931067,
    0.5878315575931067,
    0.5912427958750637,
    0.5947187380620651,
    0.5947187380620652,
    1.5628074958209335,
    1.568718083448373,
    2.013035808837258,
    2.013035808837258,
    2.013035808837258,

```



2.0277481086167364,  
4.114573484042011,  
4.1154343976538055,  
5.358852938788934,  
5.358852938788934,  
5.549639110185835,  
5.667644288942511,  
5.6706149635077026,  
7.063797010237488,  
7.658675772413245,  
8.123010743902626,  
8.633070512181217,  
8.7849794748515,  
8.7849794748515,  
10.749769122252356,  
10.89899813672382,  
11.413879450074099,  
11.413879450074099,  
-0.04151001581527148,  
-2.751209241920508,  
-0.5056705094410174,  
-0.406548832581749,  
0.8633340895103881,  
0.17259893989954428,  
-0.21235924407313156,  
-0.5485334561985523,  
0.2012951527025238,  
-0.23858034563229433,  
2.1364176057207223,  
0.7817014982866842,  
-0.1108899918027214,  
0.6048531661014985,  
1.809261328558185,  
-1.1786415575821785,  
-1.0827170099436865,  
0.4109384498547832,  
0.8090945308822337,  
-0.9356585252219308,  
0.28697429006677655,  
-0.15332459566133277,  
1.2998079093160566,  
0.3870967504567973,  
-0.2413465423953762,  
1.001771196320206,  
0.1138394509020578,  
1.3220786271535379,  
-1.1806565063083097,  
2.2789659185869464,  
0.11875741943281123,  
-0.15631084464392242,  
-2.14680662310284,  
0.18035127914430246,  
-0.260880073181003,  
0.21031876899961,  
0.7641152777599183,  
1.203568210035907,  
1.2767673297334832,  
1.2585129786889195,  
0.24752046596725819,  
0.7203551788145919,  
-0.17420447991641552,  
-1.3486030918499698,  
0.2145369555808404,  
0.8896874485404291,  
-1.6470089821954121,  
-0.37928143051952584,  
-0.29903232984244293,  
0.6984471945997809,  
0.14906235834494008,  
0.054873949093549826,  
1.3877615433857144,  
0.04193983551007985,  
1.2014028569521673,  
-0.02338341588216991,  
-0.05255422822816251,



```

1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#7'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 '
'Z 1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X '
'4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 '
'X 5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 '
'+ 1 Z 0 + '
'1 X 1 X 2 '
'+ 1 Z 1 + '
'1 X 2 X 3 '
'+ 1 Z 2 + '
'1 X 3 X 4 '
'+ 1 Z 3 + '
'1 X 4 X 5 '
'+ 1 Z 4 + '
'1 X 5 X 6 '
'+ 1 Z 5 + '
'1 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -6.662379321078875],
[12, 6, 0, 0, -5.394498644176583],
[20, 10, 0, 0, -4.374551061230002],
[28, 14, 0, 0, -3.546647371824164]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],

```

```

0],

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,
0,
0],

'depolarizing'},

'odd_wires': 4}},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {

'noise_prob': [

'status': True,
'type':

'odd_wires': 4}},
{ 'gates_num': [28, 7, 1, 0],
  'identity_factors': [3, 3, 0, 0],
  'noise_level': [28, 14, 0, 0],
  'noise_profile': {

'noise_prob': [

'status': True,
'type':

'odd_wires': 4}},
'run_time_sec': 10.743986129760742}}],
'vqe': [ { 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [ 0,
    0,
    0,
    0,
    0,
    0,
    0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 0},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'ising'}}},
'init_param': {'value': 'random'},
'noise_profile': { 'noise_on_init_param': { 'status': False,
    'value': 0},
    'noise_prob': [0.001, 0.001, 0, 0],
    'status': True,
    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
    1.0,
    1.0,
    1.0,
    1.0,
    1.0,
    1.0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 1},

```

```

        'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                    'status': True,
                    'type': 'png'},
            'file_name_prefix': 'ising_noisefree_time_evo'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0]]},

'run': 'vqe',
'state': 'dmatrix',
'vqe': { 'iteration': 10,
        'optimization': { 'algorithm': 'SLSQP',
                          'constraint': True,
                          'status': True}},

'zne': { 'data_points': None,
        'degree': 1,
        'method': 'richardson',
        'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + '
                                '1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + '
                                '1 X 4 X 5 + 1 Z 4 + 1 X 5 X 6 + 1 Z 5 + '
                                '1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '1 X 0 X 1 + 1 Z '
                                                         '0 + 1 X 1 X 2 + '
                                                         '1 Z 1 + 1 X 2 X '
                                                         '3 + 1 Z 2 + 1 X '
                                                         '3 X 4 + 1 Z 3 + '
                                                         '1 X 4 X 5 + 1 Z '
                                                         '4 + 1 X 5 X 6 + '
                                                         '1 Z 5 + 1 Z 6']],

'output': { 'exact_sol': -8.56677223350563,
            'initial_cost_history': [ 4.2809785500030175,
                                     2.611097744705238,
                                     3.419414059277099,
                                     1.5773527652373136,
                                     3.36522638437751,
                                     3.1574660994918307,
                                     4.256553926466165,
                                     4.577016272245339,
                                     4.50890344694736,
                                     4.056304045999429],
            'noise_details': { 'gates_num': [4, 1, 1, 0],
                              'identity_factors': [0, 0, 0, 0],
                              'noise_level': [4, 2, 0, 0],
                              'noise_profile': { 'noise_on_init_param': {
'noise_prob': [ 0.001,
                0.001,
                0,
                0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
'optimized_minimum_cost': [ -6.833109640228162,
                            -6.51493088468928,
                            -6.151422264793805,
                            -6.630764461698797,
                            -6.72096904084131,
                            -6.487894898369486,
                            -6.662379321078827,
                            -6.6727801903427855,
                            -6.751241519687556,
                            -6.406033238196173],
'optimized_parameters': [ [ -4.1290471568429383e-17,
                            0.028387941050870547,
                            0.028387941050870516,
                            0.028387941050870544,
                            0.4764187545019148,
                            0.485154879376271,
                            0.7094706976105217,
                            2.998376901501724,
                            3.486264965503922,
                            3.487775573446841,
                            4.058897205630428,
                            5.020552086463093,

```

```

'status': False,
'value': 0},

```

5.02158492362958,  
5.02158492362958,  
5.0846878698400815,  
5.0846878698400815,  
6.794704827143902,  
6.794704827143902,  
6.794704827143902,  
8.013356083289752,  
8.21076169573117,  
8.21076169573117,  
8.633075344303478,  
8.633075344303478,  
8.930018414781724,  
8.930018414781724,  
8.930018414781724,  
9.990329186240457,  
9.990329186240457,  
12.915390927357043,  
0.8289215528981712,  
0.6465354442587259,  
-0.06922368073773534,  
-2.0853926237797484,  
0.25605409461249207,  
-0.765586831155604,  
0.9589723041272441,  
0.27455658215646966,  
-0.07189982532198122,  
-0.3449139525561357,  
-0.46800027418386986,  
1.016480689947782,  
-0.9706976058410632,  
-0.9556868223128826,  
0.9323574793538898,  
-0.4376613900889883,  
0.44138701419965265,  
1.4418520162063444,  
0.8420619129497768,  
-0.025530845682239494,  
-2.3076344184440156,  
0.37458463155346333,  
-0.47031338116346383,  
0.07338001085955462,  
-0.869249007732584,  
1.6824786550253577,  
1.719346297136726,  
-0.9622509832303179,  
0.5779076253870294,  
0.4760527439731688,  
-0.2451715046346434,  
1.5906513054768954,  
0.35918458386075697,  
-0.44817294000256097,  
-0.37416377940751877,  
0.37048554789855764,  
0.693137718643464,  
2.288219219235325,  
-0.26501198620577204,  
0.3689053264668303,  
0.10166782579927121,  
-0.3356073800920907,  
-0.6413954053758932,  
0.28636656044125136,  
-0.8690978212322298,  
1.166030172665772,  
-0.46365263204645707,  
-0.8505396438729699,  
2.4328989003329693,  
-1.4554443951257197,  
2.09134311034601,  
1.7695145471360614,  
1.1170184462314887,  
0.20325573406500014,  
0.34206355374635444,  
0.016804831103183593,  
-0.19882507083844791,

1.4011478969931443,  
-0.0572616468882171,  
-1.3773340344964602,  
1.1031086912886459,  
0.47433623341773395,  
-0.037679845343088075,  
0.7450954028512253,  
1.3114871459373192,  
-0.18651966717154955,  
1.0750199871192778,  
0.48905379729033566,  
-0.6281827821606347,  
1.322074656325554,  
-1.4761484868509396,  
0.2859918816514792,  
-1.0033541595176405,  
0.8264053813863532,  
0.622010811103528,  
1.1636747207646185,  
-0.31883271288389914,  
-0.0013981850979601159,  
-0.09999405171802342,  
1.3085280853238759,  
-1.3727969089464465,  
-0.08341159264840771,  
1.6249369276484606,  
-0.28082331570516694,  
1.863294400254821,  
2.2932652495309953,  
1.4849536675442596,  
0.6811668802751195,  
1.5380110980874968,  
-0.6615225065895972,  
0.4000828281024264,  
0.33932121588009856,  
0.48855764825038867,  
2.5371111232777053,  
-0.7260430040504564,  
0.09005940379987407,  
-0.8762980817992282,  
-0.23800314057977784,  
0.9728027685352436,  
-0.20857834368009137,  
0.6148333457084475,  
-1.5171898336040224,  
0.8658542069129427,  
-1.6478287868490311,  
0.5770049367106069,  
0.134497700004433,  
-0.11612046371881249,  
1.5826352840237945,  
1.6045820840261675,  
-0.08805669980595342,  
-1.507745125921201,  
-0.11276651576435986,  
0.07206005105970639,  
-1.7788122679933258,  
-0.002988765738482436,  
0.7255804452314191,  
2.7661804504965604,  
-3.1943627011957507,  
-0.07088434770936546,  
0.10949711075632612],  
[ 0.27654223573266234,  
0.27654223573266246,  
0.27654223573266246,  
0.4643738922966213,  
0.6582164862517121,  
0.6582164862517121,  
0.6582164862517121,  
1.3424523496852623,  
1.47635793598756,  
1.47635793598756,  
3.385550316280557,  
3.385550316280557,

3.385550316280557,  
4.494062371253785,  
4.494062371253785,  
5.0204758683966135,  
5.023404188660082,  
7.05704094573064,  
7.087391629397132,  
7.533802135057517,  
8.245970909352765,  
8.390887842007308,  
8.390887842007308,  
8.703391612007538,  
8.703391612007538,  
9.485545381639698,  
9.485545381639698,  
9.849437794456351,  
9.849437794456351,  
10.799155842585746,  
-0.12708089143278917,  
1.4168148977025445,  
-0.13519536748631492,  
-0.32308714516775877,  
0.06981336221044306,  
-0.034321895006426455,  
-0.18209443759399158,  
-0.024858958594746107,  
0.664488174834645,  
0.6897317665852637,  
-0.008774731192519907,  
0.625642551337688,  
0.6862410821653743,  
-0.7670419540542446,  
-0.48055390132433673,  
1.573964677292243,  
-1.0555745677813198,  
1.3159721165631335,  
-0.9138502497993347,  
-0.4641566084568084,  
-0.06966564000847691,  
0.039012746519005555,  
1.0827641697579717,  
1.2190093772283843,  
1.5391150382377632,  
-0.6675581491933664,  
0.09104662559232415,  
0.5283818781579022,  
0.04478118244404365,  
1.5836075485651113,  
0.251932560991488,  
-0.3949560381811925,  
0.8854639388207172,  
-0.8611267164776638,  
1.566928747241295,  
-0.15445151319573347,  
-0.01396050433941564,  
0.8172620115356718,  
-0.014658132241289147,  
-0.6623010385304499,  
0.6299284572753584,  
-0.15026947869759505,  
-1.2293112897827836,  
-0.5768656731979434,  
1.231557922062332,  
-1.447872926116422,  
1.4918722706131171,  
0.31945486783385635,  
0.43870804207253483,  
1.3582636256308331,  
-0.8478398442626237,  
0.799518029891469,  
0.5539369896048497,  
0.13453197415145846,  
0.7167498104862234,  
-0.06589109804263343,  
0.041038724923082276,



1.151975756926885,  
-0.052026838729968425,  
0.3952978000808587,  
-1.1754748970457833,  
-0.01965607042871015,  
-0.2456324144680547,  
-0.01136184217607491,  
0.022503168314325715,  
1.1777923723104653,  
0.14554117253938412,  
-1.2287946167385297,  
-0.9683737383161766,  
1.073329622962756,  
-0.7143583802799215,  
-0.3545002682598469,  
-0.31906110571926777,  
-0.9597094503848127,  
0.8825903987559673,  
-0.08273415521500459,  
0.2895039435279609,  
-0.3388594197258312,  
0.2406459434933063,  
0.3824128671502841,  
-0.5390555829405563,  
0.3757684495816124,  
-0.5015719636333678,  
0.3958257688275076,  
-0.6428354095046468,  
-0.9178624992467067,  
0.29327306512581747,  
-0.09193285724698198,  
0.1770091195095364,  
0.6803523512851801,  
1.05525770275555,  
-0.4646437845139076,  
2.2560908642344026,  
-0.7500939262299234,  
1.92959092052175,  
-0.36895777993274226,  
-0.04538283416771957,  
1.2529586558275392,  
-0.57805717638909,  
0.3080585810325818,  
0.031910210614104206,  
0.18519950010488512,  
1.3888566879174211,  
1.087260914864616,  
0.15259355623633358,  
-0.08810167996863522,  
0.07467874103808375,  
1.4444893382870363,  
-1.446220680213735,  
0.8215180856176293,  
2.0151723649306295,  
0.13454991965456886,  
0.21923381008732426,  
0.31112145477192793,  
-0.8977876743954992,  
0.10239876571985529,  
-1.0132922278363503,  
-0.3794863035801566,  
0.8437803973608401,  
1.111671691788496],  
[ 0.3463233138801294,  
0.34632331388012944,  
0.3463233138801294,  
0.3463233138801293,  
1.2403205490491955,  
1.38033446895038,  
3.6939218351946623,  
3.6939218351946623,  
3.693921835194662,  
3.693921835194662,  
3.9412089126587,  
3.9412089126587,

3.9412089126587007,  
3.9412089126587007,  
4.8310999601027795,  
4.870844593548848,  
4.900228671797898,  
4.9002286717978984,  
4.9002286717978984,  
4.900228671797898,  
5.70167657474683,  
6.21188441483336,  
6.21188441483336,  
6.686419232103557,  
6.723504371727371,  
7.618130890836856,  
7.618130890836856,  
9.420364260644014,  
9.420364260644014,  
10.775132222422771,  
-0.3525750090684208,  
1.2748976558430758,  
-0.16146998454247521,  
1.3224575871686013,  
0.0349265192498484,  
0.36138711032415904,  
-0.5043488106619078,  
0.7634801084306476,  
-0.3536814593617201,  
0.9606809354246906,  
-1.1143894720984433,  
-0.45289061390722213,  
-0.1605333784989486,  
-1.594210268458609,  
-0.09465166736510336,  
0.11132251138190599,  
1.004235666711761,  
-0.23115493220428254,  
0.9451761882751959,  
-0.3707284170975133,  
-0.17782948231634454,  
-0.18433417990028922,  
-0.06421460341189031,  
-1.155489001827845,  
-0.2074908306187579,  
-0.036360325422879626,  
0.5283181819327893,  
0.3603171208434518,  
0.6819349944270952,  
-0.2733083993242672,  
0.7075879191324372,  
-0.042779623335368125,  
0.7032435595714176,  
-0.7363942983542189,  
0.9583235184546098,  
-0.5892472427173001,  
-0.7139877518112785,  
-0.12446625268371646,  
-0.439646171766664,  
0.7129808957109575,  
0.3373075268097138,  
0.3345550414369601,  
-0.38068761370203624,  
0.07864964370676188,  
-0.3383553862900091,  
0.6633419895127639,  
-0.578720703894673,  
0.486162302530746,  
-0.06112668401522289,  
0.34417654454775265,  
-0.09182266750822224,  
0.012215000731405658,  
0.5658291917160285,  
-0.16728488191683846,  
0.3754616489195623,  
-0.30497315054621493,  
-0.7559846133933803,

0.9474959005813702,  
-0.5904076686561035,  
-0.2620011537974264,  
0.1328515248519479,  
-0.44066408562446224,  
-0.7849425610737308,  
0.44059474279745625,  
-0.04646983134951628,  
0.27897770882356554,  
0.36838349877106535,  
1.1610009997739648,  
0.9058411506824863,  
0.3119955912029684,  
-0.5265683545543336,  
1.0661822357546584,  
0.8560044406571757,  
0.5004409227892788,  
0.5192086876555008,  
-0.0019665558968806392,  
-0.23949800878404184,  
0.32563956832297103,  
0.795323960796817,  
1.5213873243487468,  
0.8637563634588281,  
0.07945031145196896,  
1.7583315097859118,  
0.5335864884320034,  
-0.1366270407456156,  
-0.9111102828185913,  
-0.41650979281126865,  
0.20926691692934202,  
0.2776061293997892,  
1.4257231544028384,  
-0.10754544247245298,  
1.0035199546983695,  
1.1162390986419686,  
1.7211522778091677,  
-1.4332245925979028,  
1.4417595659646931,  
-2.106784537892007,  
-0.6878309432904478,  
-0.20360639354575213,  
0.6373705186717347,  
0.051333236332203484,  
-0.35868991955772395,  
-0.24365907607080922,  
1.619736185871098,  
0.5895182658245096,  
-0.6086170057348131,  
0.39774539931448055,  
1.409837948786624,  
0.17438880158294706,  
-0.0415548590378924,  
0.1413623732119859,  
-0.8192475896231625,  
0.5823982141653503,  
-0.8462302367353051,  
-0.60454163385331,  
1.8216629921858374,  
1.2634551976945552,  
-0.40200420270308274,  
-1.5954759495917508,  
-1.7732438129518737],  
[ 0.23818326834520384,  
0.242015507589488,  
0.5292100600091615,  
0.5598196968290768,  
0.5598196968290768,  
2.3451854381830244,  
2.3451854381830244,  
3.8453025861748578,  
3.8453025861748578,  
4.395137112369032,  
4.408833101975425,  
4.829585475162733,

4.867115107997544,  
5.058958687371625,  
5.058958687371625,  
5.058958687371625,  
5.581243202757385,  
6.011433944644334,  
6.011433944644334,  
8.358003932454157,  
8.358003932454157,  
8.358003932454157,  
8.371420896509267,  
8.783744346022278,  
8.783744346022278,  
9.34189587380724,  
9.34189587380724,  
9.39608576624051,  
9.726727464435275,  
10.95102910414735,  
0.14721560345391302,  
1.0205767628001141,  
0.40564926087548847,  
-1.9238321605823567,  
-0.04729505851188324,  
0.482541600628026,  
0.1152155677775581,  
0.8524320040134185,  
0.42380767990264745,  
-0.6219665889019169,  
-0.05759638705357143,  
0.8161328242190486,  
0.7425402472775383,  
0.7535392998290764,  
1.8314745216576223,  
1.3334023135030668,  
0.05552193989453376,  
0.9691374289368472,  
-0.07338372949421543,  
-0.6690664310785921,  
1.168533104165511,  
-0.01962836639606316,  
0.6576122461884292,  
-0.037637936325233226,  
-0.0009647519828692927,  
0.4524839512418326,  
-0.013115244288784337,  
1.6270372625341938,  
1.182284078721198,  
0.9533845712158122,  
1.0956662941001023,  
-0.9647918240366662,  
0.1897778948773928,  
-0.04047520420354409,  
0.5790278460715794,  
0.631719469583885,  
-0.3335418357294817,  
1.0603186443819097,  
-0.7449471003423949,  
0.1630231005006795,  
-0.07563007210422526,  
-1.1009042311153838,  
-0.34587951137957407,  
-0.22408475871037167,  
-0.6364303490666092,  
-0.5245531829065874,  
-0.7807390048523051,  
-0.7767575864285188,  
-0.9679768325508518,  
-1.8691843526791756,  
0.4783530568164554,  
0.6133546874260105,  
-0.20020986269221935,  
-0.41532071148562183,  
-0.8557118152516873,  
-0.16985308585729458,  
0.8428338023785568,

0.6750667051632169,  
1.2795031602880573,  
-0.41384224674171627,  
0.3213362409234008,  
1.2340309605381181,  
1.0506369357289735,  
-0.6415500741723684,  
-0.9628453188140567,  
1.935214357876566,  
1.4159154638103797,  
-2.0864443113151867,  
-0.07426020994129089,  
-1.0538315394110076,  
0.2589745455351295,  
-0.2955978932252484,  
-0.030644528099012087,  
-0.8602288471584197,  
-0.09490606960216369,  
0.4190622694749842,  
-1.5667390101922392,  
-0.7804920738383083,  
0.1255849265457167,  
0.5884338319364165,  
-0.46028089859616994,  
0.2488277677353687,  
-0.7513271615815256,  
-1.0561258734551267,  
0.3697237180501531,  
-0.7108432439071602,  
0.5137418203820399,  
0.946767478727941,  
1.619957961978311,  
1.2944079622561346,  
0.21625880379379211,  
0.007168703139473973,  
-0.334764182643075,  
-0.9086121674985949,  
-0.8247776105092918,  
-0.5734460393428641,  
-0.4381826298821608,  
-0.44306191141826123,  
-0.23860269421390362,  
-0.03343496826073402,  
-0.008972211649351379,  
1.2196121588758198,  
1.5985131140815898,  
0.060325450296581484,  
-0.7312434635304047,  
0.9413542695101463,  
-0.6701271691421761,  
-1.0680925542186157,  
-0.5192506372311365,  
1.5594784335685845,  
0.17928043514789443,  
0.2455246384495121,  
-0.053106843359071614,  
0.7488220810664211,  
1.3030207698426615,  
-1.787387332504871,  
-1.1184519607509558,  
-0.2511275398302805,  
1.445676213762956,  
1.5991220174606833],  
[ 0.32980400918867037,  
0.7818596814437996,  
0.9680306497310072,  
1.0586432954274991,  
1.7663116348413028,  
1.8956491295658664,  
2.0436116769319477,  
2.0436116769319477,  
2.0436116769319477,  
2.1846619555479685,  
2.1846619555479685,  
4.516997836642403,

4.516997836642403,  
5.3166564351730035,  
5.320130741320412,  
5.399447086770547,  
5.400046100307029,  
5.400046100307029,  
5.400046100307029,  
5.400046100307029,  
7.097750404951498,  
7.618222769006738,  
7.956666567531361,  
7.956666567531361,  
8.961109688308255,  
8.961109688308255,  
11.028500695271937,  
11.5809418583784,  
11.5809418583784,  
11.5809418583784,  
0.24114173221382337,  
1.3754512844042854,  
0.9720111739434927,  
-0.29877116871955545,  
-0.029737313498699618,  
0.3185153459444675,  
-0.31840745367437817,  
0.6801602139502809,  
-0.015407845998522466,  
-1.114484654283524,  
0.22997676136047449,  
1.5201821520192487,  
0.3217486942799661,  
0.43678760134757944,  
0.17618749246228715,  
0.7010359103792874,  
0.3446701255696699,  
1.4700166379981474,  
0.3471333265905846,  
-0.968444017764766,  
-1.1485269521507444,  
0.3282504398407059,  
-0.7898554413193151,  
-0.22157985789400653,  
0.4570931682042821,  
-0.22158635023930806,  
-0.36549836384277606,  
-0.2366283880333898,  
0.4114765778384287,  
-0.7694643480660831,  
-0.40507000819737765,  
-0.6576468499882752,  
0.2023600853039859,  
-1.2917280200640486,  
0.32702771491506877,  
-0.07546137553843744,  
-0.7713328193108817,  
-0.8163562225239717,  
-0.07772489804090182,  
-0.32841576637855896,  
-0.05728139293162625,  
0.8564947637293437,  
0.15384434981345546,  
0.41944080031994563,  
0.16884394015055976,  
-0.010490661309829376,  
-1.3198249528292274,  
0.07128101806419536,  
0.03515395872296211,  
-0.09826644736389979,  
-0.06882299183557238,  
-0.7062443088386591,  
-0.5280915567870916,  
0.14860690208212682,  
0.338235073517239,  
0.012130023587481156,  
-0.037483081002571056,

0.8881056862099682,  
0.06312673968269537,  
-0.44738898868242327,  
-0.2463284936792685,  
1.1708672891281489,  
0.5297819270424092,  
-0.5463182826640249,  
-1.667403353493104,  
1.3713545814180228,  
0.9413366263710182,  
-0.021951472934173096,  
1.0345046397029698,  
-0.8002739446090432,  
1.076242700462428,  
0.04994674089563993,  
-1.446235170371471,  
-0.3268246709561185,  
0.6264234635598642,  
-1.2465048991503196,  
0.1169092097763034,  
1.2453937722962254,  
0.7220287063888942,  
0.8114212311039525,  
0.18333674920471413,  
0.7345776889004225,  
0.9807678368065545,  
0.8703572591074042,  
0.28720991162605214,  
-0.9085817320602367,  
1.1216621938695932,  
1.1327477502874412,  
-1.8285395156530388,  
1.4231155243966302,  
0.08156271721069372,  
0.18027327076782884,  
-0.10302960773112253,  
-0.5560482514096969,  
-0.09484541903718098,  
0.5886430341587933,  
-1.1674014904638685,  
-0.03940950630369794,  
0.2792515765657198,  
0.08214125135098017,  
0.04344924016389119,  
-0.7787970529711157,  
0.07887586110139429,  
0.7532574519080738,  
0.17107625040009872,  
-0.4128415687827808,  
1.3723943620028143,  
1.4278581324344195,  
0.5879977529754344,  
0.28910810409117477,  
-1.4412046993697643,  
1.624844367134446,  
0.19366683662945536,  
0.3179841250458877,  
0.5357240606734743,  
1.5680682524509713,  
0.04418323830986127,  
0.2311137213204739,  
2.8741283660232546,  
0.9612408402592636],  
[ 0.46756606893882113,  
0.46983859896604685,  
0.5133985927484581,  
0.5133985927484581,  
0.5133985927484581,  
1.4016794842576101,  
1.6914116785996751,  
1.691411678599675,  
1.6941756924801525,  
1.6941756924801528,  
3.749864451084885,  
3.749864451084885,

3.7498644510848855,  
3.7498644510848855,  
4.969636107010246,  
4.969636107010246,  
4.969636107010246,  
4.969636107010246,  
4.969636107010246,  
5.983107385388112,  
5.983107385388112,  
8.378949246097575,  
8.378949246097575,  
8.635680633753974,  
8.635680633753974,  
9.108807770997622,  
9.108807770997622,  
9.108807770997622,  
9.960036411132767,  
10.436643041587223,  
10.716533289695375,  
0.5466515694267952,  
3.318518267704871,  
0.40678728382369284,  
0.6290091030083763,  
-0.4770983795300032,  
-0.7455483390932742,  
0.1630064768968011,  
0.4889724943271746,  
0.10596004146863507,  
-1.4759536729524354,  
0.957604974713893,  
0.6004514101153323,  
0.0725728265044025,  
1.4994700617905987,  
0.15508641282397265,  
-0.15494303336158094,  
-0.5663845144966579,  
2.6663065398173496,  
-0.27086336898318036,  
-1.1828784814640632,  
-0.295045685212881,  
0.6236994649007899,  
1.1769360493970402,  
1.7159795997719172,  
-0.3019600780315931,  
0.651545330446025,  
-2.0782382222089724,  
0.3186344830290561,  
-0.2815476257680432,  
0.4067635126151388,  
-0.8228051832090519,  
-0.4154478828430832,  
2.3723163321732827,  
0.931436930203099,  
0.9804374423714106,  
0.058895326584719035,  
0.3167253661454302,  
0.3390503539155689,  
-0.5024758650485814,  
-0.2425872659725522,  
-0.6703364135359525,  
-0.147558399690948,  
1.1644296968010859,  
0.5475507579506065,  
0.1736068872874216,  
0.30547527216138975,  
0.5300773267023443,  
0.7722201656261689,  
-0.6858549484151734,  
-0.16073113081558088,  
-1.197458252004488,  
-0.507307082981415,  
-0.16437738354723153,  
0.2647407403580543,  
-0.45930133674563567,  
-0.22673992276266391,  
1.8127715449849986,



-1.4334128748253496,  
-0.759404859696163,  
1.2431110601081345,  
0.8953271645792334,  
0.6963251389999259,  
-0.23147129445607595,  
0.3638861144885483,  
2.2394622330281906,  
1.543816783446588,  
1.7535830084845025,  
-0.3169637330795974,  
0.2453194636587019,  
2.0076391670843647,  
0.286017506499548,  
0.6600449842625801,  
0.19782118041633945,  
0.05463577684798935,  
0.4755005320975566,  
0.055207215781380096,  
0.06969685609102444,  
0.2645328829673777,  
-0.01235845210357445,  
1.01982876424508,  
2.262492417600915,  
1.3443784687440867,  
0.10698144982242018,  
0.428081928456963,  
-1.5494921893757727,  
1.0701294130786736,  
0.39987519173641656,  
0.06301738855484718,  
-1.6711192593807125,  
0.26920159401030147,  
-0.08358711295948693,  
0.4054786916979446,  
-0.5013194648307361,  
2.126550690771933,  
0.10959959792145137,  
0.4205360694942305,  
-0.586878230803869,  
-0.3381608637889511,  
-0.5055401953468239,  
-0.45995744817477163,  
0.07999668782445096,  
-0.4269018063306222,  
0.9588276598807326,  
1.042187521522261,  
0.07821502449201799,  
0.6777167152964713,  
0.4177387822172794,  
-0.18721284346239236,  
-0.8064458441104513,  
2.8712851588196218,  
0.7141862154478698,  
-0.9976723444987857,  
-0.8529435737233043,  
1.9602636639541733,  
1.2634521849205176,  
-0.7170870121313951,  
0.31227949023655405,  
-1.0451293221946831,  
-0.6787852158143914,  
1.8581833428208436],  
[ 0.4319322451408806,  
0.4441934852523559,  
0.5878315575931067,  
0.5878315575931067,  
0.5912427958750637,  
0.5947187380620651,  
0.5947187380620652,  
1.5628074958209335,  
1.568718083448373,  
2.013035808837258,  
2.013035808837258,  
2.013035808837258,

2.0277481086167364,  
4.114573484042011,  
4.1154343976538055,  
5.358852938788934,  
5.358852938788934,  
5.549639110185835,  
5.667644288942511,  
5.6706149635077026,  
7.063797010237488,  
7.658675772413245,  
8.123010743902626,  
8.633070512181217,  
8.7849794748515,  
8.7849794748515,  
10.749769122252356,  
10.89899813672382,  
11.413879450074099,  
11.413879450074099,  
-0.04151001581527148,  
-2.751209241920508,  
-0.5056705094410174,  
-0.406548832581749,  
0.8633340895103881,  
0.17259893989954428,  
-0.21235924407313156,  
-0.5485334561985523,  
0.2012951527025238,  
-0.23858034563229433,  
2.1364176057207223,  
0.7817014982866842,  
-0.1108899918027214,  
0.6048531661014985,  
1.809261328558185,  
-1.1786415575821785,  
-1.0827170099436865,  
0.4109384498547832,  
0.8090945308822337,  
-0.9356585252219308,  
0.28697429006677655,  
-0.15332459566133277,  
1.2998079093160566,  
0.3870967504567973,  
-0.2413465423953762,  
1.001771196320206,  
0.1138394509020578,  
1.3220786271535379,  
-1.1806565063083097,  
2.2789659185869464,  
0.11875741943281123,  
-0.15631084464392242,  
-2.14680662310284,  
0.18035127914430246,  
-0.260880073181003,  
0.21031876899961,  
0.7641152777599183,  
1.203568210035907,  
1.2767673297334832,  
1.2585129786889195,  
0.24752046596725819,  
0.7203551788145919,  
-0.17420447991641552,  
-1.3486030918499698,  
0.2145369555808404,  
0.8896874485404291,  
-1.6470089821954121,  
-0.37928143051952584,  
-0.29903232984244293,  
0.6984471945997809,  
0.14906235834494008,  
0.054873949093549826,  
1.3877615433857144,  
0.04193983551007985,  
1.2014028569521673,  
-0.02338341588216991,  
-0.05255422822816251,

-0.1905875093002492,  
0.16425167437144692,  
0.2542835721118732,  
1.1822299841866795,  
1.2032222480152739,  
0.30142488752060526,  
0.09125464470109583,  
-0.45638140154025475,  
0.050260497156630585,  
-0.04000614529085093,  
0.9096133936431033,  
-0.03555378439095736,  
0.4405325841695877,  
-0.48129885373423525,  
-0.3617221403442356,  
-2.5216506086368518,  
-0.5081934521569421,  
0.041332600726076626,  
0.7413771443671474,  
0.2204029987501584,  
-0.7517920276590782,  
-0.21022249714251526,  
1.5607830526955413,  
0.16615947769508344,  
-0.17023919527139658,  
-0.4295619963603494,  
-1.1838803442651602,  
0.6319564057885301,  
-0.3935277768061919,  
0.005550337258741166,  
-0.4226065324972882,  
-0.3715846249960284,  
-0.48395498614671884,  
-0.4790957128536121,  
1.4427293239187895,  
0.5875094653073935,  
1.404722056846091,  
0.6973465258635152,  
0.8623508528879442,  
-0.5460563718875903,  
0.8326491581513842,  
-2.4015389244466907,  
-0.04583861440999851,  
-0.36265388938085896,  
-0.5347868312224912,  
0.49674658852292397,  
-0.6488379607428911,  
1.1568053403721041,  
0.30662269781395407,  
-2.013151608263867,  
-0.17383275003878457,  
0.5036662539248705,  
1.9638910157847163,  
3.118155075975211,  
0.8117246453310248,  
-1.4517859264576565,  
-1.4946803709676548,  
-2.7792982516572895,  
1.1174424252005506,  
2.333430423546859,  
0.6903927508165344,  
-0.2883899927957993,  
-0.8542826896862586],  
[ 0.4349098035102067,  
0.5281397824211302,  
0.6402833431740305,  
0.701719039924861,  
0.8953768954552646,  
1.4118719346144908,  
2.230113621742168,  
2.6548053250922607,  
3.10433397641996,  
3.1043339764199596,  
4.146783795497047,  
4.146783795497047,

4.149760661232294,  
4.149760661232294,  
4.223539194779984,  
4.223539194779984,  
6.7727886487081435,  
6.7727886487081435,  
7.243551717080481,  
7.282491880183138,  
7.282491880183137,  
7.282491880183138,  
8.806989173945695,  
8.80698917394569,  
9.706285648296737,  
9.809777023075187,  
9.837118725166619,  
10.701586770517197,  
11.185931122995514,  
11.185931122995514,  
0.39919688039300266,  
1.4533249104921768,  
0.7852252158845567,  
-0.4957764525834907,  
-0.3354719566017423,  
0.16097458435951068,  
-0.21971891747261646,  
1.5370438656668401,  
0.26531517225969137,  
-0.6386119707402834,  
0.37748437574064975,  
1.2333814560270282,  
0.5934062959304571,  
1.633059089666515,  
0.31170790405459564,  
0.3995146629536743,  
-0.11155094016301184,  
0.8138063699882787,  
0.019467271717771087,  
-0.38186317682975884,  
-2.778803401027002,  
0.7887082829537533,  
-3.1348050840084074,  
-1.5109224736536222,  
-0.38589710406642097,  
-1.105927053527023,  
0.3451707237315739,  
0.6290043291617069,  
-1.834722402137916,  
-1.0551446159380258,  
-1.3581260193610523,  
0.9666180881078981,  
-0.05759676522292653,  
1.1866392284178628,  
-1.1308471740259582,  
0.34327443183487805,  
0.17662613760194443,  
-0.043135596735193626,  
-0.03667546733606037,  
-0.4901895513664937,  
-1.0399227541005371,  
0.4880459765792483,  
0.053089003166299456,  
-0.6259966396796703,  
0.03159579372412852,  
-0.09798805529491862,  
0.052872660107769434,  
1.490194875693949,  
0.22167423812356596,  
-0.33497064714209324,  
1.0144679614160885,  
0.01608415027143934,  
0.49167899744128424,  
0.12491439548600353,  
-0.1329609067962543,  
0.8639852596635488,  
-1.6607871811173882,

0.2801513494447602,  
0.3908501333463579,  
0.6044891435983025,  
0.08637544621327581,  
1.2270127042754213,  
0.11860545946003472,  
-0.13066468162372125,  
-0.998222267933649,  
-1.2643438207146234,  
0.7835210648968657,  
0.8370312354478452,  
0.06527740704106412,  
-1.0235950282739155,  
-0.705070781232052,  
0.037682760290170314,  
1.4778132318704873,  
1.7053977225841355,  
-0.1291331271719845,  
0.1648924115529835,  
2.208642048449397,  
1.1885953055185114,  
-0.8138037079028133,  
0.6715189891287302,  
0.7819572861394978,  
-0.4022064636590845,  
-0.3927127310055937,  
-0.4118784323717791,  
1.3463239978578432,  
-0.3323606385924751,  
0.6664683657180488,  
1.58852177854836,  
-1.212203169826861,  
-0.031436536468697034,  
0.5094262403458202,  
-0.0616688967239856,  
-0.0666169691754888,  
-0.7277012125404719,  
-0.12684196683036533,  
0.5325519345188151,  
2.2778420441533447,  
0.8735933622003313,  
0.9907279467768721,  
1.1448787224294625,  
0.4291077507842401,  
-0.21356701746617238,  
1.7174041100732933,  
0.1885112766205208,  
0.3630143936992631,  
0.6395640633025061,  
-0.2937369198596852,  
-0.18128670495631546,  
0.9504587478277511,  
-0.6241293783488098,  
1.8733903679237267,  
0.4875344831143031,  
-0.9182747577406853,  
0.850791268752179,  
-0.46183623376516114,  
-0.634145646812118,  
-0.9165900492445601,  
-0.8973746003077631,  
-0.879107286657044,  
0.15645801311276636],  
[ 0.48023040681030116,  
0.7029544315470944,  
0.722671987246733,  
0.9307929858945541,  
0.9307929858945543,  
2.546598088688794,  
2.546598088688794,  
2.546598088688794,  
2.546598088688794,  
5.184334435330857,  
5.195111458618343,  
5.47436411399969,

5.47436411399969,  
5.47436411399969,  
5.47436411399969,  
5.47436411399969,  
6.068336244524409,  
6.068336244524409,  
7.838605251840715,  
7.912250316107233,  
7.912250316107233,  
8.562517202814183,  
9.063385768597811,  
9.216218862905647,  
9.216218862905647,  
10.84047371877396,  
10.84047371877396,  
11.044358714867027,  
11.375406566932424,  
11.375406566932424,  
0.18886549713610382,  
0.6040291443391601,  
-0.9727809979878402,  
3.008209947509642,  
0.3239743149147096,  
-0.643987619924633,  
1.0739882269552894,  
0.4935103262912805,  
-1.1713673989643745,  
0.32339055167680386,  
-0.8254170399860232,  
3.387204293956005,  
0.5437302598099015,  
-0.6585961721148387,  
1.0903163929414719,  
-1.5261906384818182,  
1.102349928722959,  
-0.7373436929054379,  
0.1712635196093208,  
1.2086697581514199,  
-0.4977298668106944,  
-0.8828019932256734,  
-0.13051782426094366,  
0.048744185631251574,  
-1.0535030780910155,  
0.5224555306604155,  
-0.9502111367985572,  
-0.2573420205933925,  
1.5833039752620888,  
1.3806480812363842,  
0.3864833677006273,  
-0.0006284730712113316,  
0.6487740408134013,  
1.697829570896293,  
-0.20023867528920775,  
-0.32438662287273723,  
1.3674639807988553,  
-1.5592347723565667,  
-0.6294582959326964,  
1.111157394071659,  
1.4895912958038178,  
-0.7203901402661329,  
-0.027076706863032294,  
0.009574786781832467,  
1.1437695218822916,  
0.11720143179507149,  
1.0973549625545624,  
-1.0756168303605034,  
-1.5785125289756954,  
-0.42999007233668873,  
0.7592603373612552,  
0.7357293999316703,  
0.03766014972468404,  
1.450035910180884,  
-0.08978031589044846,  
0.7176267391661779,  
-2.3377280976646966,

0.3878354316208249,  
-0.8070070584177742,  
0.07084117333557359,  
-0.008998168433091903,  
0.6612796195456235,  
0.6287929626789847,  
0.8601333603228948,  
-0.7786354708155643,  
-0.144476679155352,  
0.39492950957300044,  
-0.20012968159779548,  
0.01326107241550192,  
-0.5649340596325207,  
-0.020398755490040426,  
0.6333499066300691,  
0.400844220606507,  
0.5954749034740784,  
0.8700413681534388,  
1.315868035063538,  
0.9914334712755634,  
0.10418309057983809,  
1.1095991500751576,  
-0.1712743534684691,  
-0.2730581386141925,  
0.1453142903679217,  
-0.3813955795194703,  
0.1280814941289577,  
-0.5627986213807415,  
-1.0576722394029623,  
-1.98721560251358,  
0.519862592148374,  
1.03695228961559,  
0.21101375663462807,  
-1.750252459751414,  
-1.1450993785481438,  
-2.2517541986316916,  
-1.5456964825715331,  
0.6026638989139771,  
0.47561448130168205,  
0.08201672609434518,  
0.47464262797792917,  
-0.14585857152212733,  
0.08636040211648545,  
0.7388192170680543,  
1.071366965639021,  
2.5115163876343742,  
-0.4286872636197954,  
-0.2977998181526895,  
0.46569070003689333,  
0.2115019986130443,  
-0.5123638542481742,  
0.09024611293676764,  
-0.3380729423866059,  
1.6314769884628497,  
1.3338027138849353,  
-0.7442166070564612,  
1.2186722356710948,  
1.584709484399307,  
-0.6554175978902271,  
0.36887213174672207,  
-1.365021965092438,  
-0.4623126041921459,  
0.4869420326570461],  
[ 0.5118290521669792,  
0.9034573591840084,  
1.0514460879099101,  
1.1283814725964603,  
1.1293980629167455,  
1.6874068541059999,  
1.8362001710030256,  
2.594529848453243,  
2.5949023258749775,  
4.384420392533986,  
4.804388533064279,  
4.8044974726668155,

4.925049921883437,  
4.925049921883437,  
6.055903002618935,  
6.0650337145794,  
6.06510024924717,  
6.06510024924717,  
7.719643893437192,  
7.719643893437192,  
8.110116534451196,  
8.374448879129652,  
8.374448879129652,  
9.29045698473019,  
9.2929923765699,  
9.977025927736127,  
9.977025927736127,  
9.977438303479875,  
11.277250876863835,  
11.588901828478656,  
-0.5970483257864091,  
1.048395642841534,  
0.3563299433581316,  
2.04182497417867,  
-1.0659189653240388,  
-1.5711224255679066,  
-0.6854026923334804,  
1.3002799990574343,  
0.334979527312172,  
-0.41771661057992626,  
-0.5255960701407614,  
0.9200835209290303,  
0.5840294212204432,  
0.4309612994747514,  
0.010788324288593443,  
0.8398650983618882,  
0.35555521736822654,  
0.33383672576306345,  
-0.03972798241435421,  
-0.5808926346218187,  
-0.6217506829607715,  
-0.022449055124049946,  
-0.4671428723737863,  
1.3840583406465645,  
3.321823997583478,  
1.9516123562000514,  
2.109430068020724,  
0.17138900458361278,  
1.0734765554988877,  
1.1591682463434823,  
-1.5085197494005436,  
0.3709514368460093,  
-0.08354812013321816,  
-0.6849414455501801,  
-1.1807064172516142,  
0.1889544406654655,  
0.45125852432694835,  
0.40946867023093825,  
0.9591749175330944,  
0.862406962512403,  
-0.47565451021668054,  
0.14791469386649075,  
0.012323642821740255,  
-0.3613715829994197,  
-0.6520104899254531,  
1.1500641632479522,  
0.11480411675389499,  
0.37929728325133344,  
-0.12818017639377846,  
1.5548403554359806,  
-0.08803696907532751,  
0.16058007713541472,  
-0.2835300528775952,  
1.4317946638041426,  
0.04218231832431045,  
0.6164913379423986,  
-0.5546192578057587,



[illegible]

```
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.4319322451408806,
0.4441934852523559,
0.5878315575931067,
0.5878315575931067,
0.5912427958750637,
0.5947187380620651,
0.5947187380620652,
1.5628074958209335,
1.568718083448373,
2.013035808837258,
2.013035808837258,
2.013035808837258,
2.0277481086167364,
4.114573484042011,
4.1154343976538055,
5.358852938788934,
5.358852938788934,
5.549639110185835,
5.667644288942511,
5.6706149635077026,
7.063797010237488,
7.658675772413245,
8.123010743902626,
8.633070512181217,
8.7849794748515,
8.7849794748515,
10.749769122252356,
10.89899813672382,
11.413879450074099,
11.413879450074099,
-0.04151001581527148,
-2.751209241920508,
-0.5056705094410174,
-0.406548832581749,
0.8633340895103881,
0.17259893989954428,
-0.21235924407313156,
-0.5485334561985523,
0.2012951527025238,
-0.23858034563229433,
2.1364176057207223,
0.7817014982866842,
-0.1108899918027214,
0.6048531661014985,
1.809261328558185,
-1.1786415575821785,
-1.0827170099436865,
0.4109384498547832,
0.8090945308822337,
-0.9356585252219308,
0.28697429006677655,
-0.15332459566133277,
1.2998079093160566,
0.3870967504567973,
-0.2413465423953762,
1.001771196320206,
0.1138394509020578,
1.3220786271535379,
-1.1806565063083097,
2.2789659185869464,
0.11875741943281123,
-0.15631084464392242,
-2.14680662310284,
0.18035127914430246,
-0.260880073181003,
0.21031876899961,
0.7641152777599183,
1.203568210035907,
```

1.2767673297334832,  
1.2585129786889195,  
0.24752046596725819,  
0.7203551788145919,  
-0.17420447991641552,  
-1.3486030918499698,  
0.2145369555808404,  
0.8896874485404291,  
-1.6470089821954121,  
-0.37928143051952584,  
-0.29903232984244293,  
0.6984471945997809,  
0.14906235834494008,  
0.054873949093549826,  
1.3877615433857144,  
0.04193983551007985,  
1.2014028569521673,  
-0.02338341588216991,  
-0.05255422822816251,  
-0.1905875093002492,  
0.16425167437144692,  
0.2542835721118732,  
1.1822299841866795,  
1.2032222480152739,  
0.30142488752060526,  
0.09125464470109583,  
-0.45638140154025475,  
0.050260497156630585,  
-0.04000614529085093,  
0.9096133936431033,  
-0.03555378439095736,  
0.4405325841695877,  
-0.48129885373423525,  
-0.3617221403442356,  
-2.5216506086368518,  
-0.5081934521569421,  
0.041332600726076626,  
0.7413771443671474,  
0.2204029987501584,  
-0.7517920276590782,  
-0.21022249714251526,  
1.5607830526955413,  
0.16615947769508344,  
-0.17023919527139658,  
-0.4295619963603494,  
-1.1838803442651602,  
0.6319564057885301,  
-0.3935277768061919,  
0.005550337258741166,  
-0.4226065324972882,  
-0.3715846249960284,  
-0.48395498614671884,  
-0.4790957128536121,  
1.4427293239187895,  
0.5875094653073935,  
1.404722056846091,  
0.6973465258635152,  
0.8623508528879442,  
-0.5460563718875903,  
0.8326491581513842,  
-2.4015389244466907,  
-0.04583861440999851,  
-0.36265388938085896,  
-0.5347868312224912,  
0.49674658852292397,  
-0.6488379607428911,  
1.1568053403721041,  
0.30662269781395407,  
-2.013151608263867,  
-0.17383275003878457,  
0.5036662539248705,  
1.9638910157847163,  
3.118155075975211,  
0.8117246453310248,  
-1.4517859264576565,

```

-1.4946803709676548,
-2.7792982516572895,
1.1174424252005506,
2.333430423546859,
0.6903927508165344,
-0.2883899927957993,
-0.8542826896862586}],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#7'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.662379321078875],
                          [12, 6, 0, 0, -5.394498644176583],
                          [20, 10, 0, 0, -4.374551061230002],
                          [28, 14, 0, 0, -3.546647371824164]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.00543212890625e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -7.40675994489309,
                           'others': { 'beta_coeffieicients': [ 2.1875,
                                                                -2.1875,
                                                                1.3125,
                                                                -0.3125],
                                       'cost_richardson_zne': 11.390625,
                                       'sorted_expectation_vals': [
-6.662379321078875,
-5.394498644176583,
-4.374551061230002,
-3.546647371824164],
'sorted_noise': [6, 18, 30, 42]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -6.662379321078875],
                  [ 12,
                    6,
                    0,
                    0,
                    -5.394498644176583],

```

```

[ 20,
  10,
  0,
  0,
  -4.374551061230002],
[ 28,
  14,
  0,
  0,
  -3.546647371824164]],
'sampling': 'default']]],
{ 'config': { 'ansatz': { 'gateset': 1,
  'layer': 30,
  'ugate': { 'coefficients': { 'bn': [ 0,
    0,
    0,
    0,
    0,
    0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 0},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'ising'}},
  'init_param': { 'value': [ -4.1290471568429383e-17,
    0.028387941050870547,
    0.028387941050870516,
    0.028387941050870544,
    0.4764187545019148,
    0.485154879376271,
    0.7094706976105217,
    2.998376901501724,
    3.486264965503922,
    3.487775573446841,
    4.058897205630428,
    5.020552086463093,
    5.02158492362958,
    5.02158492362958,
    5.0846878698400815,
    5.0846878698400815,
    6.794704827143902,
    6.794704827143902,
    6.794704827143902,
    8.013356083289752,
    8.21076169573117,
    8.21076169573117,
    8.633075344303478,
    8.633075344303478,
    8.930018414781724,
    8.930018414781724,
    8.930018414781724,
    9.990329186240457,
    9.990329186240457,
    12.915390927357043,
    0.8289215528981712,
    0.6465354442587259,
    -0.06922368073773534,
    -2.0853926237797484,
    0.25605409461249207,
    -0.765586831155604,
    0.9589723041272441,
    0.27455658215646966,
    -0.07189982532198122,
    -0.3449139525561357,
    -0.46800027418386986,
    1.016480689947782,
    -0.9706976058410632,
    -0.9556868223128826,
    0.9323574793538898,
    -0.4376613900889883,

```

0.44138701419965265,  
1.4418520162063444,  
0.8420619129497768,  
-0.025530845682239494,  
-2.3076344184440156,  
0.37458463155346333,  
-0.47031338116346383,  
0.07338001085955462,  
-0.869249007732584,  
1.6824786550253577,  
1.719346297136726,  
-0.9622509832303179,  
0.5779076253870294,  
0.4760527439731688,  
-0.2451715046346434,  
1.5906513054768954,  
0.35918458386075697,  
-0.44817294000256097,  
-0.37416377940751877,  
0.37048554789855764,  
0.693137718643464,  
2.288219219235325,  
-0.26501198620577204,  
0.3689053264668303,  
0.10166782579927121,  
-0.3356073800920907,  
-0.6413954053758932,  
0.28636656044125136,  
-0.8690978212322298,  
1.166030172665772,  
-0.46365263204645707,  
-0.8505396438729699,  
2.4328989003329693,  
-1.4554443951257197,  
2.09134311034601,  
1.7695145471360614,  
1.1170184462314887,  
0.20325573406500014,  
0.34206355374635444,  
0.016804831103183593,  
-0.19882507083844791,  
1.4011478969931443,  
-0.0572616468882171,  
-1.3773340344964602,  
1.1031086912886459,  
0.47433623341773395,  
-0.037679845343088075,  
0.7450954028512253,  
1.3114871459373192,  
-0.18651966717154955,  
1.0750199871192778,  
0.48905379729033566,  
-0.6281827821606347,  
1.322074656325554,  
-1.4761484868509396,  
0.2859918816514792,  
-1.0033541595176405,  
0.8264053813863532,  
0.622010811103528,  
1.1636747207646185,  
-0.31883271288389914,  
-0.0013981850979601159,  
-0.09999405171802342,  
1.3085280853238759,  
-1.3727969089464465,  
-0.08341159264840771,  
1.6249369276484606,  
-0.28082331570516694,  
1.863294400254821,  
2.2932652495309953,  
1.4849536675442596,  
0.6811668802751195,  
1.5380110980874968,  
-0.6615225065895972,  
0.4000828281024264,

```

0.33932121588009856,
0.48855764825038867,
2.5371111232777053,
-0.7260430040504564,
0.09005940379987407,
-0.8762980817992282,
-0.23800314057977784,
0.9728027685352436,
-0.20857834368009137,
0.6148333457084475,
-1.5171898336040224,
0.8658542069129427,
-1.6478287868490311,
0.5770049367106069,
0.134497700004433,
-0.11612046371881249,
1.5826352840237945,
1.6045820840261675,
-0.08805669980595342,
-1.507745125921201,
-0.11276651576435986,
0.07206005105970639,
-1.7788122679933258,
-0.002988765738482436,
0.7255804452314191,
2.7661804504965604,
-3.1943627011957507,
-0.07088434770936546,
0.10949711075632612}],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1}},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#1'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.833109640228284],
                           [12, 6, 0, 0, -5.610198560557998],
                           [20, 10, 0, 0, -4.60990156720048],
                           [28, 14, 0, 0, -3.786810221698121]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.22008850097656e-05,
            'zne_values': { 'degree': 0,

```

```
-6.833109640228284,  
-5.610198560557998,  
-4.60990156720048,  
-3.786810221698121]],
```

```
'extrapolated_value': -7.542235599448719,  
'others': { 'beta_coefficients': [ 2.1875,  
                                   -2.1875,  
                                   1.3125,  
                                   -0.3125],  
            'cost_richardson_zne': 11.390625,  
            'sorted_expectation_vals': [  
  
                'sorted_noise': [6, 18, 30, 42]],  
            'sampled_data': [ [ 4,  
                                2,  
                                0,  
                                0,  
                                -6.833109640228284],  
                              [ 12,  
                                6,  
                                0,  
                                0,  
                                -5.610198560557998],  
                              [ 20,  
                                10,  
                                0,  
                                0,  
                                -4.60990156720048],  
                              [ 28,  
                                14,  
                                0,  
                                0,  
                                -3.786810221698121]],  
            'sampling': 'default'}}},  
{ 'config': { 'ansatz': { 'gateset': 1,  
                          'layer': 30,  
                          'ugate': { 'coefficients': { 'bn': [ 0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0],  
                                                                'cn': [ 0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5],  
                                                                'r': 0},  
                          'time': {'max': 10.0, 'min': 0.0},  
                          'type': 'ising'}}},  
  'init_param': { 'value': [ 0.4349098035102067,  
                              0.5281397824211302,  
                              0.6402833431740305,  
                              0.701719039924861,  
                              0.8953768954552646,  
                              1.4118719346144908,  
                              2.230113621742168,  
                              2.6548053250922607,  
                              3.10433397641996,  
                              3.1043339764199596,  
                              4.146783795497047,  
                              4.146783795497047,  
                              4.149760661232294,  
                              4.149760661232294,  
                              4.223539194779984,  
                              4.223539194779984,  
                              6.7727886487081435,  
                              6.7727886487081435,  
                              7.243551717080481,  
                              7.282491880183138,  
                              7.282491880183137,  
                              7.282491880183138,  
                              8.806989173945695,  
                              8.80698917394569,
```



9.706285648296737,  
9.809777023075187,  
9.837118725166619,  
10.701586770517197,  
11.185931122995514,  
11.185931122995514,  
0.39919688039300266,  
1.4533249104921768,  
0.7852252158845567,  
-0.4957764525834907,  
-0.3354719566017423,  
0.16097458435951068,  
-0.21971891747261646,  
1.5370438656668401,  
0.26531517225969137,  
-0.6386119707402834,  
0.37748437574064975,  
1.2333814560270282,  
0.5934062959304571,  
1.633059089666515,  
0.31170790405459564,  
0.3995146629536743,  
-0.11155094016301184,  
0.8138063699882787,  
0.019467271717771087,  
-0.38186317682975884,  
-2.778803401027002,  
0.7887082829537533,  
-3.1348050840084074,  
-1.5109224736536222,  
-0.38589710406642097,  
-1.105927053527023,  
0.3451707237315739,  
0.6290043291617069,  
-1.834722402137916,  
-1.0551446159380258,  
-1.3581260193610523,  
0.9666180881078981,  
-0.05759676522292653,  
1.1866392284178628,  
-1.1308471740259582,  
0.34327443183487805,  
0.17662613760194443,  
-0.043135596735193626,  
-0.03667546733606037,  
-0.4901895513664937,  
-1.0399227541005371,  
0.4880459765792483,  
0.053089003166299456,  
-0.6259966396796703,  
0.03159579372412852,  
-0.09798805529491862,  
0.052872660107769434,  
1.490194875693949,  
0.22167423812356596,  
-0.33497064714209324,  
1.0144679614160885,  
0.01608415027143934,  
0.49167899744128424,  
0.12491439548600353,  
-0.1329609067962543,  
0.8639852596635488,  
-1.6607871811173882,  
0.2801513494447602,  
0.3908501333463579,  
0.6044891435983025,  
0.08637544621327581,  
1.2270127042754213,  
0.11860545946003472,  
-0.13066468162372125,  
-0.998222267933649,  
-1.2643438207146234,  
0.7835210648968657,  
0.8370312354478452,  
0.06527740704106412,

```

-1.0235950282739155,
-0.705070781232052,
0.037682760290170314,
1.4778132318704873,
1.7053977225841355,
-0.1291331271719845,
0.1648924115529835,
2.208642048449397,
1.1885953055185114,
-0.8138037079028133,
0.6715189891287302,
0.7819572861394978,
-0.4022064636590845,
-0.3927127310055937,
-0.4118784323717791,
1.3463239978578432,
-0.3323606385924751,
0.6664683657180488,
1.58852177854836,
-1.212203169826861,
-0.031436536468697034,
0.5094262403458202,
-0.0616688967239856,
-0.0666169691754888,
-0.7277012125404719,
-0.12684196683036533,
0.5325519345188151,
2.2778420441533447,
0.8735933622003313,
0.9907279467768721,
1.1448787224294625,
0.4291077507842401,
-0.21356701746617238,
1.7174041100732933,
0.1885112766205208,
0.3630143936992631,
0.6395640633025061,
-0.2937369198596852,
-0.18128670495631546,
0.9504587478277511,
-0.6241293783488098,
1.8733903679237267,
0.4875344831143031,
-0.9182747577406853,
0.850791268752179,
-0.46183623376516114,
-0.634145646812118,
-0.9165900492445601,
-0.8973746003077631,
-0.879107286657044,
0.15645801311276636}],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},

```

```

'file_name_prefix':
'AUTOMATE_ising_noise_free_time_evo_ric4_unifrom_scaling_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]]},

'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.672780190342767],
[12, 6, 0, 0, -5.522238922989663],
[20, 10, 0, 0, -4.5712287338679385],
[28, 14, 0, 0, -3.7801844878377153]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 4.124641418457031e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -7.335239083087297,
'others': { 'beta_coefficients': [ 2.1875,
-2.1875,
1.3125,
-0.3125],
'cost_richardson_zne': 11.390625,
'sorted_expectation_vals': [
-6.672780190342767,
-5.522238922989663,
-4.5712287338679385,
-3.7801844878377153],

'sorted_noise': [6, 18, 30, 42]}},
'sampled data': [ [ 4,
2,
0,
0,
-6.672780190342767],
[ 12,
6,
0,
0,
-5.522238922989663],
[ 20,
10,
0,
0,
-4.5712287338679385],
[ 28,
14,
0,
0,
-3.7801844878377153]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.32980400918867037,
0.7818596814437996,

```

0.9680306497310072,  
1.0586432954274991,  
1.7663116348413028,  
1.8956491295658664,  
2.0436116769319477,  
2.0436116769319477,  
2.0436116769319477,  
2.1846619555479685,  
2.1846619555479685,  
4.516997836642403,  
4.516997836642403,  
5.3166564351730035,  
5.320130741320412,  
5.399447086770547,  
5.400046100307029,  
5.400046100307029,  
5.400046100307029,  
5.400046100307029,  
5.400046100307029,  
7.097750404951498,  
7.618222769006738,  
7.956666567531361,  
7.956666567531361,  
8.961109688308255,  
8.961109688308255,  
11.028500695271937,  
11.5809418583784,  
11.5809418583784,  
11.5809418583784,  
0.24114173221382337,  
1.3754512844042854,  
0.9720111739434927,  
-0.29877116871955545,  
-0.029737313498699618,  
0.3185153459444675,  
-0.31840745367437817,  
0.6801602139502809,  
-0.015407845998522466,  
-1.114484654283524,  
0.22997676136047449,  
1.5201821520192487,  
0.3217486942799661,  
0.43678760134757944,  
0.17618749246228715,  
0.7010359103792874,  
0.3446701255696699,  
1.4700166379981474,  
0.3471333265905846,  
-0.968444017764766,  
-1.1485269521507444,  
0.3282504398407059,  
-0.7898554413193151,  
-0.22157985789400653,  
0.4570931682042821,  
-0.22158635023930806,  
-0.36549836384277606,  
-0.2366283880333898,  
0.4114765778384287,  
-0.7694643480660831,  
-0.40507000819737765,  
-0.6576468499882752,  
0.2023600853039859,  
-1.2917280200640486,  
0.32702771491506877,  
-0.07546137553843744,  
-0.7713328193108817,  
-0.8163562225239717,  
-0.07772489804090182,  
-0.32841576637855896,  
-0.05728139293162625,  
0.8564947637293437,  
0.15384434981345546,  
0.41944080031994563,  
0.16884394015055976,  
-0.010490661309829376,  
-1.3198249528292274,

```
0.07128101806419536,
0.03515395872296211,
-0.09826644736389979,
-0.06882299183557238,
-0.7062443088386591,
-0.5280915567870916,
0.14860690208212682,
0.338235073517239,
0.012130023587481156,
-0.037483081002571056,
0.8881056862099682,
0.06312673968269537,
-0.44738898868242327,
-0.2463284936792685,
1.1708672891281489,
0.5297819270424092,
-0.5463182826640249,
-1.667403353493104,
1.3713545814180228,
0.9413366263710182,
-0.021951472934173096,
1.0345046397029698,
-0.8002739446090432,
1.076242700462428,
0.04994674089563993,
-1.446235170371471,
-0.3268246709561185,
0.6264234635598642,
-1.2465048991503196,
0.1169092097763034,
1.2453937722962254,
0.7220287063888942,
0.8114212311039525,
0.18333674920471413,
0.7345776889004225,
0.9807678368065545,
0.8703572591074042,
0.28720991162605214,
-0.9085817320602367,
1.1216621938695932,
1.1327477502874412,
-1.8285395156530388,
1.4231155243966302,
0.08156271721069372,
0.18027327076782884,
-0.10302960773112253,
-0.5560482514096969,
-0.09484541903718098,
0.5886430341587933,
-1.1674014904638685,
-0.03940950630369794,
0.2792515765657198,
0.08214125135098017,
0.04344924016389119,
-0.7787970529711157,
0.07887586110139429,
0.7532574519080738,
0.17107625040009872,
-0.4128415687827808,
1.3723943620028143,
1.4278581324344195,
0.5879977529754344,
0.28910810409117477,
-1.4412046993697643,
1.624844367134446,
0.19366683662945536,
0.3179841250458877,
0.5357240606734743,
1.5680682524509713,
0.04418323830986127,
0.2311137213204739,
2.8741283660232546,
0.9612408402592636}},
'noise_profile': { 'noise_on_init_param': { 'status': False,
'value': 0},
```

```
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#5'},
'redundant': { 'identity_factors': [[0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
've': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [[4, 2, 0, 0, -6.720969040841222],
                          [12, 6, 0, 0, -5.577003279994282],
                          [20, 10, 0, 0, -4.626982768162378],
                          [28, 14, 0, 0, -3.833723359776359]],
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 5.054473876953125e-05,
            'zne_values': { 'degree': 0,
                             'extrapolated_value': -7.37730143513569,
                             'others': { 'beta_coeffieicients': [ 2.1875,
                                                                    -2.1875,
                                                                    1.3125,
                                                                    -0.3125],
                             'cost_richardson_zne': 11.390625,
                             'sorted_expectation_vals': [
-6.720969040841222,
-5.577003279994282,
-4.626982768162378,
-3.833723359776359],
                             'sorted_noise': [6, 18, 30, 42]},
                             'sampled data': [[ 4,
                                                  2,
                                                  0,
                                                  0,
                                                  -6.720969040841222],
                                                [ 12,
                                                  6,
                                                  0,
                                                  0,
                                                  -5.577003279994282],
                                                [ 20,
                                                  10,
                                                  0,
                                                  0,
                                                  -4.626982768162378],
                                                [ 28,
                                                  14,
                                                  0,
                                                  0,
```

```

-3.833723359776359]],
'sampling': 'default']]],
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.46756606893882113,
0.46983859896604685,
0.5133985927484581,
0.5133985927484581,
0.5133985927484581,
1.4016794842576101,
1.6914116785996751,
1.691411678599675,
1.6941756924801525,
1.6941756924801528,
3.749864451084885,
3.749864451084885,
3.7498644510848855,
3.7498644510848855,
4.969636107010246,
4.969636107010246,
4.969636107010246,
4.969636107010246,
5.983107385388112,
5.983107385388112,
8.378949246097575,
8.378949246097575,
8.635680633753974,
8.635680633753974,
9.108807770997622,
9.108807770997622,
9.108807770997622,
9.960036411132767,
10.436643041587223,
10.716533289695375,
0.5466515694267952,
3.318518267704871,
0.40678728382369284,
0.6290091030083763,
-0.4770983795300032,
-0.7455483390932742,
0.1630064768968011,
0.4889724943271746,
0.10596004146863507,
-1.4759536729524354,
0.957604974713893,
0.6004514101153323,
0.0725728265044025,
1.4994700617905987,
0.15508641282397265,
-0.15494303336158094,
-0.5663845144966579,
2.6663065398173496,
-0.27086336898318036,
-1.1828784814640632,
-0.295045685212881,
0.6236994649007899,
1.1769360493970402,
1.7159795997719172,
-0.3019600780315931,

```

0.651545330446025,  
-2.0782382222089724,  
0.3186344830290561,  
-0.2815476257680432,  
0.4067635126151388,  
-0.8228051832090519,  
-0.4154478828430832,  
2.3723163321732827,  
0.931436930203099,  
0.9804374423714106,  
0.058895326584719035,  
0.3167253661454302,  
0.3390503539155689,  
-0.5024758650485814,  
-0.2425872659725522,  
-0.6703364135359525,  
-0.147558399690948,  
1.1644296968010859,  
0.5475507579506065,  
0.1736068872874216,  
0.30547527216138975,  
0.5300773267023443,  
0.7722201656261689,  
-0.6858549484151734,  
-0.16073113081558088,  
-1.197458252004488,  
-0.507307082981415,  
-0.16437738354723153,  
0.2647407403580543,  
-0.45930133674563567,  
-0.22673992276266391,  
1.8127715449849986,  
-1.4334128748253496,  
-0.759404859696163,  
1.2431110601081345,  
0.8953271645792334,  
0.6963251389999259,  
-0.23147129445607595,  
0.3638861144885483,  
2.2394622330281906,  
1.543816783446588,  
1.7535830084845025,  
-0.3169637330795974,  
0.2453194636587019,  
2.0076391670843647,  
0.286017506499548,  
0.6600449842625801,  
0.19782118041633945,  
0.05463577684798935,  
0.4755005320975566,  
0.055207215781380096,  
0.06969685609102444,  
0.2645328829673777,  
-0.01235845210357445,  
1.01982876424508,  
2.262492417600915,  
1.3443784687440867,  
0.10698144982242018,  
0.428081928456963,  
-1.5494921893757727,  
1.0701294130786736,  
0.39987519173641656,  
0.06301738855484718,  
-1.6711192593807125,  
0.26920159401030147,  
-0.08358711295948693,  
0.4054786916979446,  
-0.5013194648307361,  
2.126550690771933,  
0.10959959792145137,  
0.4205360694942305,  
-0.586878230803869,  
-0.3381608637889511,  
-0.5055401953468239,  
-0.45995744817477163,



```

0.07999668782445096,
-0.4269018063306222,
0.9588276598807326,
1.042187521522261,
0.07821502449201799,
0.6777167152964713,
0.4177387822172794,
-0.18721284346239236,
-0.8064458441104513,
2.8712851588196218,
0.7141862154478698,
-0.9976723444987857,
-0.8529435737233043,
1.9602636639541733,
1.2634521849205176,
-0.7170870121313951,
0.31227949023655405,
-1.0451293221946831,
-0.6787852158143914,
1.8581833428208436]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#6'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.4878948983695235],
                          [12, 6, 0, 0, -5.297876077058435],
                          [20, 10, 0, 0, -4.3310003849914125],
                          [28, 14, 0, 0, -3.539166940153787]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 5.91278076171875e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -7.181614508121177,
                           'others': { 'beta_coeffieicients': [ 2.1875,
                                                                -2.1875,
                                                                1.3125,
                                                                -0.3125],
                                         'cost_richardson_zne': 11.390625,
                                         'sorted_expectation_vals': [
-6.4878948983695235,
-5.297876077058435,

```

```
-4.3310003849914125,  
-3.539166940153787],
```

```
        'sorted_noise': [6, 18, 30, 42]],  
    'sampled data': [ [ 4,  
                        2,  
                        0,  
                        0,  
                        -6.4878948983695235],  
                      [ 12,  
                        6,  
                        0,  
                        0,  
                        -5.297876077058435],  
                      [ 20,  
                        10,  
                        0,  
                        0,  
                        -4.3310003849914125],  
                      [ 28,  
                        14,  
                        0,  
                        0,  
                        -3.539166940153787]],  
    'sampling': 'default']},  
{ 'config': { 'ansatz': { 'gateset': 1,  
                          'layer': 30,  
                          'ugate': { 'coefficients': { 'bn': [ 0,  
                                                             0,  
                                                             0,  
                                                             0,  
                                                             0,  
                                                             0],  
                                                             'cn': [ 0.5,  
                                                             0.5,  
                                                             0.5,  
                                                             0.5,  
                                                             0.5,  
                                                             0.5],  
                                                             'r': 0},  
                          'time': {'max': 10.0, 'min': 0.0},  
                          'type': 'ising'}},  
    'init_param': { 'value': [ 0.27654223573266234,  
                                0.27654223573266246,  
                                0.27654223573266246,  
                                0.4643738922966213,  
                                0.6582164862517121,  
                                0.6582164862517121,  
                                0.6582164862517121,  
                                1.3424523496852623,  
                                1.47635793598756,  
                                1.47635793598756,  
                                3.385550316280557,  
                                3.385550316280557,  
                                3.385550316280557,  
                                4.494062371253785,  
                                4.494062371253785,  
                                5.0204758683966135,  
                                5.023404188660082,  
                                7.05704094573064,  
                                7.087391629397132,  
                                7.533802135057517,  
                                8.245970909352765,  
                                8.390887842007308,  
                                8.390887842007308,  
                                8.703391612007538,  
                                8.703391612007538,  
                                9.485545381639698,  
                                9.485545381639698,  
                                9.849437794456351,  
                                9.849437794456351,  
                                10.799155842585746,  
                                -0.12708089143278917,  
                                1.4168148977025445,  
                                -0.13519536748631492,
```

-0.32308714516775877,  
0.06981336221044306,  
-0.034321895006426455,  
-0.18209443759399158,  
-0.024858958594746107,  
0.664488174834645,  
0.6897317665852637,  
-0.008774731192519907,  
0.625642551337688,  
0.6862410821653743,  
-0.7670419540542446,  
-0.48055390132433673,  
1.573964677292243,  
-1.0555745677813198,  
1.3159721165631335,  
-0.9138502497993347,  
-0.4641566084568084,  
-0.06966564000847691,  
0.039012746519005555,  
1.0827641697579717,  
1.2190093772283843,  
1.5391150382377632,  
-0.6675581491933664,  
0.09104662559232415,  
0.5283818781579022,  
0.04478118244404365,  
1.5836075485651113,  
0.251932560991488,  
-0.3949560381811925,  
0.8854639388207172,  
-0.8611267164776638,  
1.566928747241295,  
-0.15445151319573347,  
-0.01396050433941564,  
0.8172620115356718,  
-0.014658132241289147,  
-0.6623010385304499,  
0.6299284572753584,  
-0.15026947869759505,  
-1.2293112897827836,  
-0.5768656731979434,  
1.231557922062332,  
-1.447872926116422,  
1.4918722706131171,  
0.31945486783385635,  
0.43870804207253483,  
1.3582636256308331,  
-0.8478398442626237,  
0.799518029891469,  
0.5539369896048497,  
0.13453197415145846,  
0.7167498104862234,  
-0.06589109804263343,  
0.041038724923082276,  
1.151975756926885,  
-0.052026838729968425,  
0.3952978000808587,  
-1.1754748970457833,  
-0.01965607042871015,  
-0.2456324144680547,  
-0.01136184217607491,  
0.022503168314325715,  
1.1777923723104653,  
0.14554117253938412,  
-1.2287946167385297,  
-0.9683737383161766,  
1.073329622962756,  
-0.7143583802799215,  
-0.3545002682598469,  
-0.31906110571926777,  
-0.9597094503848127,  
0.8825903987559673,  
-0.08273415521500459,  
0.2895039435279609,  
-0.3388594197258312,

```

0.2406459434933063,
0.3824128671502841,
-0.5390555829405563,
0.3757684495816124,
-0.5015719636333678,
0.3958257688275076,
-0.6428354095046468,
-0.9178624992467067,
0.29327306512581747,
-0.09193285724698198,
0.1770091195095364,
0.6803523512851801,
1.05525770275555,
-0.4646437845139076,
2.2560908642344026,
-0.7500939262299234,
1.92959092052175,
-0.36895777993274226,
-0.04538283416771957,
1.2529586558275392,
-0.57805717638909,
0.3080585810325818,
0.031910210614104206,
0.18519950010488512,
1.3888566879174211,
1.087260914864616,
0.15259355623633358,
-0.08810167996863522,
0.07467874103808375,
1.4444893382870363,
-1.446220680213735,
0.8215180856176293,
2.0151723649306295,
0.13454991965456886,
0.21923381008732426,
0.31112145477192793,
-0.8977876743954992,
0.10239876571985529,
-1.0132922278363503,
-0.3794863035801566,
0.8437803973608401,
1.111671691788496]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#2'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,

```

```

        'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.514930884689278],
                           [12, 6, 0, 0, -5.310706408751286],
                           [20, 10, 0, 0, -4.328532484009807],
                           [28, 14, 0, 0, -3.520772220894083]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.076957702636719e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -7.21519860734783,
                            'others': { 'beta_coefficients': [ 2.1875,
                                                                -2.1875,
                                                                1.3125,
                                                                -0.3125],
                            'cost_richardson_zne': 11.390625,
                            'sorted_expectation_vals': [
-6.514930884689278,
-5.310706408751286,
-4.328532484009807,
-3.520772220894083],
                                'sorted_noise': [6, 18, 30, 42]},
                            'sampled data': [ [ 4,
                                                  2,
                                                  0,
                                                  0,
                                                  -6.514930884689278],
                                                [ 12,
                                                  6,
                                                  0,
                                                  0,
                                                  -5.310706408751286],
                                                [ 20,
                                                  10,
                                                  0,
                                                  0,
                                                  -4.328532484009807],
                                                [ 28,
                                                  14,
                                                  0,
                                                  0,
                                                  -3.520772220894083]],
                            'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                           'layer': 30,
                           'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                           'time': {'max': 10.0, 'min': 0.0},
                           'type': 'ising'}}},
  'init_param': { 'value': [ 0.3463233138801294,
                              0.34632331388012944,
                              0.3463233138801294,
                              0.3463233138801293,
                              1.2403205490491955,
                              1.38033446895038,
                              3.6939218351946623,
                              3.6939218351946623,
                              3.693921835194662,
                              3.693921835194662,
                              3.9412089126587,

```

3.9412089126587,  
3.9412089126587007,  
3.9412089126587007,  
4.8310999601027795,  
4.870844593548848,  
4.900228671797898,  
4.9002286717978984,  
4.9002286717978984,  
4.900228671797898,  
5.70167657474683,  
6.21188441483336,  
6.21188441483336,  
6.686419232103557,  
6.723504371727371,  
7.618130890836856,  
7.618130890836856,  
9.420364260644014,  
9.420364260644014,  
10.775132222422771,  
-0.3525750090684208,  
1.2748976558430758,  
-0.16146998454247521,  
1.3224575871686013,  
0.0349265192498484,  
0.36138711032415904,  
-0.5043488106619078,  
0.7634801084306476,  
-0.3536814593617201,  
0.9606809354246906,  
-1.1143894720984433,  
-0.45289061390722213,  
-0.1605333784989486,  
-1.594210268458609,  
-0.09465166736510336,  
0.11132251138190599,  
1.004235666711761,  
-0.23115493220428254,  
0.9451761882751959,  
-0.3707284170975133,  
-0.17782948231634454,  
-0.18433417990028922,  
-0.06421460341189031,  
-1.155489001827845,  
-0.2074908306187579,  
-0.036360325422879626,  
0.5283181819327893,  
0.3603171208434518,  
0.6819349944270952,  
-0.2733083993242672,  
0.7075879191324372,  
-0.042779623335368125,  
0.7032435595714176,  
-0.7363942983542189,  
0.9583235184546098,  
-0.5892472427173001,  
-0.7139877518112785,  
-0.12446625268371646,  
-0.439646171766664,  
0.7129808957109575,  
0.3373075268097138,  
0.3345550414369601,  
-0.38068761370203624,  
0.07864964370676188,  
-0.3383553862900091,  
0.6633419895127639,  
-0.578720703894673,  
0.486162302530746,  
-0.06112668401522289,  
0.34417654454775265,  
-0.09182266750822224,  
0.012215000731405658,  
0.5658291917160285,  
-0.16728488191683846,  
0.3754616489195623,  
-0.30497315054621493,

```
-0.7559846133933803,
0.9474959005813702,
-0.5904076686561035,
-0.2620011537974264,
0.1328515248519479,
-0.44066408562446224,
-0.7849425610737308,
0.44059474279745625,
-0.04646983134951628,
0.27897770882356554,
0.36838349877106535,
1.1610009997739648,
0.9058411506824863,
0.3119955912029684,
-0.5265683545543336,
1.0661822357546584,
0.8560044406571757,
0.5004409227892788,
0.5192086876555008,
-0.0019665558968806392,
-0.23949800878404184,
0.32563956832297103,
0.795323960796817,
1.5213873243487468,
0.8637563634588281,
0.07945031145196896,
1.7583315097859118,
0.5335864884320034,
-0.1366270407456156,
-0.9111102828185913,
-0.41650979281126865,
0.20926691692934202,
0.2776061293997892,
1.4257231544028384,
-0.10754544247245298,
1.0035199546983695,
1.1162390986419686,
1.7211522778091677,
-1.4332245925979028,
1.4417595659646931,
-2.106784537892007,
-0.6878309432904478,
-0.20360639354575213,
0.6373705186717347,
0.051333236332203484,
-0.35868991955772395,
-0.24365907607080922,
1.619736185871098,
0.5895182658245096,
-0.6086170057348131,
0.39774539931448055,
1.409837948786624,
0.17438880158294706,
-0.0415548590378924,
0.1413623732119859,
-0.8192475896231625,
0.5823982141653503,
-0.8462302367353051,
-0.60454163385331,
1.8216629921858374,
1.2634551976945552,
-0.40200420270308274,
-1.5954759495917508,
-1.7732438129518737]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0 },
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
```

[illegible]



```
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}},
'init_param': { 'value': [ 0.48023040681030116,
0.7029544315470944,
0.722671987246733,
0.9307929858945541,
0.9307929858945543,
2.546598088688794,
2.546598088688794,
2.546598088688794,
2.546598088688794,
5.184334435330857,
5.195111458618343,
5.47436411399969,
5.47436411399969,
5.47436411399969,
5.47436411399969,
5.47436411399969,
6.068336244524409,
6.068336244524409,
7.838605251840715,
7.912250316107233,
7.912250316107233,
8.562517202814183,
9.063385768597811,
9.216218862905647,
9.216218862905647,
10.84047371877396,
10.84047371877396,
11.044358714867027,
11.375406566932424,
11.375406566932424,
0.18886549713610382,
0.6040291443391601,
-0.9727809979878402,
3.008209947509642,
0.3239743149147096,
-0.643987619924633,
1.0739882269552894,
0.4935103262912805,
-1.1713673989643745,
0.32339055167680386,
-0.8254170399860232,
3.387204293956005,
0.5437302598099015,
-0.6585961721148387,
1.0903163929414719,
-1.5261906384818182,
1.102349928722959,
-0.7373436929054379,
0.1712635196093208,
1.2086697581514199,
-0.4977298668106944,
-0.8828019932256734,
-0.13051782426094366,
0.048744185631251574,
-1.0535030780910155,
0.5224555306604155,
-0.9502111367985572,
-0.2573420205933925,
1.5833039752620888,
1.3806480812363842,
0.3864833677006273,
-0.0006284730712113316,
0.6487740408134013,
1.697829570896293,
```

-0.20023867528920775,  
-0.32438662287273723,  
1.3674639807988553,  
-1.5592347723565667,  
-0.6294582959326964,  
1.111157394071659,  
1.4895912958038178,  
-0.7203901402661329,  
-0.027076706863032294,  
0.009574786781832467,  
1.1437695218822916,  
0.11720143179507149,  
1.0973549625545624,  
-1.0756168303605034,  
-1.5785125289756954,  
-0.42999007233668873,  
0.7592603373612552,  
0.7357293999316703,  
0.03766014972468404,  
1.450035910180884,  
-0.08978031589044846,  
0.7176267391661779,  
-2.3377280976646966,  
0.3878354316208249,  
-0.8070070584177742,  
0.07084117333557359,  
-0.008998168433091903,  
0.6612796195456235,  
0.6287929626789847,  
0.8601333603228948,  
-0.7786354708155643,  
-0.144476679155352,  
0.39492950957300044,  
-0.20012968159779548,  
0.01326107241550192,  
-0.5649340596325207,  
-0.020398755490040426,  
0.6333499066300691,  
0.400844220606507,  
0.5954749034740784,  
0.8700413681534388,  
1.315868035063538,  
0.9914334712755634,  
0.10418309057983809,  
1.1095991500751576,  
-0.1712743534684691,  
-0.2730581386141925,  
0.1453142903679217,  
-0.3813955795194703,  
0.1280814941289577,  
-0.5627986213807415,  
-1.0576722394029623,  
-1.98721560251358,  
0.519862592148374,  
1.03695228961559,  
0.21101375663462807,  
-1.750252459751414,  
-1.1450993785481438,  
-2.2517541986316916,  
-1.5456964825715331,  
0.6026638989139771,  
0.47561448130168205,  
0.08201672609434518,  
0.47464262797792917,  
-0.14585857152212733,  
0.08636040211648545,  
0.7388192170680543,  
1.071366965639021,  
2.5115163876343742,  
-0.4286872636197954,  
-0.2977998181526895,  
0.46569070003689333,  
0.2115019986130443,  
-0.5123638542481742,  
0.09024611293676764,

```

-0.3380729423866059,
1.6314769884628497,
1.3338027138849353,
-0.7442166070564612,
1.2186722356710948,
1.584709484399307,
-0.6554175978902271,
0.36887213174672207,
-1.365021965092438,
-0.4623126041921459,
0.4869420326570461]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1}},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.75124151968758],
                          [12, 6, 0, 0, -5.575778108730956],
                          [20, 10, 0, 0, -4.6095181057209125],
                          [28, 14, 0, 0, -3.8092488284193005]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.363059997558594e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -7.43092846634528,
                           'others': { 'beta_coeffieicients': [ 2.1875,
                                                                -2.1875,
                                                                1.3125,
                                                                -0.3125],
                                       'cost_richardson_zne': 11.390625,
                                       'sorted_expectation_vals': [
-6.75124151968758,
-5.575778108730956,
-4.6095181057209125,
-3.8092488284193005],

'sorted_noise': [6, 18, 30, 42]],
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -6.75124151968758],
                  [ 12,
                    6,
                    0,
                    0,
                    -5.575778108730956],
                  [ 20,
                    10,
                    0,
                    0,
                    -4.6095181057209125],
                  [ 28,
                    14,
                    0,
                    0,
                    -3.8092488284193005]]]

```

```

        6,
        0,
        0,
        -5.575778108730956],
    [ 20,
      10,
      0,
      0,
      -4.6095181057209125],
    [ 28,
      14,
      0,
      0,
      -3.8092488284193005]],
    'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                                'time': {'max': 10.0, 'min': 0.0},
                                'type': 'ising'}}},
  'init_param': { 'value': [ 0.5118290521669792,
                              0.9034573591840084,
                              1.0514460879099101,
                              1.1283814725964603,
                              1.1293980629167455,
                              1.6874068541059999,
                              1.8362001710030256,
                              2.594529848453243,
                              2.5949023258749775,
                              4.384420392533986,
                              4.804388533064279,
                              4.8044974726668155,
                              4.925049921883437,
                              4.925049921883437,
                              6.055903002618935,
                              6.0650337145794,
                              6.06510024924717,
                              6.06510024924717,
                              7.719643893437192,
                              7.719643893437192,
                              8.110116534451196,
                              8.374448879129652,
                              8.374448879129652,
                              9.29045698473019,
                              9.2929923765699,
                              9.977025927736127,
                              9.977025927736127,
                              9.977438303479875,
                              11.277250876863835,
                              11.588901828478656,
                              -0.5970483257864091,
                              1.048395642841534,
                              0.3563299433581316,
                              2.04182497417867,
                              -1.0659189653240388,
                              -1.5711224255679066,
                              -0.6854026923334804,
                              1.3002799990574343,
                              0.334979527312172,
                              -0.41771661057992626,
                              -0.5255960701407614,
                              0.9200835209290303,

```

0.5840294212204432,  
0.4309612994747514,  
0.010788324288593443,  
0.8398650983618882,  
0.35555521736822654,  
0.33383672576306345,  
-0.03972798241435421,  
-0.5808926346218187,  
-0.6217506829607715,  
-0.022449055124049946,  
-0.4671428723737863,  
1.3840583406465645,  
3.321823997583478,  
1.9516123562000514,  
2.109430068020724,  
0.17138900458361278,  
1.0734765554988877,  
1.1591682463434823,  
-1.5085197494005436,  
0.3709514368460093,  
-0.08354812013321816,  
-0.6849414455501801,  
-1.1807064172516142,  
0.1889544406654655,  
0.45125852432694835,  
0.40946867023093825,  
0.9591749175330944,  
0.862406962512403,  
-0.47565451021668054,  
0.14791469386649075,  
0.012323642821740255,  
-0.3613715829994197,  
-0.6520104899254531,  
1.1500641632479522,  
0.11480411675389499,  
0.37929728325133344,  
-0.12818017639377846,  
1.5548403554359806,  
-0.08803696907532751,  
0.16058007713541472,  
-0.2835300528775952,  
1.4317946638041426,  
0.04218231832431045,  
0.6164913379423986,  
-0.5546192578057587,  
-0.0016176435191898148,  
0.3455446109244303,  
-0.7983090776945799,  
0.06548494602750325,  
0.09601011255154575,  
-1.274882751616874,  
-0.6639296860891427,  
0.08468574728059233,  
0.09178155492125434,  
-1.9746588496307496,  
1.363083624655819,  
-0.11754172722968637,  
-1.7454296260872237,  
0.689437867548643,  
0.09536601432398076,  
2.1875690275532618,  
1.9737367040865754,  
0.19623670188051764,  
1.3618525198389628,  
-1.6551377680800423,  
-1.2796187335858575,  
-0.02979150349567955,  
0.3655877448114123,  
-1.339933806945279,  
-1.6131280858420662,  
1.1268021774842836,  
0.7853899025443938,  
-1.214954346638235,  
1.881374469676006,  
-2.2108375055617597,

```

0.38299461206746305,
-0.062378913993248956,
-1.0812916442950207,
0.19113842494911862,
0.43947065709017896,
1.4340329690981122,
-2.1914706359927933,
1.683520172253517,
-0.4151753501170658,
0.2652280013518245,
-0.09829123134965576,
-0.4033858255054015,
-0.09488290407421365,
1.1087820722198931,
1.3758250784849964,
0.3693308876448478,
-1.4774754586810708,
0.45790576106810227,
-1.318961759734687,
1.2898775251023542,
0.5291693857421421,
-0.7225860054677886,
-0.6024865845145562,
1.1258609582335735,
1.4545810101615688,
0.4988359655120556,
0.39968483637691726,
1.4778005154845164,
1.6358502222921723,
0.07081811420225437,
1.5336807499569445,
-0.7595143926860392,
0.07947795439670366}],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#10'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -6.4060332381961675],
                          [12, 6, 0, 0, -5.147683680770249],
                          [20, 10, 0, 0, -4.13060369641699],
                          [28, 14, 0, 0, -3.301960374777364]],
         'degree': 0,
         'method': 'richardson',

```

```

'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 4.267692565917969e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -7.14219439129857,
'others': { 'beta_coefficients': [ 2.1875,
-2.1875,
1.3125,
-0.3125],
'cost_richardson_zne': 11.390625,
'sorted_expectation_vals': [
-6.4060332381961675,
-5.147683680770249,
-4.13060369641699,
-3.301960374777364],

'sorted_noise': [6, 18, 30, 42]},
'sampled data': [ [ 4,
2,
0,
0,
-6.4060332381961675],
[ 12,
6,
0,
0,
-5.147683680770249],
[ 20,
10,
0,
0,
-4.13060369641699],
[ 28,
14,
0,
0,
-3.301960374777364]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'ising'}}},
'init_param': { 'value': [ 0.23818326834520384,
0.242015507589488,
0.5292100600091615,
0.5598196968290768,
0.5598196968290768,
2.3451854381830244,
2.3451854381830244,
3.8453025861748578,
3.8453025861748578,
4.395137112369032,
4.408833101975425,
4.829585475162733,
4.867115107997544,
5.058958687371625,
5.058958687371625,
5.058958687371625,
5.581243202757385,
6.011433944644334,
6.011433944644334,
8.358003932454157,

```

8.358003932454157,  
8.358003932454157,  
8.371420896509267,  
8.783744346022278,  
8.783744346022278,  
9.34189587380724,  
9.34189587380724,  
9.39608576624051,  
9.726727464435275,  
10.95102910414735,  
0.14721560345391302,  
1.0205767628001141,  
0.40564926087548847,  
-1.9238321605823567,  
-0.04729505851188324,  
0.482541600628026,  
0.1152155677775581,  
0.8524320040134185,  
0.42380767990264745,  
-0.6219665889019169,  
-0.05759638705357143,  
0.8161328242190486,  
0.7425402472775383,  
0.7535392998290764,  
1.8314745216576223,  
1.3334023135030668,  
0.05552193989453376,  
0.9691374289368472,  
-0.07338372949421543,  
-0.6690664310785921,  
1.168533104165511,  
-0.01962836639606316,  
0.6576122461884292,  
-0.037637936325233226,  
-0.0009647519828692927,  
0.4524839512418326,  
-0.013115244288784337,  
1.6270372625341938,  
1.182284078721198,  
0.9533845712158122,  
1.0956662941001023,  
-0.9647918240366662,  
0.1897778948773928,  
-0.04047520420354409,  
0.5790278460715794,  
0.631719469583885,  
-0.3335418357294817,  
1.0603186443819097,  
-0.7449471003423949,  
0.1630231005006795,  
-0.07563007210422526,  
-1.1009042311153838,  
-0.34587951137957407,  
-0.22408475871037167,  
-0.6364303490666092,  
-0.5245531829065874,  
-0.7807390048523051,  
-0.7767575864285188,  
-0.9679768325508518,  
-1.8691843526791756,  
0.4783530568164554,  
0.6133546874260105,  
-0.20020986269221935,  
-0.41532071148562183,  
-0.8557118152516873,  
-0.16985308585729458,  
0.8428338023785568,  
0.6750667051632169,  
1.2795031602880573,  
-0.41384224674171627,  
0.3213362409234008,  
1.2340309605381181,  
1.0506369357289735,  
-0.6415500741723684,  
-0.9628453188140567,



```

1.935214357876566,
1.4159154638103797,
-2.0864443113151867,
-0.07426020994129089,
-1.0538315394110076,
0.2589745455351295,
-0.2955978932252484,
-0.030644528099012087,
-0.8602288471584197,
-0.09490606960216369,
0.4190622694749842,
-1.5667390101922392,
-0.7804920738383083,
0.1255849265457167,
0.5884338319364165,
-0.46028089859616994,
0.2488277677353687,
-0.7513271615815256,
-1.0561258734551267,
0.3697237180501531,
-0.7108432439071602,
0.5137418203820399,
0.946767478727941,
1.619957961978311,
1.2944079622561346,
0.21625880379379211,
0.007168703139473973,
-0.334764182643075,
-0.9086121674985949,
-0.8247776105092918,
-0.5734460393428641,
-0.4381826298821608,
-0.44306191141826123,
-0.23860269421390362,
-0.03343496826073402,
-0.008972211649351379,
1.2196121588758198,
1.5985131140815898,
0.060325450296581484,
-0.7312434635304047,
0.9413542695101463,
-0.6701271691421761,
-1.0680925542186157,
-0.5192506372311365,
1.5594784335685845,
0.17928043514789443,
0.2455246384495121,
-0.053106843359071614,
0.7488220810664211,
1.3030207698426615,
-1.787387332504871,
-1.1184519607509558,
-0.2511275398302805,
1.445676213762956,
1.5991220174606833}},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},

```

```

        'def': 'ising'},
        'output': { 'draw': { 'fig_dpi': 100,
                                'status': False,
                                'type': 'png'},
                    'file_name_prefix':
'AUTOMATE_ising_noisefree_time_evo_ric4_unifrom_scaling_sample#4'},
        'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                [1, 1, 0, 0],
                                                [2, 2, 0, 0],
                                                [3, 3, 0, 0]]},
        'run': 'zne',
        'state': 'dmatrix',
        'vqe': { 'iteration': 1,
                  'optimization': { 'algorithm': 'SLSQP',
                                    'constraint': True,
                                    'status': False}},
        'zne': { 'data_points': [ [4, 2, 0, 0, -6.630764461698827],
                                    [12, 6, 0, 0, -5.461578440310042],
                                    [20, 10, 0, 0, -4.498507346043123],
                                    [28, 14, 0, 0, -3.699540169020614]],
                  'degree': 0,
                  'method': 'richardson',
                  'sampling': 'default'}},
        'output': { 'exact_sol': -8.566772233505624,
                    'run_time_sec': 4.076957702636719e-05,
                    'zne_values': { 'degree': 0,
                                    'extrapolated_value': -7.305779010650624,
                                    'others': { 'beta_coeffiecients': [ 2.1875,
                                                                        -2.1875,
                                                                        1.3125,
                                                                        -0.3125],
                                                'cost_richardson_zne': 11.390625,
                                                'sorted_expectation_vals': [
-6.630764461698827,
-5.461578440310042,
-4.498507346043123,
-3.699540169020614],
'sorted_noise': [6, 18, 30, 42]],
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -6.630764461698827],
                    [ 12,
                    6,
                    0,
                    0,
                    -5.461578440310042],
                    [ 20,
                    10,
                    0,
                    0,
                    -4.498507346043123],
                    [ 28,
                    14,
                    0,
                    0,
                    -3.699540169020614]],
'sampling': 'default'}}}},
        'xy-ric2': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
                                                              'layer': 30,
                                                              'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                                 'cn': [ 0.5,
                                                                 0.5,
                                                                 0.5,
                                                                 0.5,
                                                                 0.5,
                                                                 0.5],
                                                                 'r': 0},
                                                              'time': { 'max': 10.0, 'min': 0.0},
                                                              'type': 'xy-iss'}},
'init_param': { 'value': 'random'},
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   'status': False,

```



3.800207092295721,  
4.798448841518561,  
4.812026604031267,  
6.02543601067661,  
6.02543601067661,  
6.5265343452987,  
6.5265343452987,  
6.526534345298701,  
6.528381158760148,  
6.528381158760148,  
7.113023968622042,  
7.113023968622042,  
7.593654062389684,  
7.5949106716383605,  
7.780058793305066,  
9.000370275113886,  
9.005799799983558,  
-0.22105281285875572,  
0.07196296170715184,  
1.0527781347416576,  
-0.4594806493129553,  
1.0526039239081737,  
-0.01709270509934428,  
0.3199675106146978,  
-0.0972220164715271,  
0.9145097677998977,  
0.09808103992344623,  
0.5373974901276602,  
-0.5786059880820694,  
-0.02594763303680847,  
-0.22132394348491485,  
-0.7274785930689547,  
-0.41090279602128,  
-0.520884263329148,  
-1.0260835302846771,  
0.1692597388493397,  
1.3250313995601488,  
1.510357845739394,  
-0.9233604808876308,  
-0.2049157632594096,  
-0.9894281051832,  
0.25772120620526445,  
-0.04822142329545429,  
-0.3912638297585932,  
-0.48486712444934904,  
1.4836649713082644,  
1.566996182191827,  
0.08093959953023218,  
-2.3562926055425963,  
-0.21876618997457167,  
0.10911407834571141,  
-1.3776955808248483,  
-0.31816531211057325,  
0.7083857256813267,  
0.5593482503842677,  
0.7483381318097894,  
0.010042025170353972,  
0.05290425882351868,  
0.20616876613540233,  
-0.8673924682871486,  
-0.08017548043713153,  
-0.3056222778255953,  
2.3981163154468383,  
0.37079365521682633,  
0.3870558721039623,  
0.19341028278759992,  
-0.3154248344945196,  
-0.12073260037561208,  
-1.5858414285227351,  
0.59830347262823,  
0.30388710178795286,  
-1.4558796844932331,  
-0.3225618511944297,  
0.09243390755822743,  
-0.0006426173071943948,

0.7561662109631148,  
-1.3902324585417218,  
0.1677701056843372,  
2.7311884232201735,  
-1.1122880815211051,  
0.0467986017971284,  
-0.020089420529231013,  
0.005481851366742631,  
1.3205596999819047,  
-0.1290403664286252,  
0.3870444394307043,  
-0.6549197738372419,  
-0.17656835190090397,  
-0.0008013451895215781,  
-0.8769883624496301,  
1.6929520910231297,  
0.7288671099890552,  
-0.6169673343691255,  
1.667217439782634,  
0.2554635335546482,  
-0.029515171705053127,  
-0.8290153205719569,  
0.042733616172741226,  
-0.5148227135977747,  
1.2301836750084596,  
-0.9175908300980525,  
0.5229779878549122,  
-1.5901934710811256,  
-0.07316585886439231,  
1.1195018365185199,  
-0.31111306362203306,  
0.7254709796877604,  
1.1995417479543053,  
0.6908225815252583,  
-0.2919630814941808,  
0.15955998483086176,  
1.2871422030548714,  
-1.2683991057896014,  
-0.3768598572966417,  
1.4863954796333156,  
-0.4300298743216642,  
0.19151460300148976,  
0.9665838873771405,  
-0.07244306377732504,  
-0.04169546816073936,  
-0.389029635704794,  
1.5218961812832925,  
-0.1772066326032777,  
-0.70949107362336,  
-0.015222466074935298,  
0.3587128629768407,  
1.5809494716454662,  
0.12428164288740734,  
1.5083554487395696,  
-0.044379618902227067,  
-0.03505579308192811,  
-0.6786538117837789,  
-0.007428157845337949,  
1.5281494732580478,  
-0.14124856089608578,  
2.726718429443767,  
-0.003106328084445967],  
[ 0.5270475437101116,  
0.7815425625485376,  
1.6469610445191378,  
1.6712876404917778,  
2.122904188877425,  
2.131106816606521,  
3.7367798442214175,  
3.7367798442219424,  
4.750276145421292,  
4.853973384996016,  
4.865098072058574,  
4.873980651141647,  
4.987599328262889,

5.00246239884106,  
5.520902021852277,  
5.793284849001337,  
5.8087832398624775,  
7.432729128414403,  
7.432953787975026,  
8.144896858715603,  
8.172580744083415,  
8.788071761144659,  
8.792288306719156,  
8.828260688191317,  
9.011586808740137,  
9.011995976067807,  
9.538729699920484,  
9.576884709106812,  
10.486750161390887,  
10.48675016212107,  
-0.15531374899360717,  
-0.0849039080739262,  
-0.8434555658556069,  
0.9447826609611266,  
-0.19482082661427938,  
2.4999420394249707,  
-2.7164831941210483,  
-1.5408169364026967,  
-0.8621482593978547,  
0.31547458537730877,  
1.4220435826823787,  
1.348860553316339,  
0.40827474166943256,  
1.063960383917828,  
-0.21906798993221652,  
-0.33263312803097533,  
0.4889869181158972,  
-0.25524084746075687,  
-1.3622146811064544,  
0.996105149433398,  
1.4161210728452394,  
-0.6491827941870941,  
0.7399329880002848,  
-0.11994422281276146,  
3.179573825543474,  
-0.034943024466848674,  
0.6075464711124173,  
-0.3019825794696199,  
0.029392952712390567,  
0.14840732209332994,  
0.08592470568620861,  
0.016725634393736574,  
-1.3697962205589145,  
-0.06155375586805023,  
0.16508080354919497,  
-0.5975014914051775,  
0.09635736997937351,  
1.254101402191796,  
-0.6193953337438176,  
0.47602269510847217,  
-1.7251540483535392,  
0.5378274350019089,  
-1.0159384367751108,  
1.0968223266795405,  
-0.79878134010976,  
0.10468891520322528,  
-0.2910173593847854,  
-0.7078981306941186,  
-0.3510837282628223,  
0.5371002854277007,  
-0.4911274293534503,  
1.7273270693440552,  
1.3500555714793954,  
0.9052059235505011,  
0.4771526028272018,  
-0.1893747959421651,  
0.13989050072973697,  
-0.5930955187300607,

0.36780210947560876,  
-0.5043370473487999,  
-0.4851893292987325,  
0.1987440888222681,  
-0.5806445532873666,  
2.3171646404124093,  
0.06032126128170586,  
-0.6389920437730593,  
0.9985359186149056,  
0.04870155999532171,  
0.16447399991313041,  
0.05315090520136875,  
0.15727255736970833,  
-1.3722292706433088,  
-0.33233649668322635,  
0.7758243461945761,  
-0.20476613404890107,  
0.06972046040604139,  
0.3143879960336948,  
-0.01452323353492752,  
-1.2901366074359686,  
-0.31033000747276407,  
-0.16264485166390844,  
-1.3914094473719103,  
-0.5273128620655095,  
0.02465459151953875,  
0.10942766294132272,  
1.0292094835171124,  
-1.882689768994833,  
-1.553216293090225,  
1.3287846024814622,  
0.20963913600213377,  
0.7195732642990699,  
0.0969787732183028,  
-0.9744344415633356,  
1.5822487402774768,  
0.7077471503862973,  
-0.766345302327988,  
0.3831437091022152,  
-0.12028853613988252,  
-0.8209919023748664,  
-0.21164805512089607,  
0.5290684330656528,  
-0.1040878870845114,  
1.1956945887281514,  
0.25703931501419025,  
0.6344733295912399,  
-0.02497584874729833,  
-0.20937697561532842,  
-1.4409411147319051,  
0.9707320454927133,  
1.4039378085761043,  
0.9760826987262126,  
-0.17314228405542512,  
0.16734556762922406,  
0.07881248116464283,  
-0.2924467918405051,  
1.4946430081327182,  
0.7516806171134963,  
0.799700486923224,  
-0.8440600324500036,  
-0.01069194371181784],  
[ 0.3388610072211759,  
0.3930923343746358,  
0.4059472295013711,  
0.4597995545870322,  
0.4597995545870322,  
0.4667083780713653,  
0.9924683364283498,  
1.054118787032341,  
1.3839145947816414,  
1.4469616998432806,  
3.044048229936016,  
3.044048229936016,  
4.682975233106521,

4.682975233106521,  
5.287925895396742,  
5.287925895396742,  
5.625677830869467,  
5.625677830869467,  
6.519005703020383,  
6.519005703020383,  
6.519005703020383,  
6.854665591577039,  
6.854665591577039,  
8.092962128458302,  
8.097830997780322,  
8.102159968176109,  
8.111954675742565,  
8.727038821401255,  
8.727038821401255,  
8.784424594255395,  
-0.8636093730812797,  
-0.04742973062196874,  
-0.37989856483295564,  
0.3750798322441465,  
-0.509087961968837,  
0.5366875438436245,  
0.1232704940065221,  
0.5249134835872401,  
0.13594138148710633,  
0.10802292582448766,  
-0.7156772546121367,  
0.34756877087651405,  
-0.5704812075854907,  
0.289395233495819,  
0.2674862930849357,  
0.8724143866961164,  
0.5770602988816299,  
0.658777432128999,  
-0.47288232304292416,  
-0.029663566814993374,  
-1.323180236232167,  
-0.2890901656039231,  
-0.015141732930961212,  
1.1846850771343012,  
-0.4506688471965015,  
0.22241980016839272,  
-0.015748484493019736,  
1.1522499025192263,  
0.2996907655672081,  
-1.7370631162182948,  
-0.35306232532663057,  
0.17322471105923057,  
-1.1855180134814352,  
-0.31537295018088835,  
-1.8120366955290261,  
0.6663892425075478,  
0.21874911670355193,  
1.2729693967005706,  
-0.14230256773273223,  
0.2012427441067739,  
-2.3269317425793643,  
-0.03299848401271634,  
-0.4074853136565566,  
-0.30371905431664253,  
-0.12037074206123735,  
0.8456676988075262,  
-0.21838328071319946,  
0.019494764922420988,  
0.16383099728733078,  
0.056056403895700845,  
-3.5632063709291613,  
0.6579904510057321,  
0.5207861046034454,  
-0.017180990359968364,  
0.2532807007765998,  
-0.03315495616728509,  
0.7564905992030696,  
-0.11091568858030387,



-0.9281890577202553,  
-0.6082181315906088,  
-0.4480511658411004,  
2.1953283079942025,  
-0.30446713497464617,  
-0.03359602431311142,  
0.28972943746372876,  
0.17817064395522006,  
0.7965754083210965,  
-0.9520780563921613,  
0.10150445450145726,  
1.3510884636720888,  
-0.37849615173878054,  
0.17729737647006832,  
0.1884683806301832,  
-0.03234547530918763,  
-1.338763456177623,  
-0.6711058962200585,  
-0.012976043431998471,  
0.027578392175021227,  
0.10161286285089129,  
-0.00939135247962935,  
-1.302164623174096,  
1.3715576399721376,  
0.737767307868418,  
1.5939269674119705,  
1.4291758244230544,  
0.5601859764306084,  
0.3488764286390935,  
-1.093762224545935,  
-1.1976831420922067,  
1.4557381665683378,  
0.8924472305311927,  
0.5300221300338881,  
1.0785280788144638,  
-0.6029509417428172,  
-0.6790632925762424,  
0.4138865114731201,  
0.2917474006869537,  
1.8050154062536312,  
0.05177383423831921,  
0.25467777497912664,  
1.4671356779039024,  
0.4422247342165525,  
-1.5431607378377095,  
1.8101814873938125,  
1.6870467346899987,  
0.7517920825884995,  
1.3622912362338087,  
0.13653050459472865,  
1.5210183141257738,  
-0.004247168330480351,  
0.26137218980413907,  
0.5451511562235306,  
-0.6705596749039198,  
1.2136085126593865,  
0.5231529087420831,  
-0.03279466120532818,  
0.2548954759886831,  
1.5797820110558691,  
1.075840789720537,  
1.5541818084195007],  
[ 3.821020346740443e-17,  
1.386496864345847,  
1.386496864345847,  
1.7951472089989222,  
1.8559400139285378,  
2.7980544315911504,  
2.7980544315911504,  
2.82954781812891,  
2.82954781812891,  
2.82954781812891,  
2.956183634338348,  
3.840561875918348,  
3.840561875918348,

4.79501776182173,  
4.79501776182173,  
5.670460018404704,  
5.670460018404704,  
5.670460018404704,  
5.670460018404704,  
6.865392250052202,  
6.865392250052202,  
7.506826147384778,  
7.506826147384778,  
8.737685173635683,  
8.737685173635683,  
8.737685173635683,  
8.737685173635683,  
9.601023092540274,  
9.601023092540274,  
9.853738132880634,  
9.853738132880634,  
0.5611658219809542,  
1.427331325859137,  
0.8881601644240952,  
-0.8937497791603879,  
0.5712044928850715,  
1.3195951619089188,  
0.5467792160605555,  
-0.6816630744322637,  
0.06707477836950569,  
0.6798692668930644,  
0.19576168860111362,  
0.5094724850631845,  
1.1424414477256812,  
0.30471145260454696,  
-0.08158911485577636,  
0.9585661478313002,  
1.0836238583568754,  
-0.3718197048926503,  
0.7841948506971846,  
0.3023515457437066,  
0.7662240328883452,  
0.9970048707689876,  
-0.8946064024093777,  
0.27649390200762114,  
-0.15342626519190924,  
-0.4015720487025046,  
1.460926694270634,  
-0.055421168101734586,  
0.6077050880702092,  
-0.7932081335349191,  
1.3188332541813446,  
0.01929555634963922,  
-1.1301845164589392,  
-0.1718174564221745,  
2.26154163970611,  
-0.9882028269623031,  
0.8038643847286138,  
0.6849304102208338,  
0.874798983022982,  
-0.016486064274954207,  
0.0264221098096002,  
-0.3625000384278827,  
1.4376331477886695,  
0.8499992740594865,  
0.10042171561200945,  
0.14542648933357244,  
1.3513090878714353,  
-0.22248922869259902,  
-0.4483175327546578,  
1.2345758678942387,  
-0.18983522552694923,  
0.019591210301167533,  
-1.3607248526627624,  
0.018375533581887468,  
-0.3730738776375715,  
1.0123537416913542,  
0.7412601688930508,  
-1.6525919628732422,

-0.8341682190885938,  
0.04519729634722039,  
-0.06718028327556408,  
-1.5649719285752928,  
-0.37531851249345394,  
-0.11822841604899964,  
0.008154106549025474,  
-1.4601449692077721,  
-0.0030993446167428395,  
1.462573870839384,  
-0.11887757571245174,  
-0.09361960188417112,  
-1.2543408854038138,  
-1.525280802664792,  
-1.241413372948363,  
0.008758808605552393,  
-1.6676332942965022,  
0.13826170532334445,  
0.7537363962746654,  
0.0833397476047736,  
-0.12216949704941273,  
0.02084807234445201,  
-0.3421949354726438,  
0.0017882611822728064,  
1.5186851123669147,  
-0.4603163345929323,  
-0.09956972276089109,  
0.7247597830417082,  
0.5304935691839561,  
0.003193152207841171,  
0.5581346990750625,  
0.010542051444639388,  
0.7553167297004638,  
0.5956891015800863,  
-0.05566254332595716,  
0.5362461335652635,  
0.009895282042162012,  
-0.3029901133286735,  
0.09399206534914867,  
0.8818812838713691,  
-0.06795832284115338,  
-1.580933930101608,  
0.3014975711017802,  
1.2092022074751856,  
-0.019692531397995948,  
0.9250981578351692,  
0.4673383297638096,  
0.03344339272872125,  
0.13058472572385768,  
0.036262684184263205,  
0.458095375934523,  
0.6492846129896516,  
1.3039221898344189,  
0.024764812872192767,  
0.7236926243101844,  
0.01444840086266692,  
-1.0388939706148563,  
-0.08359693344439546,  
-0.4698004238001188,  
-0.48055768545836347,  
0.4662000815300196,  
-0.041204969991243484],  
[ 0.01798320141016013,  
0.3393419127512466,  
0.7047697703765823,  
0.7064789163091142,  
0.7191656785855808,  
0.7198672068604162,  
0.719867206860416,  
1.0840512961729545,  
1.0900003904895101,  
1.1926153174924548,  
1.867054342490295,  
1.867054342490295,  
2.368094916985588,

2.3683751276938714,  
3.6383003552329964,  
3.642527762446636,  
4.505845683894636,  
4.602446412902637,  
4.972427659100928,  
4.972427659100928,  
5.1148164150678035,  
5.8066136392845,  
5.820681023327439,  
6.727088267818048,  
8.352653016300794,  
8.773334122756978,  
9.065902540064004,  
9.065902540064004,  
9.74880092287043,  
11.30145464466351,  
-0.13904770480884485,  
0.23493722133539818,  
0.4497803172772882,  
-0.640584995353188,  
0.9779304528121034,  
0.0011745349607135795,  
-0.7175493520168287,  
0.373620380836484,  
0.08111255661159392,  
0.6653458367314794,  
0.0037967443269442437,  
0.6286122183467432,  
-0.03825426016359485,  
0.6896824961465278,  
-0.23916946602734285,  
0.4624850989736848,  
0.1419493525208794,  
0.7145176662978019,  
-0.316909964913161,  
0.6605458698076423,  
-0.39309909050950365,  
0.7623048158369822,  
0.7469736169282462,  
1.2400892032597353,  
0.12266455668869777,  
0.19578648318487166,  
-0.784043232212839,  
-0.10334183265831844,  
0.32774480702026265,  
-0.011491906972883237,  
0.322988869457402,  
-0.2027870428092001,  
0.1281571522083961,  
-0.1947961113336468,  
1.7114513053475526,  
0.005425684515457419,  
0.8136825826883561,  
-0.25903007981373005,  
-0.5015428579892063,  
-0.2600978115589891,  
-0.15405473476720474,  
-0.4207498663011112,  
1.04622682040645,  
-0.8642339256273757,  
0.6248691295250803,  
-0.3539240130838131,  
0.011689879721248103,  
-0.3068283940685192,  
-0.6048660879777619,  
-0.11704784670887185,  
-1.2745062338511486,  
-1.7890038533223112,  
-0.7818671277256136,  
-0.8877455887286905,  
0.3164818198590212,  
-0.27477307924208777,  
1.8083251930535746,  
-0.5031479272825263,

-0.9648993597903888,  
-0.41682962131770707,  
0.27040705073896654,  
1.0892900815418987,  
0.17779960873468054,  
0.020337033950376556,  
1.0551529464315492,  
-0.10705558118147128,  
-0.8851977322505518,  
0.2232945485845247,  
-0.5850403569085746,  
-0.7690595025978197,  
-0.4391673030332381,  
-0.9309566421919284,  
0.2973030450025941,  
0.6780545449896137,  
0.14045373030826291,  
-0.5109313900859794,  
-0.44070010469428217,  
1.6940975579604587,  
0.17062304524159472,  
-0.402681393200546,  
-0.7091187255059627,  
1.3132357546586793,  
0.2729391261599054,  
1.0115940175088693,  
1.0046673925246778,  
0.4982257464819494,  
0.04454679168285006,  
0.4863023994043421,  
-1.1433261311581624,  
-1.820308437409531,  
0.6035405700431521,  
0.04003907881711185,  
2.99381748600971,  
-1.0437523456620463,  
-0.22517480393070408,  
0.10746937069246698,  
-0.8788513722547997,  
1.286531186523234,  
-1.3157160458746164,  
-0.6979748907629274,  
-0.16573593981190854,  
0.2529194783090185,  
-0.2562517800846549,  
-0.7966921479109774,  
-0.4446940958312971,  
-1.052310031662883,  
-0.1506245930250076,  
0.1615975776996014,  
2.9220364155549214,  
-1.7197843955783065,  
-0.6592103621593355,  
-0.2007498223803255,  
-1.6188873615119244,  
-0.15193115939751467,  
-0.20866967970071015,  
1.2910791163230286,  
-0.4917152660712325,  
-0.42348313202027765,  
0.3518303936962707,  
-0.10034486495238693],  
[ 0.009039772647041902,  
1.1400526086001903,  
1.466905028683042,  
1.6524670085313564,  
1.987797816914966,  
1.9900950346150876,  
2.1413202332332344,  
2.390935514217652,  
2.402429399816812,  
2.81913686416337,  
2.81913686416337,  
3.5656810200683298,  
3.5656810200683298,

3.5656810200683298,  
3.76603447051701,  
3.76603447051701,  
5.499236323276389,  
5.4992363232763894,  
5.4992363232763894,  
5.532789537471719,  
5.532789537471719,  
7.371733777832876,  
7.371733777832876,  
7.680783486275433,  
7.706623781446164,  
7.706623781446164,  
8.457742149729329,  
8.457742149729329,  
8.95222736351662,  
8.95222736351662,  
0.18928393791812126,  
1.0354889043700823,  
0.3703113207409527,  
0.30988589523494625,  
-0.34669340410550803,  
0.09615284519636855,  
0.1011898884094612,  
0.6160115432573767,  
0.6148540393435122,  
0.07934943483664206,  
0.8557624329627399,  
-0.7672633290674925,  
-0.14188111026081618,  
0.1995320641320393,  
0.4594888802421805,  
-0.03593187081620776,  
1.2926591415659605,  
0.31433950962447343,  
0.8053272546604554,  
0.6634815559763872,  
0.311660786273531,  
0.0294653444200854,  
0.3044394736040779,  
0.7599259037372076,  
0.22962735656034647,  
0.22562971232722423,  
0.29511485598499815,  
0.02260075636691185,  
-0.9497096253675098,  
-0.5331371571917215,  
0.2192512323868535,  
1.104832430155296,  
0.8636617903941131,  
-0.6756684630428217,  
0.4169844309263729,  
1.1297527651723116,  
-1.160118439748996,  
-0.7971836651224,  
1.9169656561991728,  
-0.007260796290839314,  
0.3614132074474742,  
0.6243022778229537,  
1.8335025630018775,  
0.35139722497115833,  
-0.7247870129359816,  
-0.6744811297738377,  
0.49997538785346773,  
1.4139521212248116,  
-3.0799818401546553,  
-0.14768564076593044,  
0.06251500852230953,  
-0.8547134606957393,  
-0.30107856776262504,  
-0.7654972812734481,  
0.28603020918627825,  
0.2129303248959857,  
-1.2077141264570097,  
-0.8488549318812054,

0.6492574804166855,  
0.7751290676155554,  
0.40909519807061084,  
-1.2750630737105486,  
0.4187798718836698,  
0.33498424523924863,  
-0.19017028209895162,  
-0.03232931911977397,  
1.0621483440417678,  
0.452017889610544,  
1.0192767515800205,  
0.7290563184502946,  
-0.5286462788982386,  
-0.05512372609304388,  
1.3189151919853837,  
0.5865235617306253,  
-0.579843833868396,  
0.6980158293666034,  
0.027004860579276476,  
1.2876675233834314,  
-0.1718561727774212,  
-0.3827017785428823,  
-0.7286404996479297,  
1.1682112525473984,  
0.22765379123755217,  
1.4870969768845252,  
1.1642898801914527,  
-0.03976972562460009,  
-0.8163296820868416,  
-0.15318057329999143,  
0.0482918949035788,  
-0.06014345828968787,  
1.1478583262090496,  
-0.005141116181289305,  
-0.5820859555621626,  
1.086519910329415,  
-1.08558016317555,  
1.531511042803357,  
0.042734048269580674,  
0.7452599788242152,  
-1.3094923903018465,  
-0.9012205175381317,  
-0.0755166851159581,  
1.5493661520767013,  
-0.2278023712186688,  
0.8627212805492942,  
1.8523276191392382,  
-0.10961709979291216,  
0.6746606852631131,  
0.22566845572735392,  
0.5920154791154506,  
1.2709342533151342,  
0.26903045177842116,  
0.11724485476711638,  
0.621942277674204,  
0.15491924869980966,  
1.472217084758381,  
0.8975149794611956,  
0.3601026339731485,  
1.3234513983254743,  
0.0182465793142515,  
-0.11914786829986494],  
[ -5.765348397008027e-18,  
0.3428984748224433,  
0.3655450682584724,  
0.704784031551808,  
1.5409081472811441,  
1.549300366088437,  
2.3787666619954635,  
2.3787666619954635,  
2.8808650819472406,  
2.884987740396357,  
3.1308808834009203,  
3.1363836212549696,  
4.869321728501938,

4.869321728501938,  
6.1150174264690085,  
6.2582278136815175,  
6.271636236200362,  
6.551203581243674,  
6.59741701640448,  
8.230564833747417,  
8.294003346338926,  
8.31431753208387,  
8.369586036193128,  
8.415319617883744,  
8.70447046242739,  
8.709120596281233,  
8.918659758853744,  
8.99410216914391,  
9.002256766523654,  
10.218690251738174,  
-0.6798627919679444,  
-1.1436724543472427,  
-0.1278269606092795,  
-0.9286552360068459,  
0.6524046490818174,  
0.06134572949387961,  
-0.49761179900021657,  
-1.3918471119443894,  
0.5858287319319103,  
0.18669127045720346,  
-0.4586789737568629,  
0.2400608953322058,  
0.022222124883641912,  
0.9282004764805514,  
0.6952358394741303,  
0.805684979006905,  
0.6146729452742722,  
0.6777524139082742,  
-0.8117842884117104,  
0.3426849285038029,  
0.7100299235979358,  
0.7658186509139059,  
-0.05418633990950139,  
0.1761917490887145,  
0.5744825473612316,  
0.31705937472296297,  
-0.9188523464356001,  
-0.7337446596965294,  
0.2061368312243915,  
-0.6645694031850036,  
-0.009871104765786294,  
-0.14388187083546433,  
-1.2485707106311008,  
2.849540809212292,  
-0.5119215846255833,  
-0.19381894062193808,  
-0.17310717674563775,  
0.8465397629359774,  
-0.46757240698237135,  
-0.05607605828560263,  
-0.40986137011816176,  
0.07649505002491204,  
-2.1522907800348112,  
-0.6653346582594515,  
0.4084801543759574,  
0.4028897820911683,  
0.16908117843954765,  
-0.07217026591146015,  
-0.72804755296126,  
-0.13548738477012795,  
-2.590679566047418,  
-0.40743076961744734,  
1.1030856800887578,  
0.08388380440455438,  
0.25224805905642333,  
0.10644300798076774,  
1.0474125729404944,  
-1.1459016177859003,



-1.6916287310468103,  
-0.9886067106540645,  
0.24182274960650893,  
-0.25703819491337826,  
-1.1942818044595898,  
-0.7763678643520989,  
-0.916718557142268,  
0.20086626876005667,  
-0.3711023890817823,  
-0.006962349053602254,  
2.687031223814704,  
0.3970791704566904,  
-0.6890591654410289,  
1.0504536719091986,  
-1.2458238157294268,  
-1.197330311624414,  
-0.12155955689525438,  
-0.2969718406476498,  
0.15406921803787998,  
0.9984735505197111,  
-0.2734456365103056,  
0.0100494123830882,  
0.16172873483083283,  
-0.6780409734277772,  
0.4539997995464368,  
0.7558576390626953,  
0.9556605206819043,  
-0.10572075101403118,  
1.5564628686733721,  
0.05397552837650759,  
0.7415987024402694,  
-0.1648500682327342,  
1.052699139325594,  
0.6776572023171561,  
0.15219630541397192,  
0.8843933196559655,  
1.3948099389813178,  
-0.16710315713046545,  
1.2199200746863228,  
-0.3825678575328573,  
-0.26766985045935626,  
2.5777182352113908,  
0.23156136798610805,  
-0.3377548185037014,  
1.0689111835439342,  
-0.17216022970038714,  
-0.29381807805976945,  
-0.5689533077540762,  
0.30596827309967156,  
0.5260993417881752,  
-0.6768480303494689,  
-0.1092430795457648,  
1.5442082488768039,  
-0.10826504240549732,  
-0.9555598065181787,  
0.5334835330029429,  
0.5569227134357198,  
1.2665483894271157,  
-1.9677332823608626,  
1.5559931182978979,  
0.7709453943956464,  
1.5746506000831744],  
[ 1.7625089228179507e-05,  
1.298540182320117,  
1.3141870420194457,  
1.3305471045820527,  
2.0686735179487985,  
2.23810597518972,  
2.267373737425337,  
2.295441377067579,  
2.3325388050051976,  
2.352484360014207,  
2.370891483796666,  
3.3117124844820194,  
3.363605896627787,

3.858981460194034,  
3.8589814603490344,  
3.859537867870235,  
3.8595381713444072,  
4.26458571773699,  
4.264585717738593,  
6.599549149586233,  
6.655963438031886,  
6.939612414177192,  
6.939612414268938,  
7.004302986969205,  
7.010544991093791,  
7.97314828104894,  
7.999280802101656,  
8.022628296732579,  
8.027896471579398,  
10.077254342713585,  
-1.0733166032270363,  
0.4264387306682,  
-0.29490479134596703,  
-0.45181113351566254,  
-0.9496712390342118,  
-0.24412788786515252,  
-0.17005038539710493,  
2.131747001055919,  
-0.8801477965160032,  
0.1985900676052623,  
-0.17829180427317373,  
0.1513896817808816,  
-0.2996418627583153,  
0.09152392337611555,  
1.0155053498240294,  
0.6713280773462803,  
-0.5915672184524843,  
-0.21780814909773427,  
-0.23676595566314207,  
-0.1539223229682568,  
0.9733737893230769,  
-0.8325690111887051,  
-0.6684349693104433,  
0.944923850675747,  
-0.8270803600282979,  
0.4869668407293288,  
0.07342964610078141,  
-0.8928903181234079,  
-0.04262248204617692,  
-0.7602498290394286,  
-0.48858825463899247,  
1.7340528561515622,  
0.7340502315717261,  
0.5163401187759543,  
-0.5015858040228415,  
0.2890335055344555,  
-0.46033506221820203,  
-0.8185907107929625,  
0.4557079379705311,  
1.6601520871164626,  
0.07125306723268252,  
-1.4035119795986863,  
-0.6741575848895364,  
1.84360490583597,  
1.6836338044245691,  
-0.33329370458317326,  
0.19854317161902654,  
2.03917897859608,  
-0.3342251938073038,  
-1.6015864477635742,  
0.35422488479060155,  
0.1487121545506934,  
-0.2821114888507261,  
0.21869934797564045,  
0.7523961573071125,  
1.3021785537923125,  
0.26184859002187644,  
1.2441238228144538,

0.039670539596101485,  
-0.15687777352236798,  
1.1386642271664005,  
-0.13559116971858365,  
0.39167499360215746,  
2.4453261619465274,  
-1.0890320328395309,  
-0.4289422005081893,  
1.425249318116838,  
-0.0016733698174337221,  
0.023121567661497415,  
-0.28325087531692295,  
0.940069260590291,  
1.163437407349777,  
-0.4256527399896147,  
-1.4972731615803316,  
-0.12624975701746496,  
-0.10144651691714318,  
1.3307378561466523,  
0.041778278155808674,  
-1.2746374184036902,  
-1.2216848741140482,  
1.4048769664929757,  
0.8957112974734468,  
1.0058068981677006,  
-3.0965653057688316,  
-0.3344448337959029,  
-1.0948102803209163,  
-0.038478236121346335,  
0.12618687504486675,  
-0.0850775611793361,  
1.33550885346982,  
-0.04334772196309596,  
0.2406908654957122,  
0.7327249608913058,  
0.9966290850109706,  
2.2852565843192423,  
-0.030570948934034583,  
-0.5566407461361556,  
0.813246653395058,  
0.5946355273642772,  
0.07519254658407079,  
0.27120989268694123,  
-0.15415722381241237,  
-1.1239288818585278,  
1.893751281002709,  
0.7530205722182245,  
1.4454588921082565,  
0.15037300343080462,  
0.1793867334099716,  
0.3587259643057371,  
-0.006799349268608,  
1.0907160355013774,  
-0.30186717991666434,  
0.8507589785411056,  
0.009155709268365956,  
-0.8165113788656561,  
0.011816515180360782,  
1.116430418883973,  
1.5343789763879045,  
-0.1682835166498154,  
-1.5032827361947747],  
[ 0.10956969985098665,  
0.4360115975982133,  
0.5932904704915389,  
0.6050451872391112,  
1.3688142364348175,  
1.3737597367805747,  
1.5226773273508583,  
1.5589271816733294,  
3.150320547140947,  
3.1613053536766147,  
4.7635234433865605,  
4.823148382609575,  
4.823188243925802,

7.171157860626202,  
7.171157878485542,  
7.171158529865571,  
7.175073431930883,  
7.183070822592498,  
8.102400589897519,  
8.10392263292654,  
8.103940780725882,  
9.021308924987686,  
9.02133947231205,  
9.082831297490506,  
9.094868565409332,  
9.236804949782064,  
9.237029573386183,  
9.26430291432718,  
10.00744744746223,  
10.032040374677464,  
-0.5042382729215367,  
1.0180015436638659,  
0.10423420212375085,  
-0.3355687578372037,  
-0.3902319222280216,  
-0.09867602213718178,  
0.3860296418386605,  
0.8522828003851446,  
-0.7730596965193267,  
0.08803782521712378,  
1.175277695996097,  
-0.3769225558693855,  
-0.4553519820435133,  
0.4758962487375975,  
-1.0517577693418567,  
0.3712029741888282,  
0.27334544561774066,  
0.03397030216872572,  
0.3891396532807883,  
0.12152393226873999,  
1.5192516885791116,  
-0.5124931636551364,  
-0.5667003913709334,  
-0.08425393582345661,  
-0.8152956002657638,  
-0.008087141654348068,  
-0.20833380477584987,  
-0.19186344764752156,  
0.309463849209865,  
-0.16555810903618162,  
-0.28534485935787846,  
0.025710068868521854,  
-0.9172960495760906,  
0.027100436879331523,  
-0.9806057417125867,  
0.46877133554227174,  
0.22597640762440013,  
-1.8700902599315918,  
-0.6222133609404971,  
0.023922176634194332,  
-0.6777524378245746,  
-0.3883818313368169,  
-0.19921738892417568,  
-1.3418496115619054,  
-0.05365669225714106,  
0.38835985529462186,  
0.46741217514915123,  
-0.1388983196762152,  
1.0002905156718758,  
1.6633296566254185,  
-1.0097136763815113,  
1.203957772036831,  
0.34033273848251194,  
1.1456357751380877,  
-0.4637199651146574,  
-0.13624703361320328,  
0.6785440200843139,  
0.21691345067474185,

-0.4166036808107477,  
1.6003722740710606,  
-0.294881370724797,  
0.04198878790454511,  
-0.689532047804753,  
-1.3911901894570817,  
-1.1667039833298627,  
0.824824800006074,  
0.8047687705752488,  
0.5727196814509768,  
0.2385364014798047,  
-0.512164832149354,  
0.17925141295137917,  
-0.19704824673887428,  
-1.6372757558452697,  
0.5441675736491897,  
-0.13936070677778437,  
1.3935144064781402,  
0.10763856884501717,  
0.6679788244416961,  
-0.33118654939932857,  
-0.35796695002153883,  
0.2632208027041665,  
1.5831503864671255,  
-0.25140146740224,  
1.135774876905931,  
0.5897962040478675,  
-0.7664904031063712,  
1.092649076983624,  
-0.9862462517151122,  
0.010216869101717933,  
0.5705833807099128,  
0.09839127014019662,  
-1.034770130526523,  
0.20582133073730807,  
-0.44428721001967564,  
0.5272444819968604,  
-0.2627660867388947,  
-0.9857421779520247,  
-1.3646538516413942,  
0.14779052759756187,  
1.1207932022043874,  
0.30427416833245535,  
-1.055109005337564,  
0.30548258474769546,  
0.8153937738463674,  
0.5082537250510629,  
-0.2973639305797175,  
0.0034742209991892575,  
1.5168338311712208,  
0.0971904670135119,  
0.5305672799342332,  
-0.08170159551874663,  
0.4909203029282298,  
-1.1771354207712392,  
0.038725619801271274,  
-0.6655680746562402,  
1.312626970471223,  
-1.0115568894576918,  
0.16290676730453105,  
0.3074286838975462,  
0.013117345918778788],  
[ 0.4866654913190249,  
0.4866654913190249,  
1.4314116389487666,  
1.4314116389487666,  
1.548608655381947,  
1.5552664901547235,  
1.662920497545568,  
1.676155881591226,  
1.6952532774325564,  
1.6952532774325564,  
2.46741851740979,  
2.50102877426778,  
3.636145431120801,

3.6361454311208004,  
3.6361454311208004,  
3.6361454311208004,  
4.0161273218482085,  
4.0161273218482085,  
4.5411636896776235,  
4.5411636896776235,  
4.922545565757144,  
5.624338470516907,  
5.642847901355697,  
5.904037934138086,  
5.915382265322609,  
6.860930229950661,  
6.860930229950661,  
9.422517992567101,  
9.467623480195014,  
9.467623480195014,  
0.40091998571272736,  
-0.3581846438287994,  
-0.32033246941904975,  
0.24409866553117068,  
0.176560178011825,  
0.4452285262890565,  
-0.37150326481454765,  
-1.0185408309777293,  
1.6197684873006286,  
2.0095194673452026,  
-0.20342804182482532,  
-0.4471079471088122,  
0.37127155242298737,  
0.4199607045713712,  
0.11145558426636207,  
-0.289968410859463,  
0.9752004498173846,  
-0.11972987215087512,  
-0.8215210043660294,  
-0.4144105549344152,  
0.04966095047933562,  
0.6091224412599766,  
-0.2481186610805342,  
-0.9036735819055022,  
0.22922493224752044,  
-0.04567884568114995,  
-0.40529506738584414,  
-0.44609185937563545,  
1.1000542207972743,  
0.8995834380092431,  
-0.4391184290327733,  
-1.623814742575614,  
0.11121717167805684,  
-0.15344289124808663,  
0.7072346226342329,  
0.013911394934765222,  
1.1008239636292285,  
1.1342299046285917,  
-0.1605718532112884,  
-0.8521154510350495,  
-0.9726520318623231,  
-0.11078467990736285,  
1.2893067940177063,  
-0.8656847782514395,  
-0.4554157535410911,  
0.46752563535079134,  
1.0115326820592876,  
-0.017465678177200683,  
0.7555243091795097,  
0.2225241128439446,  
-0.6129237770264853,  
0.36249038141661666,  
-0.1470816778834455,  
-0.23781939745964606,  
0.7410640700988803,  
-0.10219672891678527,  
-0.9043863030697507,  
-0.054446492384892985,

```

-0.23618927113386157,
-0.3971482428910102,
0.42980979959963467,
-0.4511512430809565,
-0.3322123782853245,
0.15031459204805087,
-1.4287283715133035,
-0.026859055017604255,
0.20826999854501216,
-0.016397767746330064,
-0.026711091547853946,
0.15899307013846248,
0.18349959987180348,
-0.019181103141429404,
-1.3777401647916119,
0.05578672583947999,
-0.17191397249005735,
0.08492618339903452,
0.2781511329827625,
1.6853098582374997,
-0.7964285169174421,
0.13628687772581302,
-0.26524580358677924,
1.3615146942088054,
-0.18163849035743365,
-1.5476669195398023,
0.2740670870741208,
0.19740142577560438,
0.18567840551061798,
0.43288784764736754,
-0.8069341399605817,
1.5139336080928714,
-0.7594440385529729,
-0.20443587392639553,
0.0916888700165231,
-0.03922249489745327,
0.4135801157921025,
-0.06731598775715468,
0.5038720973518589,
-0.7705715736697758,
-1.4775324565516457,
0.061950004909204714,
-0.9555167624183505,
3.1277455162888304,
-1.137887484425651,
-0.09852947784569874,
0.042597844143281625,
0.06134264537966588,
0.3384848933516047,
0.012002169875906457,
1.5732417764972468,
-0.3550969359952667,
0.37821230776206083,
1.4914211446267915,
-1.2027836619303884,
0.22421848814312553,
-0.2072711571643093,
0.05122655754886873,
-1.5578500765322636,
1.5918641150141506,
1.2635397829742223,
-1.2452354025631063]],
'run_time_sec': 43720.81102514267}}]],
'redundant': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0}},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}}},

```

```
'init_param': { 'value': [ 0.5482907189468895,  
0.6413620809492503,  
0.6422482149552934,  
1.5892409709442974,  
1.850708229814058,  
1.850708229814058,  
1.8745552660050262,  
2.400679867939261,  
2.402212278134192,  
2.485190345183722,  
2.485190345183722,  
2.4851903451837223,  
2.488397493491329,  
2.4883974934913287,  
5.077476636438464,  
5.077476636438464,  
5.732990197214016,  
5.806868622878696,  
5.817834245705687,  
6.166757373752113,  
7.3114292874931905,  
7.311858449036949,  
8.346734585466223,  
8.350435170229554,  
8.354614694314481,  
8.35659817980371,  
8.356905245901928,  
9.313534396314816,  
9.313534396314816,  
10.443787047737276,  
-0.5971318801423705,  
-0.6830583120471296,  
0.053446928626708114,  
-1.488251087277441,  
0.7409998345617078,  
-0.020561007687691084,  
-0.47029189134787985,  
-0.9187802118512801,  
-0.07390570205801456,  
0.6091612085770479,  
0.5696050095749661,  
-2.634874245900948,  
0.14733366015521565,  
1.0781100436188797,  
0.3459269460772517,  
1.2820636645787713,  
-1.605623121104658,  
0.856791024529966,  
0.16374864437029604,  
-0.7377840957855112,  
0.7603752030179747,  
0.4958590077418653,  
1.0293890027768824,  
0.4862585296205842,  
-1.0838654128292502,  
1.2632637762941026,  
-1.1043454462318527,  
-0.7867654190654241,  
0.8818217647037212,  
1.0406267750063978,  
0.05770567519039498,  
-0.5922070722918433,  
-0.3271403288282926,  
0.5980786503295974,  
-0.02050375112330311,  
-0.9007241609880184,  
0.5239405469453117,  
0.7601496703420288,  
-0.6449049942439851,  
1.7340858429103823,  
0.10050113333288421,  
0.3143347863780438,  
0.28408386490618526,  
-0.1222389867527315,  
-0.09502282329152913,
```



-1.3004368662949968,  
0.16856179320059875,  
0.6790103402211991,  
0.3355977478652572,  
0.0935957266804422,  
0.42936820813464754,  
0.5148227650107633,  
0.10764356588532305,  
-0.054251737808208085,  
0.06525040933822983,  
-0.21143245853075732,  
-1.5801988491404158,  
0.023513208971767067,  
1.0921277689034055,  
-0.11501776583679489,  
-0.14182911234947893,  
1.8716225858725093,  
-1.0747761250482988,  
-0.01873186129021693,  
0.9952348515577564,  
1.5589645169221944,  
2.4625123021717044,  
1.5320934484141422,  
0.6264578101560674,  
0.015802850908690148,  
0.6559295719723718,  
0.5030706883609005,  
0.010357532831659657,  
-0.6971755064049523,  
-1.334963536555068,  
0.05714132580252865,  
0.9478292633237722,  
1.541635767019547,  
-1.2357775558070643,  
1.5753066317572375,  
1.2206753513411082,  
-0.013882574638756213,  
2.102115305768464,  
0.6867648509985108,  
-1.0810617894892982,  
0.608205793929093,  
-1.0701207529796843,  
-0.008804617073740417,  
1.0802724219136723,  
1.4472704941581649,  
-0.525983160453369,  
0.10347757085774918,  
0.07451664808136123,  
0.8113743025574697,  
-0.19830571509994802,  
0.20760359505818776,  
-0.5709476706639499,  
0.1791350390980861,  
-0.32061652775092425,  
-1.6382844876022806,  
2.271046687924862,  
0.09972766177435569,  
1.671157305178672,  
1.0596955078067567,  
-0.7395801076185267,  
-0.8217251410877643,  
1.2660358026872456,  
-0.149859182069558,  
1.7386861885389688,  
-0.003505497297480453,  
0.677126408740769,  
-1.0541684899696007,  
0.9437251450981726,  
1.7354017388586316,  
-0.8022872949930118,  
0.01881044769021433,  
-0.013699411839369284,  
1.5965466699123847,  
0.4486397166383021,  
1.5669137279484207]]},

```
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric2_sample#1'},
'redundant': { 'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'veqe': { 'iteration': 1,
          'optimization': { 'algorithm': 'SLSQP',
                            'constraint': True,
                            'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 + '
                                '1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X '
                                '5 X 6 + 1 Z 5 + 1 Z 6',
           'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Z 0 Z 1 + '
                                                       '0.5 X 1 X 2 + 0.5 Z 1 Z 2 + '
                                                       '0.5 X 2 X 3 + 0.5 Z 2 Z 3 + '
                                                       '0.5 X 3 X 4 + 0.5 Z 3 Z 4 + '
                                                       '0.5 X 4 X 5 + 0.5 Z 4 Z 5 + '
                                                       '0.5 X 5 X 6 + 0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.463351332654991],
                             [12, 6, 0, 0, -5.841676652164559]],
           'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                               'identity_factors': [0, 0, 0, 0],
                               'noise_level': [4, 2, 0, 0],
                               'noise_profile': { 'noise_on_init_param': { 'status':
False,
0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': { 'status':
False,
0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}],
'run_time_sec': 4.388555526733398}},
{'config': { 'ansatz': { 'gateset': 1,
                        'layer': 30,
                        'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                    'cn': [ 0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5],
                                                    'r': 0},
                                'time': {'max': 10.0, 'min': 0.0},
                                'type': 'xy-iss'}}},
'init_param': { 'value': [ 0.003408343124459994,
                           0.0034083431244599804,
                           0.006710027629051694,
                           0.2484817728699434,
                           1.1672656342280407,
                           1.167470260322433,
```

3.1453440534904744,  
3.166261678218574,  
3.2843704266652405,  
4.089250903115526,  
4.091989893807717,  
4.091989893807717,  
5.181052167254873,  
5.181052167254873,  
5.184972473956635,  
5.585122024093685,  
5.5990893229720795,  
5.630355974178803,  
5.704160317443757,  
8.658831571647385,  
8.66505230970618,  
8.712765508205756,  
8.712765508205756,  
8.712765508205756,  
9.168875276976076,  
9.176734348833309,  
9.262471352200725,  
9.262471352200725,  
10.578606537988184,  
10.578606537988184,  
1.5905119084430799,  
0.8691136234632737,  
0.04907693052707525,  
-0.23336553986203207,  
0.4284777328779486,  
2.2866815267075147,  
0.1760352312050406,  
0.27820168999860917,  
2.067264415281462,  
0.5755331494929522,  
-0.06858856463703264,  
-0.7222667597755238,  
0.7750924366303688,  
-0.278304785792398,  
0.5352624789798245,  
-1.1702690163303244,  
-0.012717570027659048,  
-0.07125250327360101,  
1.7927644689789062,  
1.3752915621891346,  
-1.1981440291126808,  
-0.30737164793891514,  
0.2657743539912098,  
0.04156274567190095,  
1.1363043468044227,  
0.059217925806269944,  
0.7608352104096147,  
-0.1513784586666425,  
0.025696061144845524,  
0.861481321747562,  
-0.48544656000194114,  
-0.006033515622113467,  
0.473431667961849,  
1.5469119181224316,  
0.1871819193791605,  
1.555475823471471,  
0.9001349633565042,  
-1.5961139272878428,  
-0.6749613217725859,  
-1.5596468027729833,  
0.5296186936496604,  
-0.8549575199843406,  
1.7649719371938613,  
1.5569889217595585,  
-0.9244334407213903,  
-1.5804326845781602,  
0.3840271097002098,  
-0.8070678340768227,  
-0.48791686278645724,  
0.13110829311357092,  
-2.023238766590243,

```

-0.8997043584182223,
0.8435119798114825,
0.12108034013815198,
-0.7013572315179941,
0.05813246571029178,
-1.3645229029121433,
-1.704441396215925,
0.6160899239086374,
-1.6580292769388947,
-1.550797918270104,
-0.033040246679508146,
-0.7595754539148374,
0.6024045095197653,
0.446745843265138,
0.9717727329863253,
-1.3190014690683383,
-3.180952616822137,
-0.47685451708111876,
0.03958388950097112,
-0.04894683660460036,
-0.013869967587830365,
0.9715551393376142,
-0.2688733257646762,
-1.7112803723577967,
-0.06346862095088202,
1.2756440828431679,
0.4087049517265435,
-0.4433737535464867,
0.07044159255576982,
0.877714241226598,
-0.33059433004855665,
-0.41683973817974146,
-0.09123983383660174,
1.153451542408442,
1.5381060924707182,
1.4432055127327397,
0.7948381511053778,
0.12126271666707081,
0.3736422837955817,
-0.06595460407520624,
-0.1569219765005705,
1.4053035958769775,
-0.3443177603686477,
0.14604377230684606,
0.733462484703497,
1.2365404639754205,
-0.020105376528163625,
-0.09631958929266826,
-0.16876809298151013,
0.42184799028013376,
0.8803036484986011,
-0.4148292271104988,
0.011464734896518355,
1.0895788780475535,
-0.006017115067308532,
0.6476481463328121,
-0.4792828310008005,
1.7145504838049759,
0.9300252591703124,
1.4147034805691376,
-0.04601267898776636,
-0.34579443398211707,
0.006107561937391137,
2.7608588509789516,
-2.470402787070412,
-0.2193552778493498,
-0.43636419827955597,
0.5036040054264609,
-0.006776779992121664}],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'ngubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],

```

```

        'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
        'r': 1},
    'def': 'ising'},
    'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
                'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric2_sample#7'},
    'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
    'run': 'redundant',
    'state': 'dmatrix',
    'vqe': { 'iteration': 1,
              'optimization': { 'algorithm': 'SLSQP',
                                'constraint': True,
                                'status': False}},
    'zne': { 'data_points': None,
              'degree': 0,
              'method': 'richardson',
              'sampling': 'default'}},
    'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 + '
                                     '1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X '
                                     '5 X 6 + 1 Z 5 + 1 Z 6',
                 'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Z 0 Z 1 + '
                                                             '0.5 X 1 X 2 + 0.5 Z 1 Z 2 + '
                                                             '0.5 X 2 X 3 + 0.5 Z 2 Z 3 + '
                                                             '0.5 X 3 X 4 + 0.5 Z 3 Z 4 + '
                                                             '0.5 X 4 X 5 + 0.5 Z 4 Z 5 + '
                                                             '0.5 X 5 X 6 + 0.5 Z 5 Z 6']},
    'output': { 'data_points': [ [4, 2, 0, 0, -7.568863804770512],
                                  [12, 6, 0, 0, -6.084665473601482]],
                'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                      'identity_factors': [0, 0, 0, 0],
                                      'noise_level': [4, 2, 0, 0],
                                      'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                              'value':
0},
                                                                  'noise_prob': [0.001, 0.001, 0, 0],
                                                                  'status': True,
                                                                  'type': 'depolarizing'},
                                                                  'odd_wires': 4},
                                    { 'gates_num': [12, 3, 1, 0],
                                      'identity_factors': [1, 1, 0, 0],
                                      'noise_level': [12, 6, 0, 0],
                                      'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                              'value':
0},
                                                                  'noise_prob': [0.001, 0.001, 0, 0],
                                                                  'status': True,
                                                                  'type': 'depolarizing'},
                                                                  'odd_wires': 4}],
                  'run_time_sec': 4.094593048095703}},
    { 'config': { 'ansatz': { 'gateset': 1,
                              'layer': 30,
                              'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                            'cn': [ 0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5],
                                                            'r': 0},
                                          'time': {'max': 10.0, 'min': 0.0},
                                          'type': 'xy-iss'}}},
      'init_param': { 'value': [ 0.5698358581496117,
                                 1.0111463732621893,
                                 1.116254023022104,
                                 1.116254023022104,
                                 1.4543153683590362,
                                 1.4543153683590362,
                                 1.551144943675129,
                                 1.551144943675129,
                                 2.3321866923810566,
                                 2.4857852178760083,
                                 3.837593499897418,
                                 3.837593499897418,
```

3.837593499897418,  
4.847467397840062,  
5.03660309473088,  
5.176578602594472,  
5.176578602594472,  
5.214332760543968,  
6.547255537065404,  
6.547255537065404,  
7.083633091144979,  
7.083633091144979,  
7.133204014188821,  
7.133204014188821,  
7.133204014188821,  
7.937225733864811,  
8.370661235857398,  
8.62656679928389,  
8.759707620277526,  
9.424598849529344,  
0.24247733923543782,  
0.79275118507479,  
-0.012314768690710378,  
1.2247395896468714,  
-0.6087890007814074,  
0.9804698093938512,  
0.19554007335952167,  
-0.18291383394130525,  
-0.08254523307317092,  
0.18380200005144362,  
-0.06242013495608768,  
-0.18902966193120999,  
0.4846770511497838,  
1.2162916157423216,  
0.4476502570273604,  
-0.5204828708955642,  
1.1525916637240337,  
0.9814837501696517,  
1.2019836737296188,  
0.10039944576408244,  
-1.165620769823409,  
0.5709783345435084,  
0.04690539627488982,  
0.3150855883896384,  
0.6835833386917337,  
0.7350671828581666,  
0.15105693185753874,  
0.7851129846448224,  
-0.290237804763004,  
0.02628688844012564,  
-0.3427838784588314,  
-0.12202424723691215,  
0.30368921729231485,  
-0.08398845633414893,  
-0.34421225485285395,  
-1.0992299599969957,  
-0.6679166311787512,  
-0.4925602784337871,  
-0.7607905356843834,  
-0.061822787578292515,  
-0.33643902903801526,  
1.7237644621079549,  
1.1087838048318122,  
1.4391293107545464,  
-0.2688865923867924,  
0.07238699078201241,  
-0.7262166431073663,  
-0.8607492696026928,  
0.1828620517189283,  
-1.5556021786529124,  
-0.5230641559705965,  
-0.023465829708141782,  
0.5773817105800866,  
-0.6189512057198875,  
-0.1704298219551506,  
0.6935490081871019,  
0.43024761601627914,

```

-1.3818053283072975,
0.32069867830077864,
0.11223505487625844,
-0.6642209341325642,
-0.7163563578386999,
0.9533459704680486,
-2.5373567196844773,
-0.3530595330204968,
-0.36744271288254204,
-0.4105700661159024,
-0.529185988706723,
-0.5074466275713505,
0.5969687397167245,
0.1454479675984071,
0.9510340399481164,
-0.16051754924491393,
0.168676911677473,
1.6243103666539225,
-0.3533677275828062,
0.23248347317288842,
1.550100715213732,
0.3540002793004863,
0.11004939052123668,
0.0026309322638186474,
1.0023099891482978,
1.3075603782358884,
0.06614039249633322,
0.12696883216368457,
0.4650745950568721,
0.09288306127511851,
-0.05535633254466518,
1.0893487961438044,
0.1856572010619516,
-0.3369565165204948,
1.1993442715596423,
-0.1637322799431796,
-0.05574034797393315,
-0.6499132821077687,
-1.1854402746414112,
-0.20554021240749126,
-0.697991352679575,
0.7715290435685477,
0.27728540290360154,
-0.7490020286422794,
0.6727458447445039,
-1.3928966895283914,
-1.1123692530480307,
1.2429888713160355,
0.5002310144425463,
1.0425617895549082,
-0.41250228671824735,
-0.20782873770333182,
0.952256354944612,
-0.2180059005687231,
0.8024032545701543,
-1.0975152466418368,
0.6192383355749876,
-0.44420258004771784,
-1.3605235580058401,
1.4196204597477091,
-1.1230853758949062,
0.09475958663430169,
0.9412942473630452}],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'ngubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric2_sample#8'},

```





8.258376681022987,  
8.258376681022987,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.265620267330194,  
8.265620267330194,  
9.412842541483705,  
9.412842541483705,  
10.502716174481437,  
10.502716174481437,  
0.1665558361704551,  
0.0766182276072886,  
-0.06331706305100791,  
0.03225035272845343,  
-0.2265177184784691,  
0.6859734408919996,  
0.358399999202588,  
-0.31490649734707366,  
0.03084506070978915,  
0.8141179515629021,  
-0.05751068028622007,  
0.9013204998454583,  
-0.325467390457223,  
-0.16027539072229496,  
0.19756436832536928,  
0.17875052394899651,  
0.07441990946369173,  
-1.7121562848350094,  
0.5411900571694856,  
0.025994665514066265,  
-1.0547594680221428,  
-0.3558195097906033,  
0.2575282902752545,  
-0.32652811387218433,  
-0.17477771883072452,  
0.05603758809983181,  
-0.31531793685177084,  
0.24953935818155465,  
-0.21945102528047247,  
0.016201452486715968,  
-0.47139285875704856,  
0.8354485366702803,  
0.28783787212142514,  
-1.483190369052958,  
-0.05324490057492157,  
0.00808064868141892,  
-1.3894868155533049,  
0.07648399162880297,  
0.28128388531065984,  
-0.8032486745370345,  
0.9961277979922681,  
0.7271807873997648,  
-0.2598267503182047,  
0.058937213125893145,  
1.4176939090014022,  
1.5623836495300838,  
-1.2281014386266311,  
1.627596878633186,  
0.150437982354294,  
0.017798034487339433,  
-0.2091243023446671,  
0.08776907917710067,  
0.637527078885032,  
1.2603122563899933,  
1.0910453886717337,  
0.001707278941889729,  
-0.5366140699752073,  
-0.04457743756443993,  
0.708269991966563,  
1.6757260639955311,  
0.6610325406900899,  
-0.508228690084442,  
-0.5178693625521746,

```

-0.2955589105377924,
-0.47790822054112786,
0.31077598178920485,
0.020632196003020267,
1.5538854336639996,
1.2816443511581943,
-0.6926864187150775,
0.73698114320343,
0.3645818015611773,
-0.2097443780477125,
0.1421287040679699,
0.052774836076248374,
-0.7306191772967899,
1.107856618529218,
0.3743379513498811,
1.2959169452837032,
0.8858564921663113,
0.03370518740548656,
-1.0860983069970114,
1.2199055901240408,
-1.0630806559423625,
1.3748402618369016,
0.9943926078324806,
0.7116645059379805,
-0.21098608064682703,
0.04581715611274856,
-0.17117312830066983,
1.2229557830916487,
-1.6273428514067598,
1.8508927721454946,
0.851693435560975,
1.0946646161197402,
0.43088380554694883,
-0.6171985422875839,
1.6866137951313547,
-0.2289359575496427,
-0.09152362655526167,
1.6917359096449291,
0.22722692961233917,
0.49434218233553445,
1.2228162165990006,
-0.4070166799423108,
0.00966082758630671,
-0.3344922737632815,
-1.0755692755599169,
1.1846485271761396,
-0.06070659712292082,
0.6384418838463358,
-0.034216786122488324,
-0.6519049362670448,
-0.0019231105719348242,
0.503764046349436,
0.5779702041064313,
-0.8610978040126155,
0.5832069567020347,
0.07954533618121334,
0.016329041774977193]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'ngubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                 'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric2_sample#3'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,

```



8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
9.275481401407285,  
0.034552241786943605,  
0.7960682992937013,  
-0.16960774395822967,  
-0.13488653659207303,  
-0.07127010448742209,  
0.7213919487775996,  
0.07517487951530155,  
0.7669403129297154,  
-0.0980146039609658,  
0.2841753594230342,  
0.41897129078802076,  
0.7644737129881134,  
0.21659836679204617,  
0.40978346593820614,  
0.23386906952753808,  
0.6351364889148511,  
0.33021983360135304,  
0.3518425622667454,  
-0.16759580526603354,  
1.1955178055405769,  
-0.1119172073880175,  
-1.6647459335605923,  
-0.09499524124538847,  
1.171044098528735,  
-0.022137095989983098,  
0.46479840085551427,  
0.5434533112600137,  
0.7953483283824695,  
-0.23791626316884204,  
-0.34327459028867535,  
0.9770824990177593,  
0.3972109926583832,  
0.031305244787475206,  
0.06660894739153407,  
-0.4270300066285869,  
-1.4580475210852422,  
0.18899331747125298,  
-0.5789031865333153,  
0.2203088633995836,  
-0.028805094274594364,  
-0.21236041446549625,  
0.00835869807102751,  
1.84444421334304235,  
-0.36021419267454113,  
-1.0777998782841605,  
0.7201309879688491,  
-0.07151832135087417,  
0.013523038580686776,  
-0.5101061898109359,  
1.528477364550823,  
-0.24055091899624312,  
1.595727742687772,  
1.181011187425284,  
-0.07205139039345279,  
-0.3645912646252544,  
0.922259297261975,  
0.47504473393792157,  
-1.4582846498754758,  
-1.1041238978674286,  
-0.08619812725702276,  
1.5348185477516838,  
-0.034799821636765677,  
0.34854563969795865,  
-0.3057886345189525,  
0.3435344949085216,  
2.387989506593159,  
0.5928805156422549,  
-0.02250711897690342,  
0.734685803060112,

```

1.1230348216575474,
0.9339212770561773,
0.5429657194529808,
-0.9530889967003539,
1.2607191116533525,
-0.18262479735843284,
0.2292294020716647,
0.484625167272873,
2.2621526738562925,
0.3832060422832924,
0.2504382199240898,
-1.1186566372739195,
1.0354182359738777,
-0.9045076995614423,
1.0282595509077306,
1.805679851173207,
0.9332861023326164,
1.4396403686507162,
1.6178312922032976,
-0.22196274260736226,
0.19030625281227892,
-0.32840557234129963,
1.004592356770436,
1.8720477930131976,
-0.06388076228748135,
0.12235432131563899,
-0.5998878734536057,
-0.5461403115162753,
-0.17116133229966776,
0.6826247841010238,
0.6607748570434985,
0.7854114346995006,
0.5612002866021459,
-0.2559995100181322,
-0.8863827207156498,
0.2553569774973194,
0.6372473265785513,
-0.14017909069433732,
0.016226196464851673,
-0.10437448541592237,
2.5268983957827906,
2.3709647446626767,
-0.8108547070158446,
0.5698393243760288,
-1.2042979310590165,
-0.5004321415825274,
-1.0362881146071494,
-0.18531750144204898,
1.5646886079478448,
0.08968487420602586,
-1.6120268318409705]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'ngubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric2_sample#10'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 + '

```

```

'1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X '
'5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Z 0 Z 1 + '
'0.5 X 1 X 2 + 0.5 Z 1 Z 2 + '
'0.5 X 2 X 3 + 0.5 Z 2 Z 3 + '
'0.5 X 3 X 4 + 0.5 Z 3 Z 4 + '
'0.5 X 4 X 5 + 0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + 0.5 Z 5 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -7.512595875373562],
[12, 6, 0, 0, -6.004303631668366]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': { 'noise_on_init_param': { 'status':
'value':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': { 'status':
'value':
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4}],
'run_time_sec': 4.752339839935303}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.2383708143795501,
0.8137820253985804,
1.0561141201801563,
1.2070683478267785,
1.9518166906091101,
2.08301823027678,
2.6774459967535513,
2.7270096866449576,
3.7369434259122447,
3.7421546540398443,
4.458327272130387,
4.463102384700506,
4.463102384700506,
4.482690585412051,
4.482694652744643,
4.498978826283554,
6.3580266266370415,
7.886395999997723,
7.886532810158634,
8.060529572035655,
8.06234783983503,
8.127555772505229,
8.130166630032164,
8.42408407139234,
8.433074307328475,
9.412401860498063,
9.420584174895616,
9.429609653004679,
9.434851407347677,
11.283524698808058,

```

0.19157417616433814,  
0.42257952171340063,  
0.3129095694283805,  
0.28360255750055535,  
-0.7229159635345903,  
2.545731433831817,  
1.1687892956196542,  
0.5222949375721274,  
0.9482151911772319,  
0.28742832079435787,  
1.1627391357840349,  
-0.27939056132165146,  
-0.07574334812551493,  
-0.529119211391362,  
-0.08653083237786212,  
0.042544229108731915,  
-0.09154582517805988,  
0.2776265525620834,  
0.373637405241428,  
-0.666296500917012,  
-0.729825790392568,  
0.36164641825124294,  
1.2066181407380305,  
0.18327070025757417,  
2.2757552060408917,  
-0.004789158452516104,  
0.49019439516235463,  
2.190622553796523,  
0.6131206832540379,  
1.0987721265230228,  
1.9413219378309259,  
0.07975169469268534,  
0.17531082109327745,  
0.01770145552231998,  
0.22429808435825893,  
1.1460098869067579,  
-0.25766861736092417,  
0.4386465248337572,  
0.7521614434169624,  
0.07039918338308593,  
-0.23913727928604284,  
0.062497116873310714,  
0.27575365987954265,  
-0.8268952220573135,  
0.8599765782432734,  
0.6958325703328606,  
-0.16792542378671177,  
-0.13186811496768225,  
0.17745018848846658,  
-0.13764108606901534,  
-0.34798347931108986,  
0.3901205214779397,  
-0.12832331396189006,  
0.7623260417931323,  
-0.08745728181826747,  
0.22448567111633413,  
0.5103689813486589,  
0.020179740460913417,  
-0.4639048953982949,  
1.8052783293547816,  
-0.06895296635033099,  
-0.46137869531525183,  
-0.7694587159951923,  
-0.1507074275764489,  
-3.159084078074864,  
1.5556721360426484,  
0.9802025173412374,  
-1.5980562353917622,  
0.9974678614222413,  
0.11965749551778265,  
-0.5964068365118492,  
1.00912773091807,  
1.2674306548806673,  
1.7418320010188646,  
-1.2223756485879664,

```

-0.006270145144671745,
0.7863824204489233,
-0.08410721186616651,
0.13420385894759826,
0.6686584151585806,
-0.7946689395347296,
-1.448768973512125,
-0.4158373205099576,
-0.1003664997933048,
0.5370971852976741,
-0.013369261455621718,
-1.2134070474127567,
2.71822204346588,
-0.8266087910498845,
-0.04274152999618493,
0.627725493238542,
-0.10714625448592663,
1.4055199595750496,
-0.08877591733311402,
-0.6400618055168635,
0.27990653766167567,
0.27230874688701184,
1.8329367216853043,
0.12128377229042309,
0.03719209379786179,
0.7558193864298689,
-0.027085062677120984,
0.7947118159580207,
-0.18810209431195668,
0.008294184744538372,
-0.9110921816475059,
1.3065108206329406,
0.004810940817056788,
1.4030602129547465,
0.03878633149748846,
0.29850504257680605,
-0.9524583070906825,
0.10037229527914636,
0.4277056649647598,
-2.2528322583674503,
0.030724614514628212,
0.8416350822543037,
1.5579013461800135,
0.5696673724928452,
-1.5352194543526818}},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric2_sample#4'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 +
'1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X
'5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Z 0 Z 1 +
'0.5 X 1 X 2 + 0.5 Z 1 Z 2 +
'0.5 X 2 X 3 + 0.5 Z 2 Z 3 +
'0.5 X 3 X 4 + 0.5 Z 3 Z 4 +

```



```

'0.5 X 4 X 5 + 0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + 0.5 Z 5 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -7.418732841657522],
                             [12, 6, 0, 0, -5.815573107517698]],
  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                      'identity_factors': [0, 0, 0, 0],
                      'noise_level': [4, 2, 0, 0],
                      'noise_profile': { 'noise_on_init_param': { 'status':
                                                                    'value':
                                                                    'noise_prob': [0.001, 0.001, 0, 0],
                                                                    'status': True,
                                                                    'type': 'depolarizing'},
                      'odd_wires': 4},
                    { 'gates_num': [12, 3, 1, 0],
                      'identity_factors': [1, 1, 0, 0],
                      'noise_level': [12, 6, 0, 0],
                      'noise_profile': { 'noise_on_init_param': { 'status':
                                                                    'value':
                                                                    'noise_prob': [0.001, 0.001, 0, 0],
                                                                    'status': True,
                                                                    'type': 'depolarizing'},
                      'odd_wires': 4}},
  'run_time_sec': 4.602649450302124}},
{ 'config': { 'ansatz': { 'gateset': 1,
                        'layer': 30,
                        'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                    'cn': [ 0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5],
                                                    'r': 0},
                        'time': {'max': 10.0, 'min': 0.0},
                        'type': 'xy-iss'}},
  'init_param': { 'value': [ 4.1837705414928806e-17,
                             1.1742327239243593,
                             1.1742327239243593,
                             1.174232723924359,
                             1.3021435979041922,
                             1.3883521076730898,
                             1.4901272631800928,
                             1.490127263180093,
                             1.490127263180093,
                             2.542545188872923,
                             2.56739133991554,
                             2.677178516908646,
                             5.624946341909109,
                             5.624946341909109,
                             5.63924283183031,
                             5.672838193807689,
                             5.672838193807689,
                             5.672838193807689,
                             5.672838193807689,
                             5.672838193807689,
                             5.672838193807689,
                             5.805507018952099,
                             5.858678454346443,
                             7.374841183417447,
                             7.374841183417447,
                             9.078346087689514,
                             9.17910617229311,
                             9.185363997877552,
                             9.550522060955204,
                             9.715006087156702,
                             0.5380723684568228,
                             0.20346632529178696,
                             -0.28402043001150323,
                             -0.013694659434132353,
                             -0.8491217472851175,
                             -0.13891219530245408,

```

-0.7902948900320785,  
0.02035105936303376,  
0.35891510624171696,  
0.07011262472067725,  
0.2571910630887441,  
0.09727807922224965,  
-0.4253506785797692,  
-0.08201618636277365,  
-0.5629942371157008,  
0.4984357070329931,  
0.22460606922422946,  
0.6436861273901548,  
0.5581387866543217,  
0.6438048424266741,  
0.6625810608832491,  
-0.2877740698749285,  
0.03400434270310955,  
0.6598198228171638,  
0.15695492486622947,  
-0.23277712193728803,  
0.3379436543817524,  
0.6679629986711755,  
0.4913802101172593,  
-0.6543304626041586,  
1.2398324170787045,  
0.10868488610295632,  
0.4726806257545104,  
-1.0278416218016544,  
-0.5660236088762642,  
-0.06627186605932975,  
0.3527547117645279,  
0.3944014355355292,  
0.33709190475341266,  
0.16707772676088822,  
0.29195080738380563,  
1.0354529601392413,  
0.12500585138196232,  
-0.037178956773431956,  
0.7823218278561086,  
-0.04464215343745706,  
-0.36923576305262273,  
-0.9863817864437636,  
0.039519076991602065,  
-0.35646400258617383,  
0.04542480304419608,  
-0.46125271135496354,  
0.40472620693719735,  
0.7802480661953589,  
-0.6757172179201896,  
0.6396142241310521,  
0.2327897749192615,  
0.8954622299286413,  
0.7158405805761733,  
0.1382139633537826,  
1.0616928944303126,  
-0.6122315420380016,  
-0.6738539946512315,  
1.0433459792659807,  
0.494526070112864,  
0.20621322780405107,  
-0.05318175489586881,  
-0.11213659998229918,  
0.32941262943060273,  
0.13931786347259914,  
-0.07640781308377202,  
0.31450116184408605,  
0.3658109215963646,  
0.04460349089074807,  
-0.12913310998017427,  
0.31890485610090735,  
-0.005491508360761248,  
1.2692063073436923,  
-0.3006174703747285,  
-0.41404661321397057,  
-0.5199199797590206,

```

0.44225909618051784,
-0.4233007342169607,
0.7456354776212751,
-0.32484988424610756,
0.9268151291603125,
0.8385591284905366,
0.027219364270413358,
-0.5520387125082392,
1.3757901840365965,
0.02933419406725825,
-0.2915193842748469,
0.33917094344303517,
0.10828106345120646,
-0.5650186064180197,
-0.6041651963720519,
-0.19230834783869816,
1.9848826966849449,
0.0632219631903188,
0.04804551511145073,
0.47752350144148015,
1.3406847618100746,
-1.3722262204383469,
-1.0513455672656666,
0.7121308231347245,
0.13278942055995957,
1.9758312031522887,
2.19648222646383,
0.8936788375205645,
0.05510909660880629,
-0.18765678539637448,
0.45031205104496697,
-0.6542716355161553,
0.5783583754336702,
-0.18844184232604352,
-1.5667303012058793,
0.36110899429768645,
-0.275182998952267,
0.30367576290775045,
-0.1532687178202341}],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_xy_noise_free_time_evo_ric2_sample#2'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 +
1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X
5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Z 0 Z 1 +
0.5 X 1 X 2 + 0.5 Z 1 Z 2 +
0.5 X 2 X 3 + 0.5 Z 2 Z 3 +
0.5 X 3 X 4 + 0.5 Z 3 Z 4 +
0.5 X 4 X 5 + 0.5 Z 4 Z 5 +
0.5 X 5 X 6 + 0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.130214875567141],
[12, 6, 0, 0, -5.622281179564727]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],

```

```

False,
0},

'noise_level': [4, 2, 0, 0],
'noise_profile': { 'noise_on_init_param': { 'status':

'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': { 'noise_on_init_param': { 'status':

'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 5.198779106140137}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.3442332088020621,
0.7247295953616149,
0.7247295953616149,
0.7610537291022658,
1.7162580174489597,
2.0119282772467635,
2.0119282772467635,
3.369934702704019,
3.369934702704019,
5.00211845115155,
5.212181786011135,
5.346566249705437,
6.103091648910964,
6.103091648910964,
7.050711873868975,
7.050711873868975,
7.492144583370162,
7.492144583370162,
7.606105711064038,
7.606105711064038,
8.717193051662631,
8.753101318062777,
8.877107151002964,
8.889590522678484,
8.982812044989718,
8.982812044989718,
9.499874357008034,
9.499874357008034,
9.659025604148875,
9.671110590806489,
0.02814413440270558,
0.250593445582179,
0.17496868989230024,
-0.19749991731592192,
-0.5878125517240043,
1.1370895496823794,
0.3339578948727643,
0.30833012680275795,
0.21147160367429677,
0.5518340573364652,
0.9816766119937317,
-1.3427949214182668,

```

2.2864376119784486,  
0.673664283367827,  
0.4767745045632036,  
-0.47480445681581174,  
0.05912449937800317,  
0.9513757199218045,  
1.079093875588678,  
-0.4313388366547843,  
0.43347513808131466,  
-0.3381632209207048,  
-0.42699598389932686,  
-1.1528003206699722,  
0.2505681368756031,  
1.1900947118566725,  
-0.38260053073473543,  
-0.6405385159573362,  
0.08926968472452403,  
-0.04834256297702397,  
1.603027736914297,  
-0.44672812120859223,  
-0.5759172165575565,  
1.25237714334681,  
0.04254918814060746,  
-0.002429292667880943,  
0.47732275422632153,  
-0.10204026491637587,  
0.02357869435971368,  
0.06910865492863566,  
-0.5942663805386644,  
1.1629666490831163,  
0.28625726751699415,  
0.4183193427753825,  
0.33026699893767814,  
1.8860632823719743,  
-0.37929215782635534,  
0.8251027249542411,  
-0.13937217921728381,  
-0.35829122981546885,  
-0.11830319301401378,  
-1.1307480811476716,  
-0.33746884247229475,  
1.7161163093033744,  
-0.03517175574182253,  
-0.4044561448132672,  
-0.7301790593832838,  
-0.10496992427986328,  
-0.0377875273258637,  
0.11576685707785253,  
-0.9348023198901909,  
2.132577954045408,  
-0.47199808297503054,  
0.09642080758509694,  
-1.5590866370005203,  
0.10045413530924742,  
-0.3215930726850239,  
-0.7020784722315541,  
1.2376661808413174,  
0.5709879203761018,  
-0.820670510834149,  
0.1634866307612446,  
0.06270250983710676,  
-0.03570422816362065,  
-0.5699745682010601,  
-0.26488761312159137,  
1.795803611544861,  
-0.4017001375917998,  
-1.757541020399501,  
-0.05132347348943386,  
0.8521664539464072,  
0.4812990598336637,  
-0.7041980923594973,  
0.6941905718406797,  
1.5589556954504384,  
1.9089912382579748,  
0.4849438728523755,

```

0.03939482159422182,
-0.2564597588944596,
-0.16675906759041134,
2.5610800117093855,
0.9927310518963223,
1.3170410278463267,
0.6281459286410694,
-0.07878692694615999,
0.5865838795710373,
0.4894408136056478,
-0.043552207832595204,
0.8988064624972067,
-0.35279792613941824,
1.5088457985023234,
-0.32174328535909336,
0.41978129355629945,
0.01456784690823548,
-0.17446008524494477,
0.35494980160059775,
1.44166715836895,
0.027787407199764528,
-0.2573832607835415,
0.9605798444843694,
-0.08907047543629609,
-0.012116788408097524,
1.2676248549462201,
-0.2512276837340942,
0.7869834357157488,
-2.3607393050467915,
0.1914341630047483,
-1.0542342437530707,
0.8454261921281611,
0.02027118187750096]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
'AUTOMATE_xy_noise_free_time_evo_ric2_sample#5'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 + '
'1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X '
'5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Z 0 Z 1 + '
'0.5 X 1 X 2 + 0.5 Z 1 Z 2 + '
'0.5 X 2 X 3 + 0.5 Z 2 Z 3 + '
'0.5 X 3 X 4 + 0.5 Z 3 Z 4 + '
'0.5 X 4 X 5 + 0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + 0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.407206817517894],
[12, 6, 0, 0, -5.829141582765496]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': { 'noise_on_init_param': { 'status':
False,
'value':
0},
'noise_prob': [0.001, 0.001, 0, 0],

```

```

        'status': True,
        'type': 'depolarizing'},
    'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': { 'noise_on_init_param': { 'status':
                                                    'value':
                                                    'noise_prob': [0.001, 0.001, 0, 0],
                                                    'status': True,
                                                    'type': 'depolarizing'},
    'odd_wires': 4}},
  'run_time_sec': 4.433908700942993}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [ 0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5,
                                                                    0.5],
                                                         'r': 0},
                                      'time': {'max': 10.0, 'min': 0.0},
                                      'type': 'xy-iss'}},
  'init_param': { 'value': [ 0.17961742860022237,
                              0.4029745783400613,
                              0.4271020388774394,
                              0.6998927493507625,
                              1.1444327445959492,
                              1.4463150894355827,
                              1.7859669797147917,
                              1.7859669797147917,
                              1.8910076260348616,
                              2.1568466639380097,
                              2.184715675260106,
                              2.3241261579565067,
                              5.221288254664872,
                              5.360678146313719,
                              5.572749542622228,
                              6.315664711217606,
                              6.332942041057151,
                              7.225695385348529,
                              7.238714694082236,
                              7.767863290353532,
                              7.947954629935657,
                              8.045079231148478,
                              8.080705184182557,
                              8.235317994608641,
                              8.52967785406855,
                              8.920755162601605,
                              8.920755162601605,
                              8.920755162601605,
                              9.75907480462672,
                              11.068402571583377,
                              -0.07026370230905016,
                              1.2758275954101812,
                              0.1960569796315372,
                              -0.7454998985427054,
                              0.5260870873255556,
                              1.3632265149428353,
                              0.06759709485075166,
                              0.7201883678889174,
                              0.7780364770341424,
                              0.7034018811814728,
                              -0.3281225120527201,
                              -0.21523884970562404,
                              0.3525948786581971,
                              0.10058439953616755,
                              0.8489242437750127,
                              0.4102210250930649,
                              -1.1239274808373552,
                              -0.07527028057729333,

```

-0.662823747816413,  
-0.09016589559770041,  
0.0005078927131911535,  
-0.9974030724775158,  
1.2973260682530905,  
0.6207513445119947,  
-0.06959715000945968,  
0.01479447508324883,  
0.5707366547040263,  
0.8024230791007029,  
0.11580671533830131,  
0.5319238260215059,  
2.029703693625361,  
0.8476591202353092,  
-0.5985490132202251,  
-1.0850372047073247,  
-0.13885829158476937,  
0.6160884575951602,  
-0.6119315652443118,  
0.25456754270344084,  
1.6135141314150674,  
1.6101080474118592,  
-1.0046888465114787,  
-1.2174288348798858,  
-0.8801790341822278,  
-0.01998793431745051,  
-1.007194981866689,  
-1.6365882266166358,  
3.524880820008825,  
1.5399950054830251,  
-1.401820445976074,  
-0.04945776017633801,  
0.9565666812114323,  
-0.20490442564626934,  
-0.5632271134618189,  
1.0033608730635488,  
0.12368927199762578,  
-0.06153617179775209,  
1.0557374829951787,  
1.532632985657107,  
-0.3069192599686721,  
1.8620498010178619,  
0.18083984306067874,  
-0.9702971127887235,  
-0.4866438529829019,  
0.2527358034573417,  
0.46390718912935613,  
0.05253485630073179,  
-0.15957905175444287,  
0.5064463362180326,  
0.6588516997606392,  
0.036226022952260704,  
-1.5941274572195923,  
0.3692191472654626,  
0.31840120283705997,  
0.8741993879399423,  
0.4802653460337955,  
0.3012459045041651,  
0.5102022084743536,  
0.3727970282915065,  
0.6665750190815365,  
-0.7773615380935764,  
0.12852119124454983,  
0.6774482070442244,  
-0.34235651892527574,  
-1.1577831131801597,  
-0.2879120353476077,  
1.157549789799121,  
-0.1818163295634488,  
-0.034519908964088415,  
-0.6744130553492667,  
1.1322140576298956,  
0.5044463860518625,  
1.5469749343656427,  
-0.19451127779487945,



```

0.16868157432748737,
0.3887158384137858,
1.179393002549757,
0.4377598134949622,
0.42273561999328285,
0.17555703442650725,
0.7637154786900613,
0.3204620558964089,
-1.0127445325141415,
-0.3366137672636463,
-0.6128563234467006,
-0.19959799618607235,
-0.22993024268879514,
0.6548635589470768,
0.5449412421525476,
0.11171602982233311,
0.5174688869584806,
-0.0926785574168733,
-0.012796553414024043,
0.872831179387319,
-0.3738274777631416,
0.708424995234135,
1.1207261796968788,
0.39043722964884914,
1.5466373285390471,
-0.0566526099067629,
-1.544789451209757]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix':
AUTOMATE_xy_noise_free_time_evo_ric2_sample#9'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 + '
'1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X '
'5 X 6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Z 0 Z 1 + '
'0.5 X 1 X 2 + 0.5 Z 1 Z 2 + '
'0.5 X 2 X 3 + 0.5 Z 2 Z 3 + '
'0.5 X 3 X 4 + 0.5 Z 3 Z 4 + '
'0.5 X 4 X 5 + 0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + 0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.395384341095475],
[12, 6, 0, 0, -5.790856073500346]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': { 'noise_on_init_param': { 'status':
False,
'value':
0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],

```

```

False,
0},

'noise_profile': { 'noise_on_init_param': { 'status':
                                             'value':

'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 4.583414316177368}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                         'r': 0},
'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                  'cn': [ 0.5,
                          0.5,
                          0.5,
                          0.5,
                          0.5,
                          0.5],
                  'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.02240293444906766,
                           0.9863710197203618,
                           1.3708545038264748,
                           1.3757718928414557,
                           1.7844795346244002,
                           2.029643659915566,
                           2.029643659915566,
                           4.135298362317422,
                           4.181946654536538,
                           4.392782597821499,
                           4.473609589126697,
                           4.474471668054438,
                           4.475838923576404,
                           4.4785869343507265,
                           4.4785869343507265,
                           5.467009291914798,
                           5.470281162008999,
                           5.840541346188122,
                           5.842392372241278,
                           6.505508038171383,
                           6.505508038171383,
                           7.536348099553183,
                           7.536348099553183,
                           9.63019412694799,
                           9.63019412694799,
                           9.63019412694799,
                           9.63019412694799,
                           9.63019412694799,
                           9.63019412694799,
                           9.63019412694799,
                           1.1150074339792337,
                           -0.03535947987647509,
                           1.1918755403807781,
                           -0.20191103850925227,
                           -0.268362117189328,
                           -0.3595192771004685,
                           1.2614204066704717,
                           -2.9429228213034166,
                           -1.054810371869961,
                           0.9594255841252335,
                           -0.09538831740389547,
                           0.3965663197177072,
                           -0.22182226409641906,
                           -0.2653718580482209,
                           0.1686090968331403,
                           1.6516484362324146,
                           -0.3049608013883917,
                           0.49165272629600476,
                           1.9061569916625292,
                           1.241422732345657,
                           -0.11527538328521378,
                           -0.22895223610637053,
                           -0.06124477487110871,
                           0.6193220715745159,

```

1.372932614853267,  
-1.1538384701543527,  
-0.1139440760455718,  
0.16973094341798492,  
-0.5943234340378932,  
0.21399932498003596,  
-0.18156105319883253,  
-1.0504702368491705,  
0.7232808408606985,  
-0.018870518436612777,  
-0.29343981279013404,  
0.30960592292227684,  
0.13511542022922338,  
0.5096669954667911,  
-1.097576281455009,  
0.12047585913747774,  
-0.5585503308065869,  
1.2279608447421912,  
1.3012401380411538,  
0.3769592231863052,  
-0.5692023175942067,  
-0.4567508363134565,  
-0.679549924864495,  
-0.24647993267323956,  
0.6292567546169889,  
0.9587256267378846,  
1.7268825428143277,  
0.1413792259593793,  
0.6520451922983643,  
0.6152471684019365,  
-1.1240317980448378,  
-0.9856730455453077,  
-1.2455074642265085,  
0.2235091354354849,  
-0.8870861048674711,  
0.5299724059178798,  
-0.21820971616414211,  
-0.09687180933262383,  
-0.9247884680119297,  
-0.4566833626656702,  
-0.4285291193052864,  
-0.6406026728496247,  
0.9023578506051637,  
0.03748900229192909,  
0.7551248935414285,  
-0.18980887545414976,  
-0.1497604267964229,  
-0.4253730408988226,  
-0.4157675203773789,  
1.677209169409502,  
0.2126888490300174,  
-0.13481167544410624,  
-1.6951458494505263,  
-0.006476362637627559,  
-0.5490470525961781,  
0.3195499617454318,  
1.077429849794694,  
0.6725724542747005,  
-0.10235701747439804,  
-0.014129818782246995,  
2.382406086835482,  
0.008866515589568993,  
1.0282503794544984,  
-0.6899701634722577,  
0.3510134577654823,  
0.6918405669356381,  
-0.08667968085870373,  
-0.0005005962237103964,  
1.3805542469189591,  
1.011514915181436,  
-0.4623191099783579,  
1.397645255720587,  
-0.7813361449321683,  
-0.9940660424170442,  
-0.6570734018108508,

```

1.0171740600492052,
0.14480072689925969,
1.157289980717297,
1.019472554492438,
1.0029573776528096,
-0.20406480565208354,
-0.011076077177880707,
-0.30566521016454584,
-0.4775965459909992,
-0.7158801142606765,
1.5610067764386268,
1.5187465408730505,
0.21158961058436962,
-0.38098352608767794,
-0.046999172842648596,
0.5964180792256618,
-0.6260168044949087,
-0.7215592053840503,
-0.5706802740378752,
0.11995346168986934,
0.17053214926260635]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'ngubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric2_sample#6'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 + '
                                '1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X '
                                '5 X 6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + 0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + 0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + 0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + 0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + 0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.25970305977228],
                             [12, 6, 0, 0, -5.766278116709839]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                'value':
0},
                                'noise_prob': [0.001, 0.001, 0, 0],
                                'status': True,
                                'type': 'depolarizing'},
                                'odd_wires': 4},
                              { 'gates_num': [12, 3, 1, 0],
                                'identity_factors': [1, 1, 0, 0],
                                'noise_level': [12, 6, 0, 0],
                                'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                'value':
0},
                                'noise_prob': [0.001, 0.001, 0, 0],
                                'status': True,

```

```

        'type': 'depolarizing'},
        'odd_wires': 4]],
        'run_time_sec': 4.72617769241333}}]],
'vqe': [ { 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
        'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
        'r': 0},
        'time': {'max': 10.0, 'min': 0.0},
        'type': 'xy-iss'}}},
    'init_param': {'value': 'random'},
    'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
        'noise_prob': [0.001, 0.001, 0, 0],
        'status': True,
        'type': 'depolarizing'},
    'nqubits': 7,
    'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
        'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
        'r': 1},
        'def': 'ising'},
    'output': { 'draw': {'fig_dpi': 100, 'status': True, 'type': 'png'},
        'file_name_prefix': 'xy_noisefree_time_evo'},
    'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
    'run': 'vqe',
    'state': 'dmatrix',
    'vqe': { 'iteration': 10,
        'optimization': { 'algorithm': 'SLSQP',
            'constraint': True,
            'status': True}},
    'zne': { 'data_points': None,
        'degree': 1,
        'method': 'richardson',
        'sampling': 'default'}},
    'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 X 2 X 3 + 1 Z 2 '
        ' + 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X 6 + 1 Z '
        '5 + 1 Z 6',
        'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Z 0 Z 1 + 0.5 X 1 '
            'X 2 + 0.5 Z 1 Z 2 + 0.5 X 2 X 3 + '
            '0.5 Z 2 Z 3 + 0.5 X 3 X 4 + 0.5 Z 3 '
            'Z 4 + 0.5 X 4 X 5 + 0.5 Z 4 Z 5 + '
            '0.5 X 5 X 6 + 0.5 Z 5 Z 6']},
    'output': { 'exact_sol': -8.56677223350563,
        'initial_cost_history': [ 3.450586259258812,
            2.2577647098356715,
            3.220573399525229,
            2.813569497850412,
            2.356577849154886,
            2.484693017894963,
            2.751192081705436,
            3.0939254363357245,
            3.3455601721392987,
            2.9399815036188865],
        'noise_details': { 'gates_num': [4, 1, 1, 0],
            'identity_factors': [0, 0, 0, 0],
            'noise_level': [4, 2, 0, 0],
            'noise_profile': { 'noise_on_init_param': { 'status': False,
                'value': 0},
                'noise_prob': [0.001, 0.001, 0, 0],
                'status': True,
                'type': 'depolarizing'},
            'odd_wires': 4},
        'optimized_minimum_cost': [ -7.463351332655033,
            -7.130214875567174,
            -7.475700783925261,
            -7.41873284165754,
            -7.407206817517966,
            -7.259703059772282,
            -7.568863804770619,
            -7.15916709982671,
            -7.395384341095537,
            -7.512595875373624],
        'optimized_parameters': [ [ 0.5482907189468895,
            0.6413620809492503,
            0.6422482149552934,
            1.5892409709442974,

```

1.850708229814058,  
1.850708229814058,  
1.8745552660050262,  
2.400679867939261,  
2.402212278134192,  
2.485190345183722,  
2.485190345183722,  
2.4851903451837223,  
2.488397493491329,  
2.4883974934913287,  
5.077476636438464,  
5.077476636438464,  
5.732990197214016,  
5.806868622878696,  
5.817834245705687,  
6.166757373752113,  
7.3114292874931905,  
7.311858449036949,  
8.346734585466223,  
8.350435170229554,  
8.354614694314481,  
8.35659817980371,  
8.356905245901928,  
9.313534396314816,  
9.313534396314816,  
10.443787047737276,  
-0.5971318801423705,  
-0.6830583120471296,  
0.053446928626708114,  
-1.488251087277441,  
0.7409998345617078,  
-0.020561007687691084,  
-0.47029189134787985,  
-0.9187802118512801,  
-0.07390570205801456,  
0.6091612085770479,  
0.5696050095749661,  
-2.634874245900948,  
0.14733366015521565,  
1.0781100436188797,  
0.3459269460772517,  
1.2820636645787713,  
-1.605623121104658,  
0.856791024529966,  
0.16374864437029604,  
-0.7377840957855112,  
0.7603752030179747,  
0.4958590077418653,  
1.0293890027768824,  
0.4862585296205842,  
-1.0838654128292502,  
1.2632637762941026,  
-1.1043454462318527,  
-0.7867654190654241,  
0.8818217647037212,  
1.0406267750063978,  
0.05770567519039498,  
-0.5922070722918433,  
-0.3271403288282926,  
0.5980786503295974,  
-0.02050375112330311,  
-0.9007241609880184,  
0.5239405469453117,  
0.7601496703420288,  
-0.6449049942439851,  
1.7340858429103823,  
0.10050113333288421,  
0.3143347863780438,  
0.28408386490618526,  
-0.1222389867527315,  
-0.09502282329152913,  
-1.3004368662949968,  
0.16856179320059875,  
0.6790103402211991,  
0.3355977478652572,

0.0935957266804422,  
0.42936820813464754,  
0.5148227650107633,  
0.10764356588532305,  
-0.054251737808208085,  
0.06525040933822983,  
-0.21143245853075732,  
-1.5801988491404158,  
0.023513208971767067,  
1.0921277689034055,  
-0.11501776583679489,  
-0.14182911234947893,  
1.8716225858725093,  
-1.0747761250482988,  
-0.01873186129021693,  
0.9952348515577564,  
1.5589645169221944,  
2.4625123021717044,  
1.5320934484141422,  
0.6264578101560674,  
0.015802850908690148,  
0.6559295719723718,  
0.5030706883609005,  
0.010357532831659657,  
-0.6971755064049523,  
-1.334963536555068,  
0.05714132580252865,  
0.9478292633237722,  
1.541635767019547,  
-1.2357775558070643,  
1.5753066317572375,  
1.2206753513411082,  
-0.013882574638756213,  
2.102115305768464,  
0.6867648509985108,  
-1.0810617894892982,  
0.608205793929093,  
-1.0701207529796843,  
-0.008804617073740417,  
1.0802724219136723,  
1.4472704941581649,  
-0.525983160453369,  
0.10347757085774918,  
0.07451664808136123,  
0.8113743025574697,  
-0.19830571509994802,  
0.20760359505818776,  
-0.5709476706639499,  
0.1791350390980861,  
-0.32061652775092425,  
-1.6382844876022806,  
2.271046687924862,  
0.09972766177435569,  
1.671157305178672,  
1.0596955078067567,  
-0.7395801076185267,  
-0.8217251410877643,  
1.2660358026872456,  
-0.149859182069558,  
1.7386861885389688,  
-0.003505497297480453,  
0.677126408740769,  
-1.0541684899696007,  
0.9437251450981726,  
1.7354017388586316,  
-0.8022872949930118,  
0.01881044769021433,  
-0.013699411839369284,  
1.5965466699123847,  
0.4486397166383021,  
1.5669137279484207],  
[ 4.1837705414928806e-17,  
1.1742327239243593,  
1.1742327239243593,  
1.174232723924359,

1.3021435979041922,  
1.3883521076730898,  
1.4901272631800928,  
1.490127263180093,  
1.490127263180093,  
2.542545188872923,  
2.56739133991554,  
2.677178516908646,  
5.624946341909109,  
5.624946341909109,  
5.63924283183031,  
5.672838193807689,  
5.672838193807689,  
5.672838193807689,  
5.672838193807689,  
5.672838193807689,  
5.672838193807689,  
5.805507018952099,  
5.858678454346443,  
7.374841183417447,  
7.374841183417447,  
9.078346087689514,  
9.17910617229311,  
9.185363997877552,  
9.550522060955204,  
9.715006087156702,  
0.5380723684568228,  
0.20346632529178696,  
-0.28402043001150323,  
-0.013694659434132353,  
-0.8491217472851175,  
-0.13891219530245408,  
-0.7902948900320785,  
0.02035105936303376,  
0.35891510624171696,  
0.07011262472067725,  
0.2571910630887441,  
0.09727807922224965,  
-0.4253506785797692,  
-0.08201618636277365,  
-0.5629942371157008,  
0.4984357070329931,  
0.22460606922422946,  
0.6436861273901548,  
0.5581387866543217,  
0.6438048424266741,  
0.6625810608832491,  
-0.2877740698749285,  
0.03400434270310955,  
0.6598198228171638,  
0.15695492486622947,  
-0.23277712193728803,  
0.3379436543817524,  
0.6679629986711755,  
0.4913802101172593,  
-0.6543304626041586,  
1.2398324170787045,  
0.10868488610295632,  
0.4726806257545104,  
-1.0278416218016544,  
-0.5660236088762642,  
-0.06627186605932975,  
0.3527547117645279,  
0.3944014355355292,  
0.33709190475341266,  
0.16707772676088822,  
0.29195080738380563,  
1.0354529601392413,  
0.12500585138196232,  
-0.037178956773431956,  
0.7823218278561086,  
-0.04464215343745706,  
-0.36923576305262273,  
-0.9863817864437636,  
0.039519076991602065,



-0.35646400258617383,  
0.04542480304419608,  
-0.46125271135496354,  
0.40472620693719735,  
0.7802480661953589,  
-0.6757172179201896,  
0.6396142241310521,  
0.2327897749192615,  
0.8954622299286413,  
0.7158405805761733,  
0.1382139633537826,  
1.0616928944303126,  
-0.6122315420380016,  
-0.6738539946512315,  
1.0433459792659807,  
0.494526070112864,  
0.20621322780405107,  
-0.05318175489586881,  
-0.11213659998229918,  
0.32941262943060273,  
0.13931786347259914,  
-0.07640781308377202,  
0.31450116184408605,  
0.3658109215963646,  
0.04460349089074807,  
-0.12913310998017427,  
0.31890485610090735,  
-0.005491508360761248,  
1.2692063073436923,  
-0.3006174703747285,  
-0.41404661321397057,  
-0.5199199797590206,  
0.44225909618051784,  
-0.4233007342169607,  
0.7456354776212751,  
-0.32484988424610756,  
0.9268151291603125,  
0.8385591284905366,  
0.027219364270413358,  
-0.5520387125082392,  
1.3757901840365965,  
0.02933419406725825,  
-0.2915193842748469,  
0.33917094344303517,  
0.10828106345120646,  
-0.5650186064180197,  
-0.6041651963720519,  
-0.19230834783869816,  
1.9848826966849449,  
0.0632219631903188,  
0.04804551511145073,  
0.47752350144148015,  
1.3406847618100746,  
-1.3722262204383469,  
-1.0513455672656666,  
0.7121308231347245,  
0.13278942055995957,  
1.9758312031522887,  
2.19648222646383,  
0.8936788375205645,  
0.05510909660880629,  
-0.18765678539637448,  
0.45031205104496697,  
-0.6542716355161553,  
0.5783583754336702,  
-0.18844184232604352,  
-1.5667303012058793,  
0.36110899429768645,  
-0.275182998952267,  
0.30367576290775045,  
-0.1532687178202341],  
[-3.641081222961908e-17,  
0.6149788059529836,  
0.7190202634465676,  
1.227117923902744,

1.282995668258181,  
1.320146784613617,  
1.320146784613617,  
3.1464089486715623,  
3.1464089486715623,  
5.021180125711677,  
5.021180125711677,  
5.021180125711677,  
6.703692809170789,  
6.703692809170789,  
7.791601108223033,  
7.8369202041803225,  
7.951907692650894,  
7.98389042115583,  
8.258376681022987,  
8.258376681022987,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.265620267330194,  
8.265620267330194,  
9.412842541483705,  
9.412842541483705,  
10.502716174481437,  
10.502716174481437,  
0.1665558361704551,  
0.0766182276072886,  
-0.06331706305100791,  
0.03225035272845343,  
-0.2265177184784691,  
0.6859734408919996,  
0.358399999202588,  
-0.31490649734707366,  
0.03084506070978915,  
0.8141179515629021,  
-0.05751068028622007,  
0.9013204998454583,  
-0.325467390457223,  
-0.16027539072229496,  
0.19756436832536928,  
0.17875052394899651,  
0.07441990946369173,  
-1.7121562848350094,  
0.5411900571694856,  
0.025994665514066265,  
-1.0547594680221428,  
-0.3558195097906033,  
0.2575282902752545,  
-0.32652811387218433,  
-0.17477771883072452,  
0.05603758809983181,  
-0.31531793685177084,  
0.24953935818155465,  
-0.21945102528047247,  
0.016201452486715968,  
-0.47139285875704856,  
0.8354485366702803,  
0.28783787212142514,  
-1.483190369052958,  
-0.05324490057492157,  
0.00808064868141892,  
-1.3894868155533049,  
0.07648399162880297,  
0.28128388531065984,  
-0.8032486745370345,  
0.9961277979922681,  
0.7271807873997648,  
-0.2598267503182047,  
0.058937213125893145,  
1.4176939090014022,  
1.5623836495300838,  
-1.2281014386266311,  
1.627596878633186,  
0.150437982354294,

0.017798034487339433,  
-0.2091243023446671,  
0.08776907917710067,  
0.637527078885032,  
1.2603122563899933,  
1.0910453886717337,  
0.001707278941889729,  
-0.5366140699752073,  
-0.04457743756443993,  
0.708269991966563,  
1.6757260639955311,  
0.6610325406900899,  
-0.508228690084442,  
-0.5178693625521746,  
-0.2955589105377924,  
-0.47790822054112786,  
0.31077598178920485,  
0.020632196003020267,  
1.5538854336639996,  
1.2816443511581943,  
-0.6926864187150775,  
0.73698114320343,  
0.3645818015611773,  
-0.2097443780477125,  
0.1421287040679699,  
0.052774836076248374,  
-0.7306191772967899,  
1.107856618529218,  
0.3743379513498811,  
1.2959169452837032,  
0.8858564921663113,  
0.03370518740548656,  
-1.0860983069970114,  
1.2199055901240408,  
-1.0630806559423625,  
1.3748402618369016,  
0.9943926078324806,  
0.7116645059379805,  
-0.21098608064682703,  
0.04581715611274856,  
-0.17117312830066983,  
1.2229557830916487,  
-1.6273428514067598,  
1.8508927721454946,  
0.851693435560975,  
1.0946646161197402,  
0.43088380554694883,  
-0.6171985422875839,  
1.6866137951313547,  
-0.2289359575496427,  
-0.09152362655526167,  
1.6917359096449291,  
0.22722692961233917,  
0.49434218233553445,  
1.2228162165990006,  
-0.4070166799423108,  
0.00966082758630671,  
-0.3344922737632815,  
-1.0755692755599169,  
1.1846485271761396,  
-0.06070659712292082,  
0.6384418838463358,  
-0.034216786122488324,  
-0.6519049362670448,  
-0.0019231105719348242,  
0.503764046349436,  
0.5779702041064313,  
-0.8610978040126155,  
0.5832069567020347,  
0.07954533618121334,  
0.016329041774977193],  
[ 0.2383708143795501,  
0.8137820253985804,  
1.0561141201801563,  
1.2070683478267785,

1.9518166906091101,  
2.08301823027678,  
2.6774459967535513,  
2.7270096866449576,  
3.7369434259122447,  
3.7421546540398443,  
4.458327272130387,  
4.463102384700506,  
4.463102384700506,  
4.482690585412051,  
4.482694652744643,  
4.498978826283554,  
6.3580266266370415,  
7.88639599997723,  
7.886532810158634,  
8.060529572035655,  
8.06234783983503,  
8.127555772505229,  
8.130166630032164,  
8.42408407139234,  
8.433074307328475,  
9.412401860498063,  
9.420584174895616,  
9.429609653004679,  
9.434851407347677,  
11.283524698808058,  
0.19157417616433814,  
0.42257952171340063,  
0.3129095694283805,  
0.28360255750055535,  
-0.7229159635345903,  
2.545731433831817,  
1.1687892956196542,  
0.5222949375721274,  
0.9482151911772319,  
0.28742832079435787,  
1.1627391357840349,  
-0.27939056132165146,  
-0.07574334812551493,  
-0.529119211391362,  
-0.08653083237786212,  
0.042544229108731915,  
-0.09154582517805988,  
0.2776265525620834,  
0.373637405241428,  
-0.666296500917012,  
-0.729825790392568,  
0.36164641825124294,  
1.2066181407380305,  
0.18327070025757417,  
2.2757552060408917,  
-0.004789158452516104,  
0.49019439516235463,  
2.190622553796523,  
0.6131206832540379,  
1.0987721265230228,  
1.9413219378309259,  
0.07975169469268534,  
0.17531082109327745,  
0.01770145552231998,  
0.22429808435825893,  
1.1460098869067579,  
-0.25766861736092417,  
0.4386465248337572,  
0.7521614434169624,  
0.07039918338308593,  
-0.23913727928604284,  
0.062497116873310714,  
0.27575365987954265,  
-0.8268952220573135,  
0.8599765782432734,  
0.6958325703328606,  
-0.16792542378671177,  
-0.13186811496768225,  
0.17745018848846658,

-0.13764108606901534,  
-0.34798347931108986,  
0.3901205214779397,  
-0.12832331396189006,  
0.7623260417931323,  
-0.08745728181826747,  
0.22448567111633413,  
0.5103689813486589,  
0.020179740460913417,  
-0.4639048953982949,  
1.8052783293547816,  
-0.06895296635033099,  
-0.46137869531525183,  
-0.7694587159951923,  
-0.1507074275764489,  
-3.159084078074864,  
1.5556721360426484,  
0.9802025173412374,  
-1.5980562353917622,  
0.9974678614222413,  
0.11965749551778265,  
-0.5964068365118492,  
1.00912773091807,  
1.2674306548806673,  
1.7418320010188646,  
-1.2223756485879664,  
-0.006270145144671745,  
0.7863824204489233,  
-0.08410721186616651,  
0.13420385894759826,  
0.6686584151585806,  
-0.7946689395347296,  
-1.448768973512125,  
-0.4158373205099576,  
-0.1003664997933048,  
0.5370971852976741,  
-0.013369261455621718,  
-1.2134070474127567,  
2.71822204346588,  
-0.8266087910498845,  
-0.04274152999618493,  
0.627725493238542,  
-0.10714625448592663,  
1.4055199595750496,  
-0.08877591733311402,  
-0.6400618055168635,  
0.27990653766167567,  
0.27230874688701184,  
1.8329367216853043,  
0.12128377229042309,  
0.03719209379786179,  
0.7558193864298689,  
-0.027085062677120984,  
0.7947118159580207,  
-0.18810209431195668,  
0.008294184744538372,  
-0.9110921816475059,  
1.3065108206329406,  
0.004810940817056788,  
1.4030602129547465,  
0.03878633149748846,  
0.29850504257680605,  
-0.9524583070906825,  
0.10037229527914636,  
0.4277056649647598,  
-2.2528322583674503,  
0.030724614514628212,  
0.8416350822543037,  
1.5579013461800135,  
0.5696673724928452,  
-1.5352194543526818],  
[ 0.3442332088020621,  
0.7247295953616149,  
0.7247295953616149,  
0.7610537291022658,

1.7162580174489597,  
2.0119282772467635,  
2.0119282772467635,  
3.369934702704019,  
3.369934702704019,  
5.00211845115155,  
5.212181786011135,  
5.346566249705437,  
6.103091648910964,  
6.103091648910964,  
7.050711873868975,  
7.050711873868975,  
7.492144583370162,  
7.492144583370162,  
7.606105711064038,  
7.606105711064038,  
8.717193051662631,  
8.753101318062777,  
8.877107151002964,  
8.889590522678484,  
8.982812044989718,  
8.982812044989718,  
9.499874357008034,  
9.499874357008034,  
9.659025604148875,  
9.671110590806489,  
0.02814413440270558,  
0.250593445582179,  
0.17496868989230024,  
-0.19749991731592192,  
-0.5878125517240043,  
1.1370895496823794,  
0.3339578948727643,  
0.30833012680275795,  
0.21147160367429677,  
0.5518340573364652,  
0.9816766119937317,  
-1.3427949214182668,  
2.2864376119784486,  
0.673664283367827,  
0.4767745045632036,  
-0.47480445681581174,  
0.05912449937800317,  
0.9513757199218045,  
1.079093875588678,  
-0.4313388366547843,  
0.43347513808131466,  
-0.3381632209207048,  
-0.42699598389932686,  
-1.1528003206699722,  
0.2505681368756031,  
1.1900947118566725,  
-0.38260053073473543,  
-0.6405385159573362,  
0.08926968472452403,  
-0.04834256297702397,  
1.603027736914297,  
-0.44672812120859223,  
-0.5759172165575565,  
1.25237714334681,  
0.04254918814060746,  
-0.002429292667880943,  
0.47732275422632153,  
-0.10204026491637587,  
0.02357869435971368,  
0.06910865492863566,  
-0.5942663805386644,  
1.1629666490831163,  
0.28625726751699415,  
0.4183193427753825,  
0.33026699893767814,  
1.8860632823719743,  
-0.37929215782635534,  
0.8251027249542411,  
-0.13937217921728381,

-0.35829122981546885,  
-0.11830319301401378,  
-1.1307480811476716,  
-0.33746884247229475,  
1.7161163093033744,  
-0.03517175574182253,  
-0.4044561448132672,  
-0.7301790593832838,  
-0.10496992427986328,  
-0.0377875273258637,  
0.11576685707785253,  
-0.9348023198901909,  
2.132577954045408,  
-0.47199808297503054,  
0.09642080758509694,  
-1.5590866370005203,  
0.10045413530924742,  
-0.3215930726850239,  
-0.7020784722315541,  
1.2376661808413174,  
0.5709879203761018,  
-0.820670510834149,  
0.1634866307612446,  
0.06270250983710676,  
-0.03570422816362065,  
-0.5699745682010601,  
-0.26488761312159137,  
1.795803611544861,  
-0.4017001375917998,  
-1.757541020399501,  
-0.05132347348943386,  
0.8521664539464072,  
0.4812990598336637,  
-0.7041980923594973,  
0.6941905718406797,  
1.5589556954504384,  
1.9089912382579748,  
0.4849438728523755,  
0.03939482159422182,  
-0.2564597588944596,  
-0.16675906759041134,  
2.5610800117093855,  
0.9927310518963223,  
1.3170410278463267,  
0.6281459286410694,  
-0.07878692694615999,  
0.5865838795710373,  
0.4894408136056478,  
-0.043552207832595204,  
0.8988064624972067,  
-0.35279792613941824,  
1.5088457985023234,  
-0.32174328535909336,  
0.41978129355629945,  
0.014567846908235548,  
-0.17446008524494477,  
0.35494980160059775,  
1.44166715836895,  
0.027787407199764528,  
-0.2573832607835415,  
0.9605798444843694,  
-0.08907047543629609,  
-0.012116788408097524,  
1.2676248549462201,  
-0.2512276837340942,  
0.7869834357157488,  
-2.3607393050467915,  
0.1914341630047483,  
-1.0542342437530707,  
0.8454261921281611,  
0.02027118187750096],  
[ 0.02240293444906766,  
0.9863710197203618,  
1.3708545038264748,  
1.3757718928414557,

1.7844795346244002,  
2.029643659915566,  
2.029643659915566,  
4.135298362317422,  
4.181946654536538,  
4.392782597821499,  
4.473609589126697,  
4.474471668054438,  
4.475838923576404,  
4.4785869343507265,  
4.4785869343507265,  
5.467009291914798,  
5.470281162008999,  
5.840541346188122,  
5.842392372241278,  
6.505508038171383,  
6.505508038171383,  
7.536348099553183,  
7.536348099553183,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
1.1150074339792337,  
-0.03535947987647509,  
1.1918755403807781,  
-0.20191103850925227,  
-0.268362117189328,  
-0.3595192771004685,  
1.2614204066704717,  
-2.9429228213034166,  
-1.054810371869961,  
0.9594255841252335,  
-0.09538831740389547,  
0.3965663197177072,  
-0.22182226409641906,  
-0.2653718580482209,  
0.1686090968331403,  
1.6516484362324146,  
-0.3049608013883917,  
0.49165272629600476,  
1.9061569916625292,  
1.241422732345657,  
-0.11527538328521378,  
-0.22895223610637053,  
-0.06124477487110871,  
0.6193220715745159,  
1.372932614853267,  
-1.1538384701543527,  
-0.1139440760455718,  
0.16973094341798492,  
-0.5943234340378932,  
0.21399932498003596,  
-0.18156105319883253,  
-1.0504702368491705,  
0.7232808408606985,  
-0.018870518436612777,  
-0.29343981279013404,  
0.30960592292227684,  
0.13511542022922338,  
0.5096669954667911,  
-1.097576281455009,  
0.12047585913747774,  
-0.5585503308065869,  
1.2279608447421912,  
1.3012401380411538,  
0.3769592231863052,  
-0.5692023175942067,  
-0.4567508363134565,  
-0.679549924864495,  
-0.24647993267323956,  
0.6292567546169889,



0.9587256267378846,  
1.7268825428143277,  
0.1413792259593793,  
0.6520451922983643,  
0.6152471684019365,  
-1.1240317980448378,  
-0.9856730455453077,  
-1.2455074642265085,  
0.2235091354354849,  
-0.8870861048674711,  
0.5299724059178798,  
-0.21820971616414211,  
-0.09687180933262383,  
-0.9247884680119297,  
-0.4566833626656702,  
-0.4285291193052864,  
-0.6406026728496247,  
0.9023578506051637,  
0.03748900229192909,  
0.7551248935414285,  
-0.18980887545414976,  
-0.1497604267964229,  
-0.4253730408988226,  
-0.4157675203773789,  
1.677209169409502,  
0.2126888490300174,  
-0.13481167544410624,  
-1.6951458494505263,  
-0.006476362637627559,  
-0.5490470525961781,  
0.3195499617454318,  
1.077429849794694,  
0.6725724542747005,  
-0.10235701747439804,  
-0.014129818782246995,  
2.382406086835482,  
0.008866515589568993,  
1.0282503794544984,  
-0.6899701634722577,  
0.3510134577654823,  
0.6918405669356381,  
-0.08667968085870373,  
-0.0005005962237103964,  
1.3805542469189591,  
1.011514915181436,  
-0.4623191099783579,  
1.397645255720587,  
-0.7813361449321683,  
-0.9940660424170442,  
-0.6570734018108508,  
1.0171740600492052,  
0.14480072689925969,  
1.157289980717297,  
1.019472554492438,  
1.0029573776528096,  
-0.20406480565208354,  
-0.011076077177880707,  
-0.30566521016454584,  
-0.4775965459909992,  
-0.7158801142606765,  
1.5610067764386268,  
1.5187465408730505,  
0.21158961058436962,  
-0.38098352608767794,  
-0.046999172842648596,  
0.5964180792256618,  
-0.6260168044949087,  
-0.7215592053840503,  
-0.5706802740378752,  
0.11995346168986934,  
0.17053214926260635],  
[ 0.003408343124459994,  
0.0034083431244599804,  
0.006710027629051694,  
0.2484817728699434,

1.1672656342280407,  
1.167470260322433,  
3.1453440534904744,  
3.166261678218574,  
3.2843704266652405,  
4.089250903115526,  
4.091989893807717,  
4.091989893807717,  
5.181052167254873,  
5.181052167254873,  
5.184972473956635,  
5.585122024093685,  
5.5990893229720795,  
5.630355974178803,  
5.704160317443757,  
8.658831571647385,  
8.66505230970618,  
8.712765508205756,  
8.712765508205756,  
8.712765508205756,  
9.168875276976076,  
9.176734348833309,  
9.262471352200725,  
9.262471352200725,  
10.578606537988184,  
10.578606537988184,  
1.5905119084430799,  
0.8691136234632737,  
0.04907693052707525,  
-0.23336553986203207,  
0.4284777328779486,  
2.2866815267075147,  
0.1760352312050406,  
0.27820168999860917,  
2.067264415281462,  
0.5755331494929522,  
-0.06858856463703264,  
-0.7222667597755238,  
0.7750924366303688,  
-0.278304785792398,  
0.5352624789798245,  
-1.1702690163303244,  
-0.012717570027659048,  
-0.07125250327360101,  
1.7927644689789062,  
1.3752915621891346,  
-1.1981440291126808,  
-0.30737164793891514,  
0.2657743539912098,  
0.04156274567190095,  
1.1363043468044227,  
0.059217925806269944,  
0.7608352104096147,  
-0.1513784586666425,  
0.025696061144845524,  
0.861481321747562,  
-0.48544656000194114,  
-0.006033515622113467,  
0.473431667961849,  
1.5469119181224316,  
0.1871819193791605,  
1.555475823471471,  
0.9001349633565042,  
-1.5961139272878428,  
-0.6749613217725859,  
-1.5596468027729833,  
0.5296186936496604,  
-0.8549575199843406,  
1.7649719371938613,  
1.5569889217595585,  
-0.9244334407213903,  
-1.5804326845781602,  
0.3840271097002098,  
-0.8070678340768227,  
-0.48791686278645724,

0.13110829311357092,  
-2.023238766590243,  
-0.8997043584182223,  
0.8435119798114825,  
0.12108034013815198,  
-0.7013572315179941,  
0.05813246571029178,  
-1.3645229029121433,  
-1.704441396215925,  
0.6160899239086374,  
-1.6580292769388947,  
-1.550797918270104,  
-0.033040246679508146,  
-0.7595754539148374,  
0.6024045095197653,  
0.446745843265138,  
0.9717727329863253,  
-1.3190014690683383,  
-3.180952616822137,  
-0.47685451708111876,  
0.03958388950097112,  
-0.04894683660460036,  
-0.013869967587830365,  
0.9715551393376142,  
-0.2688733257646762,  
-1.7112803723577967,  
-0.06346862095088202,  
1.2756440828431679,  
0.4087049517265435,  
-0.4433737535464867,  
0.07044159255576982,  
0.877714241226598,  
-0.33059433004855665,  
-0.41683973817974146,  
-0.09123983383660174,  
1.153451542408442,  
1.5381060924707182,  
1.4432055127327397,  
0.7948381511053778,  
0.12126271666707081,  
0.3736422837955817,  
-0.06595460407520624,  
-0.1569219765005705,  
1.4053035958769775,  
-0.3443177603686477,  
0.14604377230684606,  
0.733462484703497,  
1.2365404639754205,  
-0.020105376528163625,  
-0.09631958929266826,  
-0.16876809298151013,  
0.42184799028013376,  
0.8803036484986011,  
-0.4148292271104988,  
0.011464734896518355,  
1.0895788780475535,  
-0.006017115067308532,  
0.6476481463328121,  
-0.4792828310008005,  
1.7145504838049759,  
0.9300252591703124,  
1.4147034805691376,  
-0.04601267898776636,  
-0.34579443398211707,  
0.006107561937391137,  
2.7608588509789516,  
-2.470402787070412,  
-0.2193552778493498,  
-0.43636419827955597,  
0.5036040054264609,  
-0.006776779992121664],  
[ 0.5698358581496117,  
1.0111463732621893,  
1.116254023022104,  
1.116254023022104,

1.4543153683590362,  
1.4543153683590362,  
1.551144943675129,  
1.551144943675129,  
2.3321866923810566,  
2.4857852178760083,  
3.837593499897418,  
3.837593499897418,  
3.837593499897418,  
4.847467397840062,  
5.03660309473088,  
5.176578602594472,  
5.176578602594472,  
5.214332760543968,  
6.547255537065404,  
6.547255537065404,  
7.083633091144979,  
7.083633091144979,  
7.133204014188821,  
7.133204014188821,  
7.133204014188821,  
7.937225733864811,  
8.370661235857398,  
8.62656679928389,  
8.759707620277526,  
9.424598849529344,  
0.24247733923543782,  
0.79275118507479,  
-0.012314768690710378,  
1.2247395896468714,  
-0.6087890007814074,  
0.9804698093938512,  
0.19554007335952167,  
-0.18291383394130525,  
-0.08254523307317092,  
0.18380200005144362,  
-0.06242013495608768,  
-0.18902966193120999,  
0.4846770511497838,  
1.2162916157423216,  
0.4476502570273604,  
-0.5204828708955642,  
1.1525916637240337,  
0.9814837501696517,  
1.2019836737296188,  
0.10039944576408244,  
-1.165620769823409,  
0.5709783345435084,  
0.04690539627488982,  
0.3150855883896384,  
0.6835833386917337,  
0.7350671828581666,  
0.15105693185753874,  
0.7851129846448224,  
-0.290237804763004,  
0.02628688844012564,  
-0.3427838784588314,  
-0.12202424723691215,  
0.30368921729231485,  
-0.08398845633414893,  
-0.34421225485285395,  
-1.0992299599969957,  
-0.6679166311787512,  
-0.4925602784337871,  
-0.7607905356843834,  
-0.061822787578292515,  
-0.33643902903801526,  
1.7237644621079549,  
1.1087838048318122,  
1.4391293107545464,  
-0.2688865923867924,  
0.07238699078201241,  
-0.7262166431073663,  
-0.8607492696026928,  
0.1828620517189283,

-1.5556021786529124,  
-0.5230641559705965,  
-0.023465829708141782,  
0.5773817105800866,  
-0.6189512057198875,  
-0.1704298219551506,  
0.6935490081871019,  
0.43024761601627914,  
-1.3818053283072975,  
0.32069867830077864,  
0.11223505487625844,  
-0.6642209341325642,  
-0.7163563578386999,  
0.9533459704680486,  
-2.5373567196844773,  
-0.3530595330204968,  
-0.36744271288254204,  
-0.4105700661159024,  
-0.529185988706723,  
-0.5074466275713505,  
0.5969687397167245,  
0.1454479675984071,  
0.9510340399481164,  
-0.16051754924491393,  
0.168676911677473,  
1.6243103666539225,  
-0.3533677275828062,  
0.23248347317288842,  
1.550100715213732,  
0.3540002793004863,  
0.11004939052123668,  
0.0026309322638186474,  
1.0023099891482978,  
1.3075603782358884,  
0.06614039249633322,  
0.12696883216368457,  
0.4650745950568721,  
0.09288306127511851,  
-0.05535633254466518,  
1.0893487961438044,  
0.1856572010619516,  
-0.3369565165204948,  
1.1993442715596423,  
-0.1637322799431796,  
-0.05574034797393315,  
-0.6499132821077687,  
-1.1854402746414112,  
-0.20554021240749126,  
-0.697991352679575,  
0.7715290435685477,  
0.27728540290360154,  
-0.7490020286422794,  
0.6727458447445039,  
-1.3928966895283914,  
-1.1123692530480307,  
1.2429888713160355,  
0.5002310144425463,  
1.0425617895549082,  
-0.41250228671824735,  
-0.20782873770333182,  
0.952256354944612,  
-0.2180059005687231,  
0.8024032545701543,  
-1.0975152466418368,  
0.6192383355749876,  
-0.44420258004771784,  
-1.3605235580058401,  
1.4196204597477091,  
-1.1230853758949062,  
0.09475958663430169,  
0.9412942473630452],  
[ 0.17961742860022237,  
0.4029745783400613,  
0.4271020388774394,  
0.6998927493507625,

1.1444327445959492,  
1.4463150894355827,  
1.7859669797147917,  
1.7859669797147917,  
1.8910076260348616,  
2.1568466639380097,  
2.184715675260106,  
2.3241261579565067,  
5.221288254664872,  
5.360678146313719,  
5.572749542622228,  
6.315664711217606,  
6.332942041057151,  
7.225695385348529,  
7.238714694082236,  
7.767863290353532,  
7.947954629935657,  
8.045079231148478,  
8.080705184182557,  
8.235317994608641,  
8.52967785406855,  
8.920755162601605,  
8.920755162601605,  
8.920755162601605,  
9.75907480462672,  
11.068402571583377,  
-0.07026370230905016,  
1.2758275954101812,  
0.1960569796315372,  
-0.7454998985427054,  
0.5260870873255556,  
1.3632265149428353,  
0.06759709485075166,  
0.7201883678889174,  
0.7780364770341424,  
0.7034018811814728,  
-0.3281225120527201,  
-0.21523884970562404,  
0.3525948786581971,  
0.10058439953616755,  
0.8489242437750127,  
0.4102210250930649,  
-1.1239274808373552,  
-0.07527028057729333,  
-0.662823747816413,  
-0.09016589559770041,  
0.0005078927131911535,  
-0.9974030724775158,  
1.2973260682530905,  
0.6207513445119947,  
-0.06959715000945968,  
0.01479447508324883,  
0.5707366547040263,  
0.8024230791007029,  
0.11580671533830131,  
0.5319238260215059,  
2.029703693625361,  
0.8476591202353092,  
-0.5985490132202251,  
-1.0850372047073247,  
-0.13885829158476937,  
0.6160884575951602,  
-0.6119315652443118,  
0.25456754270344084,  
1.6135141314150674,  
1.6101080474118592,  
-1.0046888465114787,  
-1.2174288348798858,  
-0.8801790341822278,  
-0.01998793431745051,  
-1.007194981866689,  
-1.6365882266166358,  
3.524880820008825,  
1.5399950054830251,  
-1.401820445976074,

-0.04945776017633801,  
0.9565666812114323,  
-0.20490442564626934,  
-0.5632271134618189,  
1.0033608730635488,  
0.12368927199762578,  
-0.06153617179775209,  
1.0557374829951787,  
1.532632985657107,  
-0.3069192599686721,  
1.8620498010178619,  
0.18083984306067874,  
-0.9702971127887235,  
-0.4866438529829019,  
0.2527358034573417,  
0.46390718912935613,  
0.05253485630073179,  
-0.15957905175444287,  
0.5064463362180326,  
0.6588516997606392,  
0.036226022952260704,  
-1.5941274572195923,  
0.3692191472654626,  
0.31840120283705997,  
0.8741993879399423,  
0.4802653460337955,  
0.3012459045041651,  
0.5102022084743536,  
0.3727970282915065,  
0.6665750190815365,  
-0.7773615380935764,  
0.12852119124454983,  
0.6774482070442244,  
-0.34235651892527574,  
-1.1577831131801597,  
-0.2879120353476077,  
1.157549789799121,  
-0.1818163295634488,  
-0.034519908964088415,  
-0.6744130553492667,  
1.1322140576298956,  
0.5044463860518625,  
1.5469749343656427,  
-0.19451127779487945,  
0.16868157432748737,  
0.3887158384137858,  
1.179393002549757,  
0.4377598134949622,  
0.42273561999328285,  
0.17555703442650725,  
0.7637154786900613,  
0.3204620558964089,  
-1.0127445325141415,  
-0.3366137672636463,  
-0.6128563234467006,  
-0.19959799618607235,  
-0.22993024268879514,  
0.6548635589470768,  
0.5449412421525476,  
0.11171602982233311,  
0.5174688869584806,  
-0.0926785574168733,  
-0.012796553414024043,  
0.872831179387319,  
-0.3738274777631416,  
0.708424995234135,  
1.1207261796968788,  
0.39043722964884914,  
1.5466373285390471,  
-0.0566526099067629,  
-1.544789451209757],  
[ 0.01970245038838479,  
0.18403088824160574,  
0.23516669011749736,  
0.3619340287619915,

0.7559235356843684,  
0.8037553588156275,  
0.8037553588156274,  
0.8037553588156274,  
1.523650120002224,  
1.5399034674182392,  
3.5267025169505333,  
3.526702516950533,  
4.657784878324055,  
4.735234101549794,  
4.768060921347247,  
6.910522417024203,  
6.910522417024203,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
9.275481401407285,  
0.034552241786943605,  
0.7960682992937013,  
-0.16960774395822967,  
-0.13488653659207303,  
-0.07127010448742209,  
0.7213919487775996,  
0.07517487951530155,  
0.7669403129297154,  
-0.0980146039609658,  
0.2841753594230342,  
0.41897129078802076,  
0.7644737129881134,  
0.21659836679204617,  
0.40978346593820614,  
0.23386906952753808,  
0.6351364889148511,  
0.33021983360135304,  
0.3518425622667454,  
-0.16759580526603354,  
1.1955178055405769,  
-0.1119172073880175,  
-1.6647459335605923,  
-0.09499524124538847,  
1.171044098528735,  
-0.022137095989983098,  
0.46479840085551427,  
0.5434533112600137,  
0.7953483283824695,  
-0.23791626316884204,  
-0.34327459028867535,  
0.9770824990177593,  
0.3972109926583832,  
0.031305244787475206,  
0.06660894739153407,  
-0.4270300066285869,  
-1.4580475210852422,  
0.18899331747125298,  
-0.5789031865333153,  
0.2203088633995836,  
-0.028805094274594364,  
-0.21236041446549625,  
0.00835869807102751,  
1.8444421334304235,  
-0.36021419267454113,  
-1.0777998782841605,  
0.7201309879688491,  
-0.07151832135087417,  
0.013523038580686776,  
-0.5101061898109359,



```

1.528477364550823,
-0.24055091899624312,
1.595727742687772,
1.181011187425284,
-0.07205139039345279,
-0.3645912646252544,
0.922259297261975,
0.47504473393792157,
-1.4582846498754758,
-1.1041238978674286,
-0.08619812725702276,
1.5348185477516838,
-0.034799821636765677,
0.34854563969795865,
-0.3057886345189525,
0.3435344949085216,
2.387989506593159,
0.5928805156422549,
-0.02250711897690342,
0.734685803060112,
1.1230348216575474,
0.9339212770561773,
0.5429657194529808,
-0.9530889967003539,
1.2607191116533525,
-0.18262479735843284,
0.2292294020716647,
0.484625167272873,
2.2621526738562925,
0.3832060422832924,
0.2504382199240898,
-1.1186566372739195,
1.0354182359738777,
-0.9045076995614423,
1.0282595509077306,
1.805679851173207,
0.9332861023326164,
1.4396403686507162,
1.6178312922032976,
-0.22196274260736226,
0.19030625281227892,
-0.32840557234129963,
1.004592356770436,
1.8720477930131976,
-0.06388076228748135,
0.12235432131563899,
-0.5998878734536057,
-0.5461403115162753,
-0.17116133229966776,
0.6826247841010238,
0.6607748570434985,
0.7854114346995006,
0.5612002866021459,
-0.2559995100181322,
-0.8863827207156498,
0.2553569774973194,
0.6372473265785513,
-0.14017909069433732,
0.016226196464851673,
-0.10437448541592237,
2.5268983957827906,
2.3709647446626767,
-0.8108547070158446,
0.5698393243760288,
-1.2042979310590165,
-0.5004321415825274,
-1.0362881146071494,
-0.18531750144204898,
1.5646886079478448,
0.08968487420602586,
-1.6120268318409705]],
'run_time_sec': 68480.87647795677}}]],
'zne': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],

```

```
        'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
        'r': 0},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'xy-iss'}},
'init_param': { 'value': [ 0.3442332088020621,
    0.7247295953616149,
    0.7247295953616149,
    0.7610537291022658,
    1.7162580174489597,
    2.0119282772467635,
    2.0119282772467635,
    3.369934702704019,
    3.369934702704019,
    5.00211845115155,
    5.212181786011135,
    5.346566249705437,
    6.103091648910964,
    6.103091648910964,
    7.050711873868975,
    7.050711873868975,
    7.492144583370162,
    7.492144583370162,
    7.606105711064038,
    7.606105711064038,
    8.717193051662631,
    8.753101318062777,
    8.877107151002964,
    8.889590522678484,
    8.982812044989718,
    8.982812044989718,
    9.499874357008034,
    9.499874357008034,
    9.659025604148875,
    9.671110590806489,
    0.02814413440270558,
    0.250593445582179,
    0.17496868989230024,
    -0.19749991731592192,
    -0.5878125517240043,
    1.1370895496823794,
    0.3339578948727643,
    0.30833012680275795,
    0.21147160367429677,
    0.5518340573364652,
    0.9816766119937317,
    -1.3427949214182668,
    2.2864376119784486,
    0.673664283367827,
    0.4767745045632036,
    -0.47480445681581174,
    0.05912449937800317,
    0.9513757199218045,
    1.079093875588678,
    -0.4313388366547843,
    0.43347513808131466,
    -0.3381632209207048,
    -0.42699598389932686,
    -1.1528003206699722,
    0.2505681368756031,
    1.1900947118566725,
    -0.38260053073473543,
    -0.6405385159573362,
    0.08926968472452403,
    -0.04834256297702397,
    1.603027736914297,
    -0.44672812120859223,
    -0.5759172165575565,
    1.25237714334681,
    0.04254918814060746,
    -0.002429292667880943,
    0.47732275422632153,
    -0.10204026491637587,
    0.02357869435971368,
    0.06910865492863566,
    -0.5942663805386644,
```

1.1629666490831163,  
0.28625726751699415,  
0.4183193427753825,  
0.33026699893767814,  
1.8860632823719743,  
-0.37929215782635534,  
0.8251027249542411,  
-0.13937217921728381,  
-0.35829122981546885,  
-0.11830319301401378,  
-1.1307480811476716,  
-0.33746884247229475,  
1.7161163093033744,  
-0.03517175574182253,  
-0.4044561448132672,  
-0.7301790593832838,  
-0.10496992427986328,  
-0.0377875273258637,  
0.11576685707785253,  
-0.9348023198901909,  
2.132577954045408,  
-0.47199808297503054,  
0.09642080758509694,  
-1.5590866370005203,  
0.10045413530924742,  
-0.3215930726850239,  
-0.7020784722315541,  
1.2376661808413174,  
0.5709879203761018,  
-0.820670510834149,  
0.1634866307612446,  
0.06270250983710676,  
-0.03570422816362065,  
-0.5699745682010601,  
-0.26488761312159137,  
1.795803611544861,  
-0.4017001375917998,  
-1.757541020399501,  
-0.05132347348943386,  
0.8521664539464072,  
0.4812990598336637,  
-0.7041980923594973,  
0.6941905718406797,  
1.5589556954504384,  
1.9089912382579748,  
0.4849438728523755,  
0.03939482159422182,  
-0.2564597588944596,  
-0.16675906759041134,  
2.5610800117093855,  
0.9927310518963223,  
1.3170410278463267,  
0.6281459286410694,  
-0.07878692694615999,  
0.5865838795710373,  
0.4894408136056478,  
-0.043552207832595204,  
0.8988064624972067,  
-0.35279792613941824,  
1.5088457985023234,  
-0.32174328535909336,  
0.41978129355629945,  
0.014567846908235548,  
-0.17446008524494477,  
0.35494980160059775,  
1.44166715836895,  
0.027787407199764528,  
-0.2573832607835415,  
0.9605798444843694,  
-0.08907047543629609,  
-0.012116788408097524,  
1.2676248549462201,  
-0.2512276837340942,  
0.7869834357157488,  
-2.3607393050467915,

```

0.1914341630047483,
-1.0542342437530707,
0.8454261921281611,
0.02027118187750096]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix': 'AUTOMATE_xy_noise_free_time_evo_ric2_sample#5'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.407206817517894],
[12, 6, 0, 0, -5.829141582765496]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 4.076957702636719e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -8.196239434894093,
'others': { 'beta_coefficients': [1.5, -0.5],
'cost_richardson_zne': 2.5,
'sorted_expectation_vals': [ -7.407206817517894,
-5.829141582765496],
'sorted_noise': [6, 18]},
'sampled data': [ [4, 2, 0, 0, -7.407206817517894],
[12, 6, 0, 0, -5.829141582765496]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.003408343124459994,
0.0034083431244599804,
0.006710027629051694,
0.2484817728699434,
1.1672656342280407,
1.167470260322433,
3.1453440534904744,
3.166261678218574,
3.2843704266652405,
4.089250903115526,
4.091989893807717,
4.091989893807717,
5.181052167254873,
5.181052167254873,
5.184972473956635,
5.585122024093685,
5.5990893229720795,
5.630355974178803,
5.704160317443757,
8.658831571647385,
8.66505230970618,
8.712765508205756,
8.712765508205756,
8.712765508205756,
9.168875276976076,
9.176734348833309,
9.262471352200725,
9.262471352200725,
10.578606537988184,

```

10.578606537988184,  
1.5905119084430799,  
0.8691136234632737,  
0.04907693052707525,  
-0.23336553986203207,  
0.4284777328779486,  
2.2866815267075147,  
0.1760352312050406,  
0.27820168999860917,  
2.067264415281462,  
0.5755331494929522,  
-0.06858856463703264,  
-0.7222667597755238,  
0.7750924366303688,  
-0.278304785792398,  
0.5352624789798245,  
-1.1702690163303244,  
-0.012717570027659048,  
-0.07125250327360101,  
1.7927644689789062,  
1.3752915621891346,  
-1.1981440291126808,  
-0.30737164793891514,  
0.2657743539912098,  
0.04156274567190095,  
1.1363043468044227,  
0.059217925806269944,  
0.7608352104096147,  
-0.1513784586666425,  
0.025696061144845524,  
0.861481321747562,  
-0.48544656000194114,  
-0.006033515622113467,  
0.473431667961849,  
1.5469119181224316,  
0.1871819193791605,  
1.555475823471471,  
0.9001349633565042,  
-1.5961139272878428,  
-0.6749613217725859,  
-1.5596468027729833,  
0.5296186936496604,  
-0.8549575199843406,  
1.7649719371938613,  
1.5569889217595585,  
-0.9244334407213903,  
-1.5804326845781602,  
0.3840271097002098,  
-0.8070678340768227,  
-0.48791686278645724,  
0.13110829311357092,  
-2.023238766590243,  
-0.8997043584182223,  
0.8435119798114825,  
0.12108034013815198,  
-0.7013572315179941,  
0.05813246571029178,  
-1.3645229029121433,  
-1.704441396215925,  
0.6160899239086374,  
-1.6580292769388947,  
-1.550797918270104,  
-0.033040246679508146,  
-0.7595754539148374,  
0.6024045095197653,  
0.446745843265138,  
0.9717727329863253,  
-1.3190014690683383,  
-3.180952616822137,  
-0.47685451708111876,  
0.03958388950097112,  
-0.04894683660460036,  
-0.013869967587830365,  
0.9715551393376142,  
-0.2688733257646762,

```
-1.7112803723577967,
-0.06346862095088202,
1.2756440828431679,
0.4087049517265435,
-0.4433737535464867,
0.07044159255576982,
0.877714241226598,
-0.33059433004855665,
-0.41683973817974146,
-0.09123983383660174,
1.153451542408442,
1.5381060924707182,
1.4432055127327397,
0.7948381511053778,
0.12126271666707081,
0.3736422837955817,
-0.06595460407520624,
-0.1569219765005705,
1.4053035958769775,
-0.3443177603686477,
0.14604377230684606,
0.733462484703497,
1.2365404639754205,
-0.020105376528163625,
-0.09631958929266826,
-0.16876809298151013,
0.42184799028013376,
0.8803036484986011,
-0.4148292271104988,
0.011464734896518355,
1.0895788780475535,
-0.006017115067308532,
0.6476481463328121,
-0.4792828310008005,
1.7145504838049759,
0.9300252591703124,
1.4147034805691376,
-0.04601267898776636,
-0.34579443398211707,
0.006107561937391137,
2.7608588509789516,
-2.470402787070412,
-0.2193552778493498,
-0.43636419827955597,
0.5036040054264609,
-0.006776779992121664}},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix': 'AUTOMATE_xy_noise_free_time_evo_ric2_sample#7'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.568863804770512],
[12, 6, 0, 0, -6.084665473601482]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 3.6716461181640625e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -8.310962970355027,
'others': { 'beta_coefficients': [1.5, -0.5],
'cost_richardson_zne': 2.5,
```

```

'sorted_expectation_vals': [ -7.568863804770512,
                              -6.084665473601482],
'sorted_noise': [6, 18]},
'sampled data': [ [4, 2, 0, 0, -7.568863804770512],
                  [12, 6, 0, 0, -6.084665473601482]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                                         'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'xy-iss'}}},
  'init_param': { 'value': [ 0.5482907189468895,
                              0.6413620809492503,
                              0.6422482149552934,
                              1.5892409709442974,
                              1.850708229814058,
                              1.850708229814058,
                              1.8745552660050262,
                              2.400679867939261,
                              2.402212278134192,
                              2.485190345183722,
                              2.485190345183722,
                              2.4851903451837223,
                              2.488397493491329,
                              2.4883974934913287,
                              5.077476636438464,
                              5.077476636438464,
                              5.732990197214016,
                              5.806868622878696,
                              5.817834245705687,
                              6.166757373752113,
                              7.3114292874931905,
                              7.311858449036949,
                              8.346734585466223,
                              8.350435170229554,
                              8.354614694314481,
                              8.35659817980371,
                              8.356905245901928,
                              9.313534396314816,
                              9.313534396314816,
                              10.443787047737276,
                              -0.5971318801423705,
                              -0.6830583120471296,
                              0.053446928626708114,
                              -1.488251087277441,
                              0.7409998345617078,
                              -0.020561007687691084,
                              -0.47029189134787985,
                              -0.9187802118512801,
                              -0.07390570205801456,
                              0.6091612085770479,
                              0.5696050095749661,
                              -2.634874245900948,
                              0.14733366015521565,
                              1.0781100436188797,
                              0.3459269460772517,
                              1.2820636645787713,
                              -1.605623121104658,
                              0.856791024529966,
                              0.16374864437029604,
                              -0.7377840957855112,
                              0.7603752030179747,
                              0.4958590077418653,
                              1.0293890027768824,
                              0.4862585296205842,
                              -1.0838654128292502,
                              1.2632637762941026,
                              -1.1043454462318527,
                              -0.7867654190654241,
                              0.8818217647037212,
                              1.0406267750063978,
                              0.05770567519039498,
                              -0.5922070722918433,

```

-0.3271403288282926,  
0.5980786503295974,  
-0.02050375112330311,  
-0.9007241609880184,  
0.5239405469453117,  
0.7601496703420288,  
-0.6449049942439851,  
1.7340858429103823,  
0.10050113333288421,  
0.3143347863780438,  
0.28408386490618526,  
-0.1222389867527315,  
-0.09502282329152913,  
-1.3004368662949968,  
0.16856179320059875,  
0.6790103402211991,  
0.3355977478652572,  
0.0935957266804422,  
0.42936820813464754,  
0.5148227650107633,  
0.10764356588532305,  
-0.054251737808208085,  
0.06525040933822983,  
-0.21143245853075732,  
-1.5801988491404158,  
0.023513208971767067,  
1.0921277689034055,  
-0.11501776583679489,  
-0.14182911234947893,  
1.8716225858725093,  
-1.0747761250482988,  
-0.01873186129021693,  
0.9952348515577564,  
1.5589645169221944,  
2.4625123021717044,  
1.5320934484141422,  
0.6264578101560674,  
0.015802850908690148,  
0.6559295719723718,  
0.5030706883609005,  
0.010357532831659657,  
-0.6971755064049523,  
-1.334963536555068,  
0.05714132580252865,  
0.9478292633237722,  
1.541635767019547,  
-1.2357775558070643,  
1.5753066317572375,  
1.2206753513411082,  
-0.013882574638756213,  
2.102115305768464,  
0.6867648509985108,  
-1.0810617894892982,  
0.608205793929093,  
-1.0701207529796843,  
-0.008804617073740417,  
1.0802724219136723,  
1.4472704941581649,  
-0.525983160453369,  
0.10347757085774918,  
0.07451664808136123,  
0.8113743025574697,  
-0.19830571509994802,  
0.20760359505818776,  
-0.5709476706639499,  
0.1791350390980861,  
-0.32061652775092425,  
-1.6382844876022806,  
2.271046687924862,  
0.09972766177435569,  
1.671157305178672,  
1.0596955078067567,  
-0.7395801076185267,  
-0.8217251410877643,  
1.2660358026872456,



[illegible]

5.672838193807689,  
5.805507018952099,  
5.858678454346443,  
7.374841183417447,  
7.374841183417447,  
9.078346087689514,  
9.17910617229311,  
9.185363997877552,  
9.550522060955204,  
9.715006087156702,  
0.5380723684568228,  
0.20346632529178696,  
-0.28402043001150323,  
-0.013694659434132353,  
-0.8491217472851175,  
-0.13891219530245408,  
-0.7902948900320785,  
0.02035105936303376,  
0.35891510624171696,  
0.07011262472067725,  
0.2571910630887441,  
0.09727807922224965,  
-0.4253506785797692,  
-0.08201618636277365,  
-0.5629942371157008,  
0.4984357070329931,  
0.22460606922422946,  
0.6436861273901548,  
0.5581387866543217,  
0.6438048424266741,  
0.6625810608832491,  
-0.2877740698749285,  
0.03400434270310955,  
0.6598198228171638,  
0.15695492486622947,  
-0.23277712193728803,  
0.3379436543817524,  
0.6679629986711755,  
0.4913802101172593,  
-0.6543304626041586,  
1.2398324170787045,  
0.10868488610295632,  
0.4726806257545104,  
-1.0278416218016544,  
-0.5660236088762642,  
-0.06627186605932975,  
0.3527547117645279,  
0.3944014355355292,  
0.33709190475341266,  
0.16707772676088822,  
0.29195080738380563,  
1.0354529601392413,  
0.12500585138196232,  
-0.037178956773431956,  
0.7823218278561086,  
-0.04464215343745706,  
-0.36923576305262273,  
-0.9863817864437636,  
0.039519076991602065,  
-0.35646400258617383,  
0.04542480304419608,  
-0.46125271135496354,  
0.40472620693719735,  
0.7802480661953589,  
-0.6757172179201896,  
0.6396142241310521,  
0.2327897749192615,  
0.8954622299286413,  
0.7158405805761733,  
0.1382139633537826,  
1.0616928944303126,  
-0.6122315420380016,  
-0.6738539946512315,  
1.0433459792659807,  
0.494526070112864,

```
0.20621322780405107,
-0.05318175489586881,
-0.11213659998229918,
0.32941262943060273,
0.13931786347259914,
-0.07640781308377202,
0.31450116184408605,
0.3658109215963646,
0.04460349089074807,
-0.12913310998017427,
0.31890485610090735,
-0.005491508360761248,
1.2692063073436923,
-0.3006174703747285,
-0.41404661321397057,
-0.5199199797590206,
0.44225909618051784,
-0.4233007342169607,
0.7456354776212751,
-0.32484988424610756,
0.9268151291603125,
0.8385591284905366,
0.027219364270413358,
-0.5520387125082392,
1.3757901840365965,
0.02933419406725825,
-0.2915193842748469,
0.33917094344303517,
0.10828106345120646,
-0.5650186064180197,
-0.6041651963720519,
-0.19230834783869816,
1.9848826966849449,
0.0632219631903188,
0.04804551511145073,
0.47752350144148015,
1.3406847618100746,
-1.3722262204383469,
-1.0513455672656666,
0.7121308231347245,
0.1327894205595957,
1.9758312031522887,
2.19648222646383,
0.8936788375205645,
0.05510909660880629,
-0.18765678539637448,
0.45031205104496697,
-0.6542716355161553,
0.5783583754336702,
-0.18844184232604352,
-1.5667303012058793,
0.36110899429768645,
-0.275182998952267,
0.30367576290775045,
-0.15326871782023411}},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix': 'AUTOMATE_xy_noise_free_time_evo_ric2_sample#2'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.130214875567141],
[12, 6, 0, 0, -5.622281179564727]],
```

```

        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 5.91278076171875e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -7.884181723568348,
                            'others': { 'beta_coeffieicients': [1.5, -0.5],
                                         'cost_richardson_zne': 2.5,
                                         'sorted_expectation_vals': [ -7.130214875567141,
                                                                    -5.622281179564727],
                                         'sorted_noise': [6, 18]},
                            'sampled data': [ [4, 2, 0, 0, -7.130214875567141],
                                                [12, 6, 0, 0, -5.622281179564727]],
                            'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                                         'r': 0},
                                      'time': {'max': 10.0, 'min': 0.0},
                                      'type': 'xy-iss'}}},
  'init_param': { 'value': [ 0.02240293444906766,
                              0.9863710197203618,
                              1.3708545038264748,
                              1.3757718928414557,
                              1.7844795346244002,
                              2.029643659915566,
                              2.029643659915566,
                              4.135298362317422,
                              4.181946654536538,
                              4.392782597821499,
                              4.473609589126697,
                              4.474471668054438,
                              4.475838923576404,
                              4.4785869343507265,
                              4.4785869343507265,
                              5.467009291914798,
                              5.470281162008999,
                              5.840541346188122,
                              5.842392372241278,
                              6.505508038171383,
                              6.505508038171383,
                              7.536348099553183,
                              7.536348099553183,
                              9.63019412694799,
                              9.63019412694799,
                              9.63019412694799,
                              9.63019412694799,
                              9.63019412694799,
                              9.63019412694799,
                              9.63019412694799,
                              1.1150074339792337,
                              -0.03535947987647509,
                              1.1918755403807781,
                              -0.20191103850925227,
                              -0.268362117189328,
                              -0.3595192771004685,
                              1.2614204066704717,
                              -2.9429228213034166,
                              -1.054810371869961,
                              0.9594255841252335,
                              -0.09538831740389547,
                              0.3965663197177072,
                              -0.22182226409641906,
                              -0.2653718580482209,
                              0.1686090968331403,
                              1.6516484362324146,
                              -0.3049608013883917,
                              0.49165272629600476,
                              1.9061569916625292,
                              1.241422732345657,
                              -0.11527538328521378,
                              -0.22895223610637053,
                              -0.06124477487110871,

```

0.6193220715745159,  
1.372932614853267,  
-1.1538384701543527,  
-0.1139440760455718,  
0.16973094341798492,  
-0.5943234340378932,  
0.21399932498003596,  
-0.18156105319883253,  
-1.0504702368491705,  
0.7232808408606985,  
-0.018870518436612777,  
-0.29343981279013404,  
0.30960592292227684,  
0.13511542022922338,  
0.5096669954667911,  
-1.097576281455009,  
0.12047585913747774,  
-0.5585503308065869,  
1.2279608447421912,  
1.3012401380411538,  
0.3769592231863052,  
-0.5692023175942067,  
-0.4567508363134565,  
-0.679549924864495,  
-0.24647993267323956,  
0.6292567546169889,  
0.9587256267378846,  
1.7268825428143277,  
0.1413792259593793,  
0.6520451922983643,  
0.6152471684019365,  
-1.1240317980448378,  
-0.9856730455453077,  
-1.2455074642265085,  
0.2235091354354849,  
-0.8870861048674711,  
0.5299724059178798,  
-0.21820971616414211,  
-0.09687180933262383,  
-0.9247884680119297,  
-0.4566833626656702,  
-0.4285291193052864,  
-0.6406026728496247,  
0.9023578506051637,  
0.03748900229192909,  
0.7551248935414285,  
-0.18980887545414976,  
-0.1497604267964229,  
-0.4253730408988226,  
-0.4157675203773789,  
1.677209169409502,  
0.2126888490300174,  
-0.13481167544410624,  
-1.6951458494505263,  
-0.006476362637627559,  
-0.5490470525961781,  
0.3195499617454318,  
1.077429849794694,  
0.6725724542747005,  
-0.10235701747439804,  
-0.014129818782246995,  
2.382406086835482,  
0.008866515589568993,  
1.0282503794544984,  
-0.6899701634722577,  
0.3510134577654823,  
0.6918405669356381,  
-0.08667968085870373,  
-0.0005005962237103964,  
1.3805542469189591,  
1.011514915181436,  
-0.4623191099783579,  
1.397645255720587,  
-0.7813361449321683,  
-0.9940660424170442,

```

-0.6570734018108508,
1.0171740600492052,
0.14480072689925969,
1.157289980717297,
1.019472554492438,
1.0029573776528096,
-0.20406480565208354,
-0.011076077177880707,
-0.30566521016454584,
-0.4775965459909992,
-0.7158801142606765,
1.5610067764386268,
1.5187465408730505,
0.21158961058436962,
-0.38098352608767794,
-0.046999172842648596,
0.5964180792256618,
-0.6260168044949087,
-0.7215592053840503,
-0.5706802740378752,
0.11995346168986934,
0.17053214926260635]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix': 'AUTOMATE_xy_noise_free_evo_ric2_sample#6'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.25970305977228],
                          [12, 6, 0, 0, -5.766278116709839]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.504753112792969e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -8.006415531303501,
                           'others': { 'beta_coefficients': [1.5, -0.5],
                                         'cost_richardson_zne': 2.5,
                                         'sorted_expectation_vals': [ -7.25970305977228,
                                                                       -5.766278116709839],
                                         'sorted_noise': [6, 18]},
                           'sampled data': [ [4, 2, 0, 0, -7.25970305977228],
                                              [12, 6, 0, 0, -5.766278116709839]],
                           'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                                         'r': 0},
                                      'time': {'max': 10.0, 'min': 0.0},
                                      'type': 'xy-iss'}}},
  'init_param': { 'value': [ 0.5698358581496117,
                              1.0111463732621893,
                              1.116254023022104,
                              1.116254023022104,
                              1.4543153683590362,
                              1.4543153683590362,
                              1.551144943675129,
                              1.551144943675129,
                              2.3321866923810566,
                              2.4857852178760083,
                              3.837593499897418,

```

3.837593499897418,  
3.837593499897418,  
4.847467397840062,  
5.03660309473088,  
5.176578602594472,  
5.176578602594472,  
5.214332760543968,  
6.547255537065404,  
6.547255537065404,  
7.083633091144979,  
7.083633091144979,  
7.133204014188821,  
7.133204014188821,  
7.133204014188821,  
7.937225733864811,  
8.370661235857398,  
8.62656679928389,  
8.759707620277526,  
9.424598849529344,  
0.24247733923543782,  
0.79275118507479,  
-0.012314768690710378,  
1.2247395896468714,  
-0.6087890007814074,  
0.9804698093938512,  
0.19554007335952167,  
-0.18291383394130525,  
-0.08254523307317092,  
0.18380200005144362,  
-0.06242013495608768,  
-0.18902966193120999,  
0.4846770511497838,  
1.2162916157423216,  
0.4476502570273604,  
-0.5204828708955642,  
1.1525916637240337,  
0.9814837501696517,  
1.2019836737296188,  
0.10039944576408244,  
-1.165620769823409,  
0.5709783345435084,  
0.04690539627488982,  
0.3150855883896384,  
0.6835833386917337,  
0.7350671828581666,  
0.15105693185753874,  
0.7851129846448224,  
-0.290237804763004,  
0.02628688844012564,  
-0.3427838784588314,  
-0.12202424723691215,  
0.30368921729231485,  
-0.08398845633414893,  
-0.34421225485285395,  
-1.0992299599969957,  
-0.6679166311787512,  
-0.4925602784337871,  
-0.7607905356843834,  
-0.061822787578292515,  
-0.33643902903801526,  
1.7237644621079549,  
1.1087838048318122,  
1.4391293107545464,  
-0.2688865923867924,  
0.07238699078201241,  
-0.7262166431073663,  
-0.8607492696026928,  
0.1828620517189283,  
-1.5556021786529124,  
-0.5230641559705965,  
-0.023465829708141782,  
0.5773817105800866,  
-0.6189512057198875,  
-0.1704298219551506,  
0.6935490081871019,

```

0.43024761601627914,
-1.3818053283072975,
0.32069867830077864,
0.11223505487625844,
-0.6642209341325642,
-0.7163563578386999,
0.9533459704680486,
-2.5373567196844773,
-0.3530595330204968,
-0.36744271288254204,
-0.4105700661159024,
-0.529185988706723,
-0.5074466275713505,
0.5969687397167245,
0.1454479675984071,
0.9510340399481164,
-0.16051754924491393,
0.168676911677473,
1.6243103666539225,
-0.3533677275828062,
0.23248347317288842,
1.550100715213732,
0.3540002793004863,
0.11004939052123668,
0.0026309322638186474,
1.0023099891482978,
1.3075603782358884,
0.06614039249633322,
0.12696883216368457,
0.4650745950568721,
0.09288306127511851,
-0.05535633254466518,
1.0893487961438044,
0.1856572010619516,
-0.3369565165204948,
1.1993442715596423,
-0.1637322799431796,
-0.05574034797393315,
-0.6499132821077687,
-1.1854402746414112,
-0.20554021240749126,
-0.697991352679575,
0.7715290435685477,
0.27728540290360154,
-0.7490020286422794,
0.6727458447445039,
-1.3928966895283914,
-1.1123692530480307,
1.2429888713160355,
0.5002310144425463,
1.0425617895549082,
-0.41250228671824735,
-0.20782873770333182,
0.952256354944612,
-0.2180059005687231,
0.8024032545701543,
-1.0975152466418368,
0.6192383355749876,
-0.44420258004771784,
-1.3605235580058401,
1.4196204597477091,
-1.1230853758949062,
0.09475958663430169,
0.9412942473630452}],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix': 'AUTOMATE_xy_noisefree_time_evo_ric2_sample#8'},

```



```

'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]],
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
                          'constraint': True,
                          'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.159167099826597],
                          [12, 6, 0, 0, -5.573237410199788]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.743171691894531e-05,
            'zne_values': { 'degree': 0,
                          'extrapolated_value': -7.952131944640001,
                          'others': { 'beta_coeffieicients': [1.5, -0.5],
                                      'cost_richardson_zne': 2.5,
                                      'sorted_expectation_vals': [ -7.159167099826597,
                                                                    -5.573237410199788],
                                      'sorted_noise': [6, 18]},
                          'sampled data': [ [4, 2, 0, 0, -7.159167099826597],
                                              [12, 6, 0, 0, -5.573237410199788]],
                          'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                        'layer': 30,
                        'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0, 0],
                                                       'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                                       'r': 0},
                        'time': {'max': 10.0, 'min': 0.0},
                        'type': 'xy-iss'}}},
  'init_param': { 'value': [ 0.2383708143795501,
                             0.8137820253985804,
                             1.0561141201801563,
                             1.2070683478267785,
                             1.9518166906091101,
                             2.08301823027678,
                             2.6774459967535513,
                             2.7270096866449576,
                             3.7369434259122447,
                             3.7421546540398443,
                             4.458327272130387,
                             4.463102384700506,
                             4.463102384700506,
                             4.482690585412051,
                             4.482694652744643,
                             4.498978826283554,
                             6.3580266266370415,
                             7.88639599997723,
                             7.886532810158634,
                             8.060529572035655,
                             8.06234783983503,
                             8.127555772505229,
                             8.130166630032164,
                             8.42408407139234,
                             8.433074307328475,
                             9.412401860498063,
                             9.420584174895616,
                             9.429609653004679,
                             9.434851407347677,
                             11.283524698808058,
                             0.19157417616433814,
                             0.42257952171340063,
                             0.3129095694283805,
                             0.28360255750055535,
                             -0.7229159635345903,
                             2.545731433831817,
                             1.1687892956196542,
                             0.5222949375721274,
                             0.9482151911772319,
                             0.28742832079435787,
                             1.1627391357840349,
                             -0.27939056132165146,
                             -0.07574334812551493,
                             -0.529119211391362,

```

-0.08653083237786212,  
0.042544229108731915,  
-0.09154582517805988,  
0.2776265525620834,  
0.373637405241428,  
-0.666296500917012,  
-0.729825790392568,  
0.36164641825124294,  
1.2066181407380305,  
0.18327070025757417,  
2.2757552060408917,  
-0.004789158452516104,  
0.49019439516235463,  
2.190622553796523,  
0.6131206832540379,  
1.0987721265230228,  
1.9413219378309259,  
0.07975169469268534,  
0.17531082109327745,  
0.01770145552231998,  
0.22429808435825893,  
1.1460098869067579,  
-0.25766861736092417,  
0.4386465248337572,  
0.7521614434169624,  
0.07039918338308593,  
-0.23913727928604284,  
0.062497116873310714,  
0.27575365987954265,  
-0.8268952220573135,  
0.8599765782432734,  
0.6958325703328606,  
-0.16792542378671177,  
-0.13186811496768225,  
0.17745018848846658,  
-0.13764108606901534,  
-0.34798347931108986,  
0.3901205214779397,  
-0.12832331396189006,  
0.7623260417931323,  
-0.08745728181826747,  
0.22448567111633413,  
0.5103689813486589,  
0.020179740460913417,  
-0.4639048953982949,  
1.8052783293547816,  
-0.06895296635033099,  
-0.46137869531525183,  
-0.7694587159951923,  
-0.1507074275764489,  
-3.159084078074864,  
1.5556721360426484,  
0.9802025173412374,  
-1.5980562353917622,  
0.9974678614222413,  
0.11965749551778265,  
-0.5964068365118492,  
1.00912773091807,  
1.2674306548806673,  
1.7418320010188646,  
-1.2223756485879664,  
-0.006270145144671745,  
0.7863824204489233,  
-0.08410721186616651,  
0.13420385894759826,  
0.6686584151585806,  
-0.7946689395347296,  
-1.448768973512125,  
-0.4158373205099576,  
-0.1003664997933048,  
0.5370971852976741,  
-0.013369261455621718,  
-1.2134070474127567,  
2.71822204346588,  
-0.8266087910498845,

```

-0.04274152999618493,
0.627725493238542,
-0.10714625448592663,
1.4055199595750496,
-0.08877591733311402,
-0.6400618055168635,
0.27990653766167567,
0.27230874688701184,
1.8329367216853043,
0.12128377229042309,
0.03719209379786179,
0.7558193864298689,
-0.027085062677120984,
0.7947118159580207,
-0.18810209431195668,
0.008294184744538372,
-0.9110921816475059,
1.3065108206329406,
0.004810940817056788,
1.4030602129547465,
0.03878633149748846,
0.29850504257680605,
-0.9524583070906825,
0.10037229527914636,
0.4277056649647598,
-2.2528322583674503,
0.030724614514628212,
0.8416350822543037,
1.5579013461800135,
0.5696673724928452,
-1.5352194543526818]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
'file_name_prefix': 'AUTOMATE_xy_noise_free_time_evo_ric2_sample#4'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.418732841657522],
[12, 6, 0, 0, -5.815573107517698]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 4.172325134277344e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -8.220312708727434,
'others': { 'beta_coefficients': [1.5, -0.5],
'cost_richardson_zne': 2.5,
'sorted_expectation_vals': [ -7.418732841657522,
-5.815573107517698],
'sorted_noise': [6, 18]},
'sampled data': [ [4, 2, 0, 0, -7.418732841657522],
[12, 6, 0, 0, -5.815573107517698]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ -3.641081222961908e-17,
0.6149788059529836,

```

0.7190202634465676,  
1.227117923902744,  
1.282995668258181,  
1.320146784613617,  
1.320146784613617,  
3.1464089486715623,  
3.1464089486715623,  
5.021180125711677,  
5.021180125711677,  
5.021180125711677,  
6.703692809170789,  
6.703692809170789,  
7.791601108223033,  
7.8369202041803225,  
7.951907692650894,  
7.98389042115583,  
8.258376681022987,  
8.258376681022987,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.265620267330194,  
8.265620267330194,  
9.412842541483705,  
9.412842541483705,  
10.502716174481437,  
10.502716174481437,  
0.1665558361704551,  
0.0766182276072886,  
-0.06331706305100791,  
0.03225035272845343,  
-0.2265177184784691,  
0.6859734408919996,  
0.358399999202588,  
-0.31490649734707366,  
0.03084506070978915,  
0.8141179515629021,  
-0.05751068028622007,  
0.9013204998454583,  
-0.325467390457223,  
-0.16027539072229496,  
0.19756436832536928,  
0.17875052394899651,  
0.07441990946369173,  
-1.7121562848350094,  
0.5411900571694856,  
0.025994665514066265,  
-1.0547594680221428,  
-0.3558195097906033,  
0.2575282902752545,  
-0.32652811387218433,  
-0.17477771883072452,  
0.05603758809983181,  
-0.31531793685177084,  
0.24953935818155465,  
-0.21945102528047247,  
0.016201452486715968,  
-0.47139285875704856,  
0.8354485366702803,  
0.28783787212142514,  
-1.483190369052958,  
-0.05324490057492157,  
0.00808064868141892,  
-1.3894868155533049,  
0.07648399162880297,  
0.28128388531065984,  
-0.8032486745370345,  
0.9961277979922681,  
0.7271807873997648,  
-0.2598267503182047,  
0.058937213125893145,  
1.4176939090014022,  
1.5623836495300838,  
-1.2281014386266311,



```

        'status': True,
        'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix': 'AUTOMATE_xy_noisefree_time_evo_ric2_sample#3'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
                          'constraint': True,
                          'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.47570078392518],
                          [12, 6, 0, 0, -5.92114928278248]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.6716461181640625e-05,
            'zne_values': { 'degree': 0,
                          'extrapolated_value': -8.25297653449653,
                          'others': { 'beta_coeffieicients': [1.5, -0.5],
                                      'cost_richardson_zne': 2.5,
                                      'sorted_expectation_vals': [ -7.47570078392518,
                                                                    -5.92114928278248],
                                      'sorted_noise': [6, 18]},
                          'sampled data': [ [4, 2, 0, 0, -7.47570078392518],
                                              [12, 6, 0, 0, -5.92114928278248]],
                          'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                        'layer': 30,
                        'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                      'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                                      'r': 0},
                                'time': {'max': 10.0, 'min': 0.0},
                                'type': 'xy-iss'}}},
  'init_param': { 'value': [ 0.01970245038838479,
                             0.18403088824160574,
                             0.23516669011749736,
                             0.3619340287619915,
                             0.7559235356843684,
                             0.8037553588156275,
                             0.8037553588156274,
                             0.8037553588156274,
                             1.523650120002224,
                             1.5399034674182392,
                             3.5267025169505333,
                             3.526702516950533,
                             4.657784878324055,
                             4.735234101549794,
                             4.768060921347247,
                             6.910522417024203,
                             6.910522417024203,
                             7.937298848041795,
                             7.937298848041795,
                             7.937298848041795,
                             7.937298848041795,
                             7.937298848041795,
                             7.937298848041795,
                             7.937298848041795,
                             8.950027818739875,
                             8.950027818739875,
                             8.950027818739875,
                             8.950027818739875,
                             8.950027818739875,
                             9.275481401407285,
                             0.034552241786943605,
                             0.7960682992937013,
                             -0.16960774395822967,
                             -0.13488653659207303,
                             -0.07127010448742209,

```

0.7213919487775996,  
0.07517487951530155,  
0.7669403129297154,  
-0.0980146039609658,  
0.2841753594230342,  
0.41897129078802076,  
0.7644737129881134,  
0.21659836679204617,  
0.40978346593820614,  
0.23386906952753808,  
0.6351364889148511,  
0.33021983360135304,  
0.3518425622667454,  
-0.16759580526603354,  
1.1955178055405769,  
-0.1119172073880175,  
-1.6647459335605923,  
-0.09499524124538847,  
1.171044098528735,  
-0.022137095989983098,  
0.46479840085551427,  
0.5434533112600137,  
0.7953483283824695,  
-0.23791626316884204,  
-0.34327459028867535,  
0.9770824990177593,  
0.3972109926583832,  
0.031305244787475206,  
0.06660894739153407,  
-0.4270300066285869,  
-1.4580475210852422,  
0.18899331747125298,  
-0.5789031865333153,  
0.2203088633995836,  
-0.028805094274594364,  
-0.21236041446549625,  
0.00835869807102751,  
1.8444421334304235,  
-0.36021419267454113,  
-1.0777998782841605,  
0.7201309879688491,  
-0.07151832135087417,  
0.013523038580686776,  
-0.5101061898109359,  
1.528477364550823,  
-0.24055091899624312,  
1.595727742687772,  
1.181011187425284,  
-0.07205139039345279,  
-0.3645912646252544,  
0.922259297261975,  
0.47504473393792157,  
-1.4582846498754758,  
-1.1041238978674286,  
-0.08619812725702276,  
1.5348185477516838,  
-0.034799821636765677,  
0.34854563969795865,  
-0.3057886345189525,  
0.3435344949085216,  
2.387989506593159,  
0.5928805156422549,  
-0.02250711897690342,  
0.734685803060112,  
1.1230348216575474,  
0.9339212770561773,  
0.5429657194529808,  
-0.9530889967003539,  
1.2607191116533525,  
-0.18262479735843284,  
0.2292294020716647,  
0.484625167272873,  
2.2621526738562925,  
0.3832060422832924,  
0.2504382199240898,

```

-1.1186566372739195,
1.0354182359738777,
-0.9045076995614423,
1.0282595509077306,
1.805679851173207,
0.9332861023326164,
1.4396403686507162,
1.6178312922032976,
-0.22196274260736226,
0.19030625281227892,
-0.32840557234129963,
1.004592356770436,
1.8720477930131976,
-0.06388076228748135,
0.12235432131563899,
-0.5998878734536057,
-0.5461403115162753,
-0.17116133229966776,
0.6826247841010238,
0.6607748570434985,
0.7854114346995006,
0.5612002866021459,
-0.2559995100181322,
-0.8863827207156498,
0.2553569774973194,
0.6372473265785513,
-0.14017909069433732,
0.016226196464851673,
-0.10437448541592237,
2.5268983957827906,
2.3709647446626767,
-0.8108547070158446,
0.5698393243760288,
-1.2042979310590165,
-0.5004321415825274,
-1.0362881146071494,
-0.18531750144204898,
1.5646886079478448,
0.08968487420602586,
-1.6120268318409705]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix': 'AUTOMATE_xy_noisefree_time_evo_ric2_sample#10'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.512595875373562],
                          [12, 6, 0, 0, -6.004303631668366]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.076957702636719e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -8.266741997226159,
                           'others': { 'beta_coeffieicients': [1.5, -0.5],
                                         'cost_richardson_zne': 2.5,
                                         'sorted_expectation_vals': [ -7.512595875373562,
                                                                        -6.004303631668366],
                                         'sorted_noise': [6, 18]},
                           'sampled data': [ [4, 2, 0, 0, -7.512595875373562],
                                              [12, 6, 0, 0, -6.004303631668366]],
                           'sampling': 'default'}}},

```



```
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0, 0],
                                                         'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                                         'r': 0},
                          'time': { 'max': 10.0, 'min': 0.0},
                          'type': 'xy-iss'}},
  'init_param': { 'value': [ 0.17961742860022237,
                              0.4029745783400613,
                              0.4271020388774394,
                              0.6998927493507625,
                              1.1444327445959492,
                              1.4463150894355827,
                              1.7859669797147917,
                              1.7859669797147917,
                              1.8910076260348616,
                              2.1568466639380097,
                              2.184715675260106,
                              2.3241261579565067,
                              5.221288254664872,
                              5.360678146313719,
                              5.572749542622228,
                              6.315664711217606,
                              6.332942041057151,
                              7.225695385348529,
                              7.238714694082236,
                              7.767863290353532,
                              7.947954629935657,
                              8.045079231148478,
                              8.080705184182557,
                              8.235317994608641,
                              8.52967785406855,
                              8.920755162601605,
                              8.920755162601605,
                              8.920755162601605,
                              9.75907480462672,
                              11.068402571583377,
                              -0.07026370230905016,
                              1.2758275954101812,
                              0.1960569796315372,
                              -0.7454998985427054,
                              0.5260870873255556,
                              1.3632265149428353,
                              0.06759709485075166,
                              0.7201883678889174,
                              0.7780364770341424,
                              0.7034018811814728,
                              -0.3281225120527201,
                              -0.21523884970562404,
                              0.3525948786581971,
                              0.10058439953616755,
                              0.8489242437750127,
                              0.4102210250930649,
                              -1.1239274808373552,
                              -0.07527028057729333,
                              -0.662823747816413,
                              -0.09016589559770041,
                              0.0005078927131911535,
                              -0.9974030724775158,
                              1.2973260682530905,
                              0.6207513445119947,
                              -0.06959715000945968,
                              0.01479447508324883,
                              0.5707366547040263,
                              0.8024230791007029,
                              0.11580671533830131,
                              0.5319238260215059,
                              2.029703693625361,
                              0.8476591202353092,
                              -0.5985490132202251,
                              -1.0850372047073247,
                              -0.13885829158476937,
                              0.6160884575951602,
                              -0.6119315652443118,
                              0.25456754270344084,
```

1.6135141314150674,  
1.6101080474118592,  
-1.0046888465114787,  
-1.2174288348798858,  
-0.8801790341822278,  
-0.01998793431745051,  
-1.007194981866689,  
-1.6365882266166358,  
3.524880820008825,  
1.5399950054830251,  
-1.401820445976074,  
-0.04945776017633801,  
0.9565666812114323,  
-0.20490442564626934,  
-0.5632271134618189,  
1.0033608730635488,  
0.12368927199762578,  
-0.06153617179775209,  
1.0557374829951787,  
1.532632985657107,  
-0.3069192599686721,  
1.8620498010178619,  
0.18083984306067874,  
-0.9702971127887235,  
-0.4866438529829019,  
0.2527358034573417,  
0.46390718912935613,  
0.05253485630073179,  
-0.15957905175444287,  
0.5064463362180326,  
0.6588516997606392,  
0.036226022952260704,  
-1.5941274572195923,  
0.3692191472654626,  
0.31840120283705997,  
0.8741993879399423,  
0.4802653460337955,  
0.3012459045041651,  
0.5102022084743536,  
0.3727970282915065,  
0.6665750190815365,  
-0.7773615380935764,  
0.12852119124454983,  
0.6774482070442244,  
-0.34235651892527574,  
-1.1577831131801597,  
-0.2879120353476077,  
1.157549789799121,  
-0.1818163295634488,  
-0.034519908964088415,  
-0.6744130553492667,  
1.1322140576298956,  
0.5044463860518625,  
1.5469749343656427,  
-0.19451127779487945,  
0.16868157432748737,  
0.3887158384137858,  
1.179393002549757,  
0.4377598134949622,  
0.42273561999328285,  
0.17555703442650725,  
0.7637154786900613,  
0.3204620558964089,  
-1.0127445325141415,  
-0.3366137672636463,  
-0.6128563234467006,  
-0.19959799618607235,  
-0.22993024268879514,  
0.6548635589470768,  
0.5449412421525476,  
0.11171602982233311,  
0.5174688869584806,  
-0.0926785574168733,  
-0.012796553414024043,  
0.872831179387319,

```

-0.3738274777631416,
0.708424995234135,
1.1207261796968788,
0.39043722964884914,
1.5466373285390471,
-0.0566526099067629,
-1.544789451209757]],
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                    'noise_prob': [0.001, 0.001, 0, 0],
                    'status': True,
                    'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
                                   'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix': 'AUTOMATE_xy_noise_free_time_evo_ric2_sample#9'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.395384341095475],
                           [12, 6, 0, 0, -5.790856073500346]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.719329833984375e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.19764847489304,
                            'others': { 'beta_coefficients': [1.5, -0.5],
                                         'cost_richardson_zne': 2.5,
                                         'sorted_expectation_vals': [ -7.395384341095475,
                                                                       -5.790856073500346],
                                         'sorted_noise': [6, 18]},
                            'sampled data': [ [4, 2, 0, 0, -7.395384341095475],
                                                [12, 6, 0, 0, -5.790856073500346]],
                            'sampling': 'default'}}}},
'xy-ric3-uniform-scaling': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
                                                                      'layer': 30,
                                                                      'ugate': { 'coefficients': { 'bn': [ 0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0],
                                                                      'cn': [ 0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5],
                                                                      'r': 0},
                                                                      'time': {'max': 10.0, 'min': 0.0},
                                                                      'type': 'xy-iss'}},
                                                                      'init_param': {'value': 'random'},
                                                                      'noise_profile': { 'noise_on_init_param': { 'status': False,
                                                                      'value': 0},
                                                                      'noise_prob': [ 0.001,
                                                                      0.001,
                                                                      0.001,
                                                                      0.001],
                                                                      'status': False,
                                                                      'type': 'depolarizing'},
                                                                      'nqubits': 7,
                                                                      'observable': { 'coefficients': { 'bn': [ 1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0],
                                                                      'cn': [ 0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5],
                                                                      'r': 1},
                                                                      'def': 'ising'},
                                                                      'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
                                                                      'file_name_prefix': 'AUTOMATE_xy_noise_free_time_evo_ric3_sample#9'},
                                                                      'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
                                                                      'run': 'zne',
                                                                      'state': 'dmatrix',
                                                                      'vqe': { 'iteration': 1,
                                                                      'optimization': { 'algorithm': 'SLSQP',
                                                                      'constraint': True,
                                                                      'status': False}},
                                                                      'zne': { 'data_points': [ [4, 2, 0, 0, -7.395384341095475],
                                                                      [12, 6, 0, 0, -5.790856073500346]],
                                                                      'degree': 0,
                                                                      'method': 'richardson',
                                                                      'sampling': 'default'}}}},
                                                                      'exact_sol': -8.566772233505624,
                                                                      'run_time_sec': 3.719329833984375e-05,
                                                                      'zne_values': { 'degree': 0,
                                                                      'extrapolated_value': -8.19764847489304,
                                                                      'others': { 'beta_coefficients': [1.5, -0.5],
                                                                      'cost_richardson_zne': 2.5,
                                                                      'sorted_expectation_vals': [ -7.395384341095475,
                                                                      -5.790856073500346],
                                                                      'sorted_noise': [6, 18]},
                                                                      'sampled data': [ [4, 2, 0, 0, -7.395384341095475],
                                                                      [12, 6, 0, 0, -5.790856073500346]],
                                                                      'sampling': 'default'}}}},
                                                                      'xy-ric3-uniform-scaling': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
                                                                      'layer': 30,
                                                                      'ugate': { 'coefficients': { 'bn': [ 0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0],
                                                                      'cn': [ 0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5],
                                                                      'r': 0},
                                                                      'time': {'max': 10.0, 'min': 0.0},
                                                                      'type': 'xy-iss'}},
                                                                      'init_param': {'value': 'random'},
                                                                      'noise_profile': { 'noise_on_init_param': { 'status': False,
                                                                      'value': 0},
                                                                      'noise_prob': [ 0.001,
                                                                      0.001,
                                                                      0.001,
                                                                      0.001],
                                                                      'status': False,
                                                                      'type': 'depolarizing'},
                                                                      'nqubits': 7,
                                                                      'observable': { 'coefficients': { 'bn': [ 1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0],
                                                                      'cn': [ 0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5],
                                                                      'r': 1},
                                                                      'def': 'ising'},
                                                                      'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
                                                                      'file_name_prefix': 'AUTOMATE_xy_noise_free_time_evo_ric3_sample#9'},
                                                                      'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
                                                                      'run': 'zne',
                                                                      'state': 'dmatrix',
                                                                      'vqe': { 'iteration': 1,
                                                                      'optimization': { 'algorithm': 'SLSQP',
                                                                      'constraint': True,
                                                                      'status': False}},
                                                                      'zne': { 'data_points': [ [4, 2, 0, 0, -7.395384341095475],
                                                                      [12, 6, 0, 0, -5.790856073500346]],
                                                                      'degree': 0,
                                                                      'method': 'richardson',
                                                                      'sampling': 'default'}}}},
                                                                      'exact_sol': -8.566772233505624,
                                                                      'run_time_sec': 3.719329833984375e-05,
                                                                      'zne_values': { 'degree': 0,
                                                                      'extrapolated_value': -8.19764847489304,
                                                                      'others': { 'beta_coefficients': [1.5, -0.5],
                                                                      'cost_richardson_zne': 2.5,
                                                                      'sorted_expectation_vals': [ -7.395384341095475,
                                                                      -5.790856073500346],
                                                                      'sorted_noise': [6, 18]},
                                                                      'sampled data': [ [4, 2, 0, 0, -7.395384341095475],
                                                                      [12, 6, 0, 0, -5.790856073500346]],
                                                                      'sampling': 'default'}}}},
                                                                      'xy-ric3-uniform-scaling': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
                                                                      'layer': 30,
                                                                      'ugate': { 'coefficients': { 'bn': [ 0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0],
                                                                      'cn': [ 0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5],
                                                                      'r': 0},
                                                                      'time': {'max': 10.0, 'min': 0.0},
                                                                      'type': 'xy-iss'}},
                                                                      'init_param': {'value': 'random'},
                                                                      'noise_profile': { 'noise_on_init_param': { 'status': False,
                                                                      'value': 0},
                                                                      'noise_prob': [ 0.001,
                                                                      0.001,
                                                                      0.001,
                                                                      0.001],
                                                                      'status': False,
                                                                      'type': 'depolarizing'},
                                                                      'nqubits': 7,
                                                                      'observable': { 'coefficients': { 'bn': [ 1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0],
                                                                      'cn': [ 0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5],
                                                                      'r': 1},
                                                                      'def': 'ising'},
                                                                      'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
                                                                      'file_name_prefix': 'AUTOMATE_xy_noise_free_time_evo_ric3_sample#9'},
                                                                      'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
                                                                      'run': 'zne',
                                                                      'state': 'dmatrix',
                                                                      'vqe': { 'iteration': 1,
                                                                      'optimization': { 'algorithm': 'SLSQP',
                                                                      'constraint': True,
                                                                      'status': False}},
                                                                      'zne': { 'data_points': [ [4, 2, 0, 0, -7.395384341095475],
                                                                      [12, 6, 0, 0, -5.790856073500346]],
                                                                      'degree': 0,
                                                                      'method': 'richardson',
                                                                      'sampling': 'default'}}}},
                                                                      'exact_sol': -8.566772233505624,
                                                                      'run_time_sec': 3.719329833984375e-05,
                                                                      'zne_values': { 'degree': 0,
                                                                      'extrapolated_value': -8.19764847489304,
                                                                      'others': { 'beta_coefficients': [1.5, -0.5],
                                                                      'cost_richardson_zne': 2.5,
                                                                      'sorted_expectation_vals': [ -7.395384341095475,
                                                                      -5.790856073500346],
                                                                      'sorted_noise': [6, 18]},
                                                                      'sampled data': [ [4, 2, 0, 0, -7.395384341095475],
                                                                      [12, 6, 0, 0, -5.790856073500346]],
                                                                      'sampling': 'default'}}}},
                                                                      'xy-ric3-uniform-scaling': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
                                                                      'layer': 30,
                                                                      'ugate': { 'coefficients': { 'bn': [ 0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0],
                                                                      'cn': [ 0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5],
                                                                      'r': 0},
                                                                      'time': {'max': 10.0, 'min': 0.0},
                                                                      'type': 'xy-iss'}},
                                                                      'init_param': {'value': 'random'},
                                                                      'noise_profile': { 'noise_on_init_param': { 'status': False,
                                                                      'value': 0},
                                                                      'noise_prob': [ 0.001,
                                                                      0.001,
                                                                      0.001,
                                                                      0.001],
                                                                      'status': False,
                                                                      'type': 'depolarizing'},
                                                                      'nqubits': 7,
                                                                      'observable': { 'coefficients': { 'bn': [ 1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0,
                                                                      1.0],
                                                                      'cn': [ 0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5],
                                                                      'r': 1},
                                                                      'def': 'ising'},
                                                                      'output': { 'draw': {'fig_dpi': 100, 'status': False, 'type': 'png'},
                                                                      'file_name_prefix': 'AUTOMATE_xy_noise_free_time_evo_ric3_sample
```

```

1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': True,
'type': 'png'},
'file_name_prefix': 'xy_noise_off'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0]]},
'run': 'vqe',
'state': 'dmatrix',
'vqe': { 'iteration': 10,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': True}},
'zne': { 'data_points': None,
'degree': 1,
'method': 'richardson',
'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 '
'+ 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z '
'3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X 6 + 1 '
'Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
'0.5 Z 0 Z 1 + '
'0.5 X 1 X 2 + '
'0.5 Z 1 Z 2 + '
'0.5 X 2 X 3 + '
'0.5 Z 2 Z 3 + '
'0.5 X 3 X 4 + '
'0.5 Z 3 Z 4 + '
'0.5 X 4 X 5 + '
'0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + '
'0.5 Z 5 Z 6']},
'output': { 'exact_sol': -8.56677223350563,
'initial_cost_history': [ 4.118038614266066,
2.900590937440303,
2.874944433071395,
3.9296977116518517,
3.1841729388967344,
3.695928991667305,
3.180227821654077,
3.0475045550195774,
2.4669562192398296,
3.4124916083581294],
'noise_details': { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [0, 0, 0, 0],
'noise_profile': { 'noise_on_init_param':
{ 'status': False,
'value': 0},
'noise_prob': [ 0.001,
0.001,
0.001,
0.001],
'status': False,
'type':
'depolarizing'},
'odd_wires': 4},
'optimized_minimum_cost': [ -8.433468022982382,
-8.464942606128835,
-8.43123094137328,
-8.435401809869298,
-7.9812014353834515,
-8.371080050195895,
-8.46198057547588,
-8.19415563172473,

```

```
-8.438078664602543,  
-8.481886373274177],  
'optimized_parameters': [ [ 0.4631008843346199,  
0.8090636887146863,  
1.1101507421405439,  
1.3400184709676968,  
1.7452332568602784,  
1.9308700883292553,  
2.1752679291102544,  
2.1784212211010603,  
3.800207092295721,  
3.800207092295721,  
3.800207092295721,  
3.800207092295721,  
3.800207092295721,  
3.800207092295721,  
4.798448841518561,  
4.812026604031267,  
6.02543601067661,  
6.02543601067661,  
6.5265343452987,  
6.5265343452987,  
6.526534345298701,  
6.528381158760148,  
6.528381158760148,  
7.113023968622042,  
7.113023968622042,  
7.593654062389684,  
7.5949106716383605,  
7.780058793305066,  
9.000370275113886,  
9.005799799983558,  
-0.22105281285875572,  
0.07196296170715184,  
1.0527781347416576,  
-0.4594806493129553,  
1.0526039239081737,  
-0.01709270509934428,  
0.3199675106146978,  
-0.0972220164715271,  
0.9145097677998977,  
0.09808103992344623,  
0.5373974901276602,  
-0.5786059880820694,  
-0.02594763303680847,  
-0.22132394348491485,  
-0.7274785930689547,  
-0.41090279602128,  
-0.520884263329148,  
-1.0260835302846771,  
0.1692597388493397,  
1.3250313995601488,  
1.510357845739394,  
-0.9233604808876308,  
-0.2049157632594096,  
-0.9894281051832,  
0.25772120620526445,  
-0.04822142329545429,  
-0.3912638297585932,  
-0.48486712444934904,  
1.4836649713082644,  
1.566996182191827,  
0.08093959953023218,  
-2.3562926055425963,  
-0.21876618997457167,  
0.10911407834571141,  
-1.3776955808248483,  
-0.31816531211057325,  
0.7083857256813267,  
0.5593482503842677,  
0.7483381318097894,  
0.010042025170353972,  
0.05290425882351868,  
0.20616876613540233,  
-0.8673924682871486,
```

-0.08017548043713153,  
-0.3056222778255953,  
2.3981163154468383,  
0.37079365521682633,  
0.3870558721039623,  
0.19341028278759992,  
-0.3154248344945196,  
-0.12073260037561208,  
-1.5858414285227351,  
0.59830347262823,  
0.30388710178795286,  
-1.4558796844932331,  
-0.3225618511944297,  
0.09243390755822743,  
-0.0006426173071943948,  
0.7561662109631148,  
-1.3902324585417218,  
0.1677701056843372,  
2.7311884232201735,  
-1.1122880815211051,  
0.0467986017971284,  
-0.020089420529231013,  
0.005481851366742631,  
1.3205596999819047,  
-0.1290403664286252,  
0.3870444394307043,  
-0.6549197738372419,  
-0.17656835190090397,  
-0.0008013451895215781,  
-0.8769883624496301,  
1.6929520910231297,  
0.7288671099890552,  
-0.6169673343691255,  
1.667217439782634,  
0.2554635335546482,  
-0.029515171705053127,  
-0.8290153205719569,  
0.042733616172741226,  
-0.5148227135977747,  
1.2301836750084596,  
-0.9175908300980525,  
0.5229779878549122,  
-1.5901934710811256,  
-0.07316585886439231,  
1.1195018365185199,  
-0.31111306362203306,  
0.7254709796877604,  
1.1995417479543053,  
0.6908225815252583,  
-0.2919630814941808,  
0.15955998483086176,  
1.2871422030548714,  
-1.2683991057896014,  
-0.3768598572966417,  
1.4863954796333156,  
-0.4300298743216642,  
0.19151460300148976,  
0.9665838873771405,  
-0.07244306377732504,  
-0.04169546816073936,  
-0.389029635704794,  
1.5218961812832925,  
-0.1772066326032777,  
-0.70949107362336,  
-0.015222466074935298,  
0.3587128629768407,  
1.5809494716454662,  
0.12428164288740734,  
1.5083554487395696,  
-0.044379618902227067,  
-0.03505579308192811,  
-0.6786538117837789,  
-0.007428157845337949,  
1.5281494732580478,  
-0.14124856089608578,

2.726718429443767,  
-0.003106328084445967],  
[ 0.5270475437101116,  
0.7815425625485376,  
1.6469610445191378,  
1.6712876404917778,  
2.122904188877425,  
2.131106816606521,  
3.7367798442214175,  
3.7367798442219424,  
4.750276145421292,  
4.853973384996016,  
4.865098072058574,  
4.873980651141647,  
4.987599328262889,  
5.00246239884106,  
5.520902021852277,  
5.793284849001337,  
5.8087832398624775,  
7.432729128414403,  
7.432953787975026,  
8.144896858715603,  
8.172580744083415,  
8.788071761144659,  
8.792288306719156,  
8.828260688191317,  
9.011586808740137,  
9.011995976067807,  
9.538729699920484,  
9.576884709106812,  
10.486750161390887,  
10.48675016212107,  
-0.15531374899360717,  
-0.0849039080739262,  
-0.8434555658556069,  
0.9447826609611266,  
-0.19482082661427938,  
2.4999420394249707,  
-2.7164831941210483,  
-1.5408169364026967,  
-0.8621482593978547,  
0.31547458537730877,  
1.4220435826823787,  
1.348860553316339,  
0.40827474166943256,  
1.063960383917828,  
-0.21906798993221652,  
-0.33263312803097533,  
0.4889869181158972,  
-0.25524084746075687,  
-1.3622146811064544,  
0.996105149433398,  
1.4161210728452394,  
-0.6491827941870941,  
0.7399329880002848,  
-0.11994422281276146,  
3.179573825543474,  
-0.034943024466848674,  
0.6075464711124173,  
-0.3019825794696199,  
0.029392952712390567,  
0.14840732209332994,  
0.08592470568620861,  
0.016725634393736574,  
-1.3697962205589145,  
-0.06155375586805023,  
0.16508080354919497,  
-0.5975014914051775,  
0.09635736997937351,  
1.254101402191796,  
-0.6193953337438176,  
0.47602269510847217,  
-1.7251540483535392,  
0.5378274350019089,  
-1.0159384367751108,

1.0968223266795405,  
-0.79878134010976,  
0.10468891520322528,  
-0.2910173593847854,  
-0.7078981306941186,  
-0.3510837282628223,  
0.5371002854277007,  
-0.4911274293534503,  
1.7273270693440552,  
1.3500555714793954,  
0.9052059235505011,  
0.4771526028272018,  
-0.1893747959421651,  
0.13989050072973697,  
-0.5930955187300607,  
0.36780210947560876,  
-0.5043370473487999,  
-0.4851893292987325,  
0.1987440888222681,  
-0.5806445532873666,  
2.3171646404124093,  
0.06032126128170586,  
-0.6389920437730593,  
0.9985359186149056,  
0.04870155999532171,  
0.16447399991313041,  
0.05315090520136875,  
0.15727255736970833,  
-1.3722292706433088,  
-0.33233649668322635,  
0.7758243461945761,  
-0.20476613404890107,  
0.06972046040604139,  
0.3143879960336948,  
-0.01452323353492752,  
-1.2901366074359686,  
-0.31033000747276407,  
-0.16264485166390844,  
-1.3914094473719103,  
-0.5273128620655095,  
0.02465459151953875,  
0.10942766294132272,  
1.0292094835171124,  
-1.882689768994833,  
-1.553216293090225,  
1.3287846024814622,  
0.20963913600213377,  
0.7195732642990699,  
0.0969787732183028,  
-0.9744344415633356,  
1.5822487402774768,  
0.7077471503862973,  
-0.766345302327988,  
0.3831437091022152,  
-0.12028853613988252,  
-0.8209919023748664,  
-0.21164805512089607,  
0.5290684330656528,  
-0.1040878870845114,  
1.1956945887281514,  
0.25703931501419025,  
0.6344733295912399,  
-0.02497584874729833,  
-0.20937697561532842,  
-1.4409411147319051,  
0.9707320454927133,  
1.4039378085761043,  
0.9760826987262126,  
-0.17314228405542512,  
0.16734556762922406,  
0.07881248116464283,  
-0.2924467918405051,  
1.4946430081327182,  
0.7516806171134963,  
0.799700486923224,



-0.8440600324500036,  
-0.01069194371181784],  
[ 0.3388610072211759,  
0.3930923343746358,  
0.4059472295013711,  
0.4597995545870322,  
0.4597995545870322,  
0.4667083780713653,  
0.9924683364283498,  
1.054118787032341,  
1.3839145947816414,  
1.4469616998432806,  
3.044048229936016,  
3.044048229936016,  
4.682975233106521,  
4.682975233106521,  
5.287925895396742,  
5.287925895396742,  
5.625677830869467,  
5.625677830869467,  
6.519005703020383,  
6.519005703020383,  
6.519005703020383,  
6.854665591577039,  
6.854665591577039,  
8.092962128458302,  
8.097830997780322,  
8.102159968176109,  
8.111954675742565,  
8.727038821401255,  
8.727038821401255,  
8.784424594255395,  
-0.8636093730812797,  
-0.04742973062196874,  
-0.37989856483295564,  
0.3750798322441465,  
-0.509087961968837,  
0.5366875438436245,  
0.1232704940065221,  
0.5249134835872401,  
0.13594138148710633,  
0.10802292582448766,  
-0.7156772546121367,  
0.34756877087651405,  
-0.5704812075854907,  
0.289395233495819,  
0.2674862930849357,  
0.8724143866961164,  
0.5770602988816299,  
0.658777432128999,  
-0.47288232304292416,  
-0.029663566814993374,  
-1.323180236232167,  
-0.2890901656039231,  
-0.015141732930961212,  
1.1846850771343012,  
-0.4506688471965015,  
0.22241980016839272,  
-0.015748484493019736,  
1.1522499025192263,  
0.2996907655672081,  
-1.7370631162182948,  
-0.35306232532663057,  
0.17322471105923057,  
-1.1855180134814352,  
-0.31537295018088835,  
-1.8120366955290261,  
0.6663892425075478,  
0.21874911670355193,  
1.2729693967005706,  
-0.14230256773273223,  
0.2012427441067739,  
-2.3269317425793643,  
-0.03299848401271634,  
-0.4074853136565566,

-0.30371905431664253,  
-0.12037074206123735,  
0.8456676988075262,  
-0.21838328071319946,  
0.019494764922420988,  
0.16383099728733078,  
0.056056403895700845,  
-3.5632063709291613,  
0.6579904510057321,  
0.5207861046034454,  
-0.017180990359968364,  
0.2532807007765998,  
-0.03315495616728509,  
0.7564905992030696,  
-0.11091568858030387,  
-0.9281890577202553,  
-0.6082181315906088,  
-0.4480511658411004,  
2.1953283079942025,  
-0.30446713497464617,  
-0.03359602431311142,  
0.28972943746372876,  
0.17817064395522006,  
0.7965754083210965,  
-0.9520780563921613,  
0.10150445450145726,  
1.3510884636720888,  
-0.37849615173878054,  
0.17729737647006832,  
0.1884683806301832,  
-0.03234547530918763,  
-1.338763456177623,  
-0.6711058962200585,  
-0.012976043431998471,  
0.027578392175021227,  
0.10161286285089129,  
-0.00939135247962935,  
-1.302164623174096,  
1.3715576399721376,  
0.737767307868418,  
1.5939269674119705,  
1.4291758244230544,  
0.5601859764306084,  
0.3488764286390935,  
-1.093762224545935,  
-1.1976831420922067,  
1.4557381665683378,  
0.8924472305311927,  
0.5300221300338881,  
1.0785280788144638,  
-0.6029509417428172,  
-0.6790632925762424,  
0.4138865114731201,  
0.2917474006869537,  
1.8050154062536312,  
0.05177383423831921,  
0.25467777497912664,  
1.4671356779039024,  
0.4422247342165525,  
-1.5431607378377095,  
1.8101814873938125,  
1.6870467346899987,  
0.7517920825884995,  
1.3622912362338087,  
0.13653050459472865,  
1.5210183141257738,  
-0.004247168330480351,  
0.26137218980413907,  
0.5451511562235306,  
-0.6705596749039198,  
1.2136085126593865,  
0.5231529087420831,  
-0.03279466120532818,  
0.2548954759886831,  
1.5797820110558691,

1.075840789720537,  
1.5541818084195007],  
[ 3.821020346740443e-17,  
1.386496864345847,  
1.386496864345847,  
1.7951472089989222,  
1.8559400139285378,  
2.7980544315911504,  
2.7980544315911504,  
2.82954781812891,  
2.82954781812891,  
2.82954781812891,  
2.956183634338348,  
3.840561875918348,  
3.840561875918348,  
4.79501776182173,  
4.79501776182173,  
5.670460018404704,  
5.670460018404704,  
5.670460018404704,  
6.865392250052202,  
6.865392250052202,  
7.506826147384778,  
7.506826147384778,  
8.737685173635683,  
8.737685173635683,  
8.737685173635683,  
8.737685173635683,  
9.601023092540274,  
9.601023092540274,  
9.853738132880634,  
9.853738132880634,  
0.5611658219809542,  
1.427331325859137,  
0.8881601644240952,  
-0.8937497791603879,  
0.5712044928850715,  
1.3195951619089188,  
0.5467792160605555,  
-0.6816630744322637,  
0.06707477836950569,  
0.6798692668930644,  
0.19576168860111362,  
0.5094724850631845,  
1.1424414477256812,  
0.30471145260454696,  
-0.08158911485577636,  
0.9585661478313002,  
1.0836238583568754,  
-0.3718197048926503,  
0.7841948506971846,  
0.3023515457437066,  
0.7662240328883452,  
0.9970048707689876,  
-0.8946064024093777,  
0.27649390200762114,  
-0.15342626519190924,  
-0.4015720487025046,  
1.460926694270634,  
-0.055421168101734586,  
0.6077050880702092,  
-0.7932081335349191,  
1.3188332541813446,  
0.01929555634963922,  
-1.1301845164589392,  
-0.1718174564221745,  
2.26154163970611,  
-0.9882028269623031,  
0.8038643847286138,  
0.6849304102208338,  
0.874798983022982,  
-0.016486064274954207,  
0.0264221098096002,  
-0.3625000384278827,  
1.4376331477886695,

0.8499992740594865,  
0.10042171561200945,  
0.14542648933357244,  
1.3513090878714353,  
-0.22248922869259902,  
-0.4483175327546578,  
1.2345758678942387,  
-0.18983522552694923,  
0.019591210301167533,  
-1.3607248526627624,  
0.018375533581887468,  
-0.3730738776375715,  
1.0123537416913542,  
0.7412601688930508,  
-1.6525919628732422,  
-0.8341682190885938,  
0.04519729634722039,  
-0.06718028327556408,  
-1.5649719285752928,  
-0.37531851249345394,  
-0.11822841604899964,  
0.008154106549025474,  
-1.4601449692077721,  
-0.0030993446167428395,  
1.462573870839384,  
-0.11887757571245174,  
-0.09361960188417112,  
-1.2543408854038138,  
-1.525280802664792,  
-1.241413372948363,  
0.008758808605552393,  
-1.6676332942965022,  
0.13826170532334445,  
0.7537363962746654,  
0.0833397476047736,  
-0.12216949704941273,  
0.02084807234445201,  
-0.3421949354726438,  
0.0017882611822728064,  
1.5186851123669147,  
-0.4603163345929323,  
-0.09956972276089109,  
0.7247597830417082,  
0.5304935691839561,  
0.003193152207841171,  
0.5581346990750625,  
0.010542051444639388,  
0.7553167297004638,  
0.5956891015800863,  
-0.05566254332595716,  
0.5362461335652635,  
0.009895282042162012,  
-0.3029901133286735,  
0.09399206534914867,  
0.8818812838713691,  
-0.06795832284115338,  
-1.580933930101608,  
0.3014975711017802,  
1.2092022074751856,  
-0.019692531397995948,  
0.9250981578351692,  
0.4673383297638096,  
0.03344339272872125,  
0.13058472572385768,  
0.036262684184263205,  
0.458095375934523,  
0.6492846129896516,  
1.3039221898344189,  
0.024764812872192767,  
0.7236926243101844,  
0.01444840086266692,  
-1.0388939706148563,  
-0.08359693344439546,  
-0.4698004238001188,  
-0.48055768545836347,

0.4662000815300196,  
-0.041204969991243484],  
[ 0.01798320141016013,  
0.3393419127512466,  
0.7047697703765823,  
0.7064789163091142,  
0.7191656785855808,  
0.7198672068604162,  
0.719867206860416,  
1.0840512961729545,  
1.090003904895101,  
1.1926153174924548,  
1.867054342490295,  
1.867054342490295,  
2.368094916985588,  
2.3683751276938714,  
3.6383003552329964,  
3.642527762446636,  
4.505845683894636,  
4.602446412902637,  
4.972427659100928,  
4.972427659100928,  
5.1148164150678035,  
5.8066136392845,  
5.820681023327439,  
6.727088267818048,  
8.352653016300794,  
8.773334122756978,  
9.065902540064004,  
9.065902540064004,  
9.74880092287043,  
11.30145464466351,  
-0.13904770480884485,  
0.23493722133539818,  
0.4497803172772882,  
-0.640584995353188,  
0.9779304528121034,  
0.0011745349607135795,  
-0.7175493520168287,  
0.373620380836484,  
0.08111255661159392,  
0.6653458367314794,  
0.0037967443269442437,  
0.6286122183467432,  
-0.03825426016359485,  
0.6896824961465278,  
-0.23916946602734285,  
0.4624850989736848,  
0.1419493525208794,  
0.7145176662978019,  
-0.316909964913161,  
0.6605458698076423,  
-0.39309909050950365,  
0.7623048158369822,  
0.7469736169282462,  
1.2400892032597353,  
0.12266455668869777,  
0.19578648318487166,  
-0.784043232212839,  
-0.10334183265831844,  
0.32774480702026265,  
-0.011491906972883237,  
0.322988869457402,  
-0.2027870428092001,  
0.1281571522083961,  
-0.1947961113336468,  
1.7114513053475526,  
0.005425684515457419,  
0.8136825826883561,  
-0.25903007981373005,  
-0.5015428579892063,  
-0.2600978115589891,  
-0.15405473476720474,  
-0.4207498663011112,  
1.04622682040645,

-0.8642339256273757,  
0.6248691295250803,  
-0.3539240130838131,  
0.011689879721248103,  
-0.3068283940685192,  
-0.6048660879777619,  
-0.11704784670887185,  
-1.2745062338511486,  
-1.7890038533223112,  
-0.7818671277256136,  
-0.8877455887286905,  
0.3164818198590212,  
-0.27477307924208777,  
1.8083251930535746,  
-0.5031479272825263,  
-0.9648993597903888,  
-0.41682962131770707,  
0.27040705073896654,  
1.0892900815418987,  
0.17779960873468054,  
0.020337033950376556,  
1.0551529464315492,  
-0.10705558118147128,  
-0.8851977322505518,  
0.2232945485845247,  
-0.5850403569085746,  
-0.7690595025978197,  
-0.4391673030332381,  
-0.9309566421919284,  
0.2973030450025941,  
0.6780545449896137,  
0.14045373030826291,  
-0.5109313900859794,  
-0.44070010469428217,  
1.6940975579604587,  
0.17062304524159472,  
-0.402681393200546,  
-0.7091187255059627,  
1.3132357546586793,  
0.2729391261599054,  
1.0115940175088693,  
1.0046673925246778,  
0.4982257464819494,  
0.04454679168285006,  
0.4863023994043421,  
-1.1433261311581624,  
-1.820308437409531,  
0.6035405700431521,  
0.04003907881711185,  
2.99381748600971,  
-1.0437523456620463,  
-0.22517480393070408,  
0.10746937069246698,  
-0.8788513722547997,  
1.286531186523234,  
-1.3157160458746164,  
-0.6979748907629274,  
-0.16573593981190854,  
0.2529194783090185,  
-0.2562517800846549,  
-0.7966921479109774,  
-0.4446940958312971,  
-1.052310031662883,  
-0.1506245930250076,  
0.1615975776996014,  
2.9220364155549214,  
-1.7197843955783065,  
-0.6592103621593355,  
-0.2007498223803255,  
-1.6188873615119244,  
-0.15193115939751467,  
-0.20866967970071015,  
1.2910791163230286,  
-0.4917152660712325,  
-0.42348313202027765,

0.3518303936962707,  
-0.10034486495238693],  
[ 0.009039772647041902,  
1.1400526086001903,  
1.466905028683042,  
1.6524670085313564,  
1.987797816914966,  
1.9900950346150876,  
2.141320233232344,  
2.390935514217652,  
2.402429399816812,  
2.81913686416337,  
2.81913686416337,  
3.5656810200683298,  
3.5656810200683298,  
3.5656810200683298,  
3.76603447051701,  
3.76603447051701,  
5.499236323276389,  
5.4992363232763894,  
5.4992363232763894,  
5.532789537471719,  
5.532789537471719,  
7.371733777832876,  
7.371733777832876,  
7.680783486275433,  
7.706623781446164,  
7.706623781446164,  
8.457742149729329,  
8.457742149729329,  
8.95222736351662,  
8.95222736351662,  
0.18928393791812126,  
1.0354889043700823,  
0.3703113207409527,  
0.30988589523494625,  
-0.34669340410550803,  
0.09615284519636855,  
0.1011898884094612,  
0.6160115432573767,  
0.6148540393435122,  
0.07934943483664206,  
0.8557624329627399,  
-0.7672633290674925,  
-0.14188111026081618,  
0.1995320641320393,  
0.4594888802421805,  
-0.03593187081620776,  
1.2926591415659605,  
0.31433950962447343,  
0.8053272546604554,  
0.6634815559763872,  
0.311660786273531,  
0.0294653444200854,  
0.3044394736040779,  
0.7599259037372076,  
0.22962735656034647,  
0.22562971232722423,  
0.29511485598499815,  
0.02260075636691185,  
-0.9497096253675098,  
-0.5331371571917215,  
0.2192512323868535,  
1.104832430155296,  
0.8636617903941131,  
-0.6756684630428217,  
0.4169844309263729,  
1.1297527651723116,  
-1.160118439748996,  
-0.7971836651224,  
1.9169656561991728,  
-0.007260796290839314,  
0.3614132074474742,  
0.6243022778229537,  
1.8335025630018775,

0.35139722497115833,  
-0.7247870129359816,  
-0.6744811297738377,  
0.49997538785346773,  
1.4139521212248116,  
-3.0799818401546553,  
-0.14768564076593044,  
0.06251500852230953,  
-0.8547134606957393,  
-0.30107856776262504,  
-0.7654972812734481,  
0.28603020918627825,  
0.2129303248959857,  
-1.2077141264570097,  
-0.8488549318812054,  
0.6492574804166855,  
0.7751290676155554,  
0.40909519807061084,  
-1.2750630737105486,  
0.4187798718836698,  
0.33498424523924863,  
-0.19017028209895162,  
-0.03232931911977397,  
1.0621483440417678,  
0.452017889610544,  
1.0192767515800205,  
0.7290563184502946,  
-0.5286462788982386,  
-0.05512372609304388,  
1.3189151919853837,  
0.5865235617306253,  
-0.579843833868396,  
0.6980158293666034,  
0.027004860579276476,  
1.2876675233834314,  
-0.1718561727774212,  
-0.3827017785428823,  
-0.7286404996479297,  
1.1682112525473984,  
0.22765379123755217,  
1.4870969768845252,  
1.1642898801914527,  
-0.03976972562460009,  
-0.8163296820868416,  
-0.15318057329999143,  
0.0482918949035788,  
-0.06014345828968787,  
1.1478583262090496,  
-0.005141116181289305,  
-0.5820859555621626,  
1.086519910329415,  
-1.08558016317555,  
1.531511042803357,  
0.042734048269580674,  
0.7452599788242152,  
-1.3094923903018465,  
-0.9012205175381317,  
-0.0755166851159581,  
1.5493661520767013,  
-0.2278023712186688,  
0.8627212805492942,  
1.8523276191392382,  
-0.10961709979291216,  
0.6746606852631131,  
0.22566845572735392,  
0.5920154791154506,  
1.2709342533151342,  
0.26903045177842116,  
0.11724485476711638,  
0.621942277674204,  
0.15491924869980966,  
1.472217084758381,  
0.8975149794611956,  
0.3601026339731485,  
1.3234513983254743,



0.0182465793142515,  
-0.11914786829986494],  
[ -5.765348397008027e-18,  
0.3428984748224433,  
0.3655450682584724,  
0.704784031551808,  
1.5409081472811441,  
1.549300366088437,  
2.3787666619954635,  
2.3787666619954635,  
2.8808650819472406,  
2.884987740396357,  
3.1308808834009203,  
3.1363836212549696,  
4.869321728501938,  
4.869321728501938,  
6.1150174264690085,  
6.2582278136815175,  
6.271636236200362,  
6.551203581243674,  
6.59741701640448,  
8.230564833747417,  
8.294003346338926,  
8.31431753208387,  
8.369586036193128,  
8.415319617883744,  
8.70447046242739,  
8.709120596281233,  
8.918659758853744,  
8.99410216914391,  
9.002256766523654,  
10.218690251738174,  
-0.6798627919679444,  
-1.1436724543472427,  
-0.1278269606092795,  
-0.9286552360068459,  
0.6524046490818174,  
0.06134572949387961,  
-0.49761179900021657,  
-1.3918471119443894,  
0.5858287319319103,  
0.18669127045720346,  
-0.4586789737568629,  
0.2400608953322058,  
0.022222124883641912,  
0.9282004764805514,  
0.6952358394741303,  
0.805684979006905,  
0.6146729452742722,  
0.6777524139082742,  
-0.8117842884117104,  
0.3426849285038029,  
0.7100299235979358,  
0.7658186509139059,  
-0.05418633990950139,  
0.1761917490887145,  
0.5744825473612316,  
0.31705937472296297,  
-0.9188523464356001,  
-0.7337446596965294,  
0.2061368312243915,  
-0.6645694031850036,  
-0.009871104765786294,  
-0.14388187083546433,  
-1.2485707106311008,  
2.849540809212292,  
-0.5119215846255833,  
-0.19381894062193808,  
-0.17310717674563775,  
0.8465397629359774,  
-0.46757240698237135,  
-0.05607605828560263,  
-0.40986137011816176,  
0.07649505002491204,  
-2.1522907800348112,

-0.6653346582594515,  
0.4084801543759574,  
0.4028897820911683,  
0.16908117843954765,  
-0.07217026591146015,  
-0.72804755296126,  
-0.13548738477012795,  
-2.590679566047418,  
-0.40743076961744734,  
1.1030856800887578,  
0.08388380440455438,  
0.25224805905642333,  
0.10644300798076774,  
1.0474125729404944,  
-1.1459016177859003,  
-1.6916287310468103,  
-0.9886067106540645,  
0.24182274960650893,  
-0.25703819491337826,  
-1.1942818044595898,  
-0.7763678643520989,  
-0.916718557142268,  
0.20086626876005667,  
-0.3711023890817823,  
-0.006962349053602254,  
2.687031223814704,  
0.3970791704566904,  
-0.6890591654410289,  
1.0504536719091986,  
-1.2458238157294268,  
-1.197330311624414,  
-0.12155955689525438,  
-0.2969718406476498,  
0.15406921803787998,  
0.9984735505197111,  
-0.2734456365103056,  
0.0100494123830882,  
0.16172873483083283,  
-0.6780409734277772,  
0.4539997995464368,  
0.7558576390626953,  
0.9556605206819043,  
-0.10572075101403118,  
1.5564628686733721,  
0.05397552837650759,  
0.7415987024402694,  
-0.1648500682327342,  
1.052699139325594,  
0.6776572023171561,  
0.15219630541397192,  
0.8843933196559655,  
1.3948099389813178,  
-0.16710315713046545,  
1.2199200746863228,  
-0.3825678575328573,  
-0.26766985045935626,  
2.5777182352113908,  
0.23156136798610805,  
-0.3377548185037014,  
1.0689111835439342,  
-0.17216022970038714,  
-0.29381807805976945,  
-0.5689533077540762,  
0.30596827309967156,  
0.5260993417881752,  
-0.6768480303494689,  
-0.1092430795457648,  
1.5442082488768039,  
-0.10826504240549732,  
-0.9555598065181787,  
0.5334835330029429,  
0.5569227134357198,  
1.2665483894271157,  
-1.9677332823608626,  
1.5559931182978979,

0.7709453943956464,  
1.5746506000831744],  
[ 1.7625089228179507e-05,  
1.298540182320117,  
1.3141870420194457,  
1.3305471045820527,  
2.0686735179487985,  
2.23810597518972,  
2.267373737425337,  
2.295441377067579,  
2.3325388050051976,  
2.352484360014207,  
2.370891483796666,  
3.3117124844820194,  
3.363605896627787,  
3.858981460194034,  
3.8589814603490344,  
3.859537867870235,  
3.8595381713444072,  
4.264585717738593,  
6.599549149586233,  
6.655963438031886,  
6.939612414177192,  
6.939612414268938,  
7.004302986969205,  
7.010544991093791,  
7.97314828104894,  
7.999280802101656,  
8.022628296732579,  
8.027896471579398,  
10.077254342713585,  
-1.0733166032270363,  
0.4264387306682,  
-0.29490479134596703,  
-0.45181113351566254,  
-0.9496712390342118,  
-0.24412788786515252,  
-0.17005038539710493,  
2.131747001055919,  
-0.8801477965160032,  
0.1985900676052623,  
-0.17829180427317373,  
0.1513896817808816,  
-0.2996418627583153,  
0.09152392337611555,  
1.0155053498240294,  
0.6713280773462803,  
-0.5915672184524843,  
-0.21780814909773427,  
-0.23676595566314207,  
-0.1539223229682568,  
0.9733737893230769,  
-0.8325690111887051,  
-0.6684349693104433,  
0.944923850675747,  
-0.8270803600282979,  
0.4869668407293288,  
0.07342964610078141,  
-0.8928903181234079,  
-0.04262248204617692,  
-0.7602498290394286,  
-0.48858825463899247,  
1.7340528561515622,  
0.7340502315717261,  
0.5163401187759543,  
-0.5015858040228415,  
0.2890335055344555,  
-0.46033506221820203,  
-0.8185907107929625,  
0.4557079379705311,  
1.6601520871164626,  
0.07125306723268252,  
-1.4035119795986863,  
-0.6741575848895364,

1.84360490583597,  
1.6836338044245691,  
-0.33329370458317326,  
0.19854317161902654,  
2.03917897859608,  
-0.3342251938073038,  
-1.6015864477635742,  
0.35422488479060155,  
0.1487121545506934,  
-0.2821114888507261,  
0.21869934797564045,  
0.7523961573071125,  
1.3021785537923125,  
0.26184859002187644,  
1.2441238228144538,  
0.039670539596101485,  
-0.15687777352236798,  
1.1386642271664005,  
-0.13559116971858365,  
0.39167499360215746,  
2.4453261619465274,  
-1.0890320328395309,  
-0.4289422005081893,  
1.425249318116838,  
-0.0016733698174337221,  
0.023121567661497415,  
-0.28325087531692295,  
0.940069260590291,  
1.163437407349777,  
-0.4256527399896147,  
-1.4972731615803316,  
-0.12624975701746496,  
-0.10144651691714318,  
1.3307378561466523,  
0.041778278155808674,  
-1.2746374184036902,  
-1.2216848741140482,  
1.4048769664929757,  
0.8957112974734468,  
1.0058068981677006,  
-3.0965653057688316,  
-0.3344448337959029,  
-1.0948102803209163,  
-0.038478236121346335,  
0.12618687504486675,  
-0.0850775611793361,  
1.33550885346982,  
-0.04334772196309596,  
0.2406908654957122,  
0.7327249608913058,  
0.9966290850109706,  
2.2852565843192423,  
-0.030570948934034583,  
-0.5566407461361556,  
0.813246653395058,  
0.5946355273642772,  
0.07519254658407079,  
0.27120989268694123,  
-0.15415722381241237,  
-1.1239288818585278,  
1.893751281002709,  
0.7530205722182245,  
1.4454588921082565,  
0.15037300343080462,  
0.1793867334099716,  
0.3587259643057371,  
-0.006799349268608,  
1.0907160355013774,  
-0.30186717991666434,  
0.8507589785411056,  
0.009155709268365956,  
-0.8165113788656561,  
0.011816515180360782,  
1.116430418883973,  
1.5343789763879045,

-0.1682835166498154,  
-1.5032827361947747],  
[ 0.10956969985098665,  
0.4360115975982133,  
0.5932904704915389,  
0.6050451872391112,  
1.3688142364348175,  
1.3737597367805747,  
1.5226773273508583,  
1.5589271816733294,  
3.150320547140947,  
3.1613053536766147,  
4.7635234433865605,  
4.823148382609575,  
4.823188243925802,  
7.171157860626202,  
7.171157878485542,  
7.171158529865571,  
7.175073431930883,  
7.183070822592498,  
8.102400589897519,  
8.10392263292654,  
8.103940780725882,  
9.021308924987686,  
9.02133947231205,  
9.082831297490506,  
9.094868565409332,  
9.236804949782064,  
9.237029573386183,  
9.26430291432718,  
10.00744744746223,  
10.032040374677464,  
-0.5042382729215367,  
1.0180015436638659,  
0.10423420212375085,  
-0.3355687578372037,  
-0.3902319222280216,  
-0.09867602213718178,  
0.3860296418386605,  
0.8522828003851446,  
-0.7730596965193267,  
0.08803782521712378,  
1.175277695996097,  
-0.3769225558693855,  
-0.4553519820435133,  
0.4758962487375975,  
-1.0517577693418567,  
0.3712029741888282,  
0.27334544561774066,  
0.03397030216872572,  
0.3891396532807883,  
0.12152393226873999,  
1.5192516885791116,  
-0.5124931636551364,  
-0.5667003913709334,  
-0.08425393582345661,  
-0.8152956002657638,  
-0.008087141654348068,  
-0.20833380477584987,  
-0.19186344764752156,  
0.309463849209865,  
-0.16555810903618162,  
-0.28534485935787846,  
0.025710068868521854,  
-0.9172960495760906,  
0.027100436879331523,  
-0.9806057417125867,  
0.46877133554227174,  
0.22597640762440013,  
-1.8700902599315918,  
-0.6222133609404971,  
0.023922176634194332,  
-0.6777524378245746,  
-0.3883818313368169,  
-0.19921738892417568,

-1.3418496115619054,  
-0.05365669225714106,  
0.38835985529462186,  
0.46741217514915123,  
-0.1388983196762152,  
1.0002905156718758,  
1.6633296566254185,  
-1.0097136763815113,  
1.203957772036831,  
0.34033273848251194,  
1.1456357751380877,  
-0.4637199651146574,  
-0.13624703361320328,  
0.6785440200843139,  
0.21691345067474185,  
-0.4166036808107477,  
1.6003722740710606,  
-0.294881370724797,  
0.04198878790454511,  
-0.689532047804753,  
-1.3911901894570817,  
-1.1667039833298627,  
0.824824800006074,  
0.8047687705752488,  
0.5727196814509768,  
0.2385364014798047,  
-0.512164832149354,  
0.17925141295137917,  
-0.19704824673887428,  
-1.6372757558452697,  
0.5441675736491897,  
-0.13936070677778437,  
1.3935144064781402,  
0.10763856884501717,  
0.6679788244416961,  
-0.33118654939932857,  
-0.35796695002153883,  
0.2632208027041665,  
1.5831503864671255,  
-0.25140146740224,  
1.135774876905931,  
0.5897962040478675,  
-0.7664904031063712,  
1.092649076983624,  
-0.9862462517151122,  
0.010216869101717933,  
0.5705833807099128,  
0.09839127014019662,  
-1.034770130526523,  
0.20582133073730807,  
-0.44428721001967564,  
0.5272444819968604,  
-0.2627660867388947,  
-0.9857421779520247,  
-1.3646538516413942,  
0.14779052759756187,  
1.1207932022043874,  
0.30427416833245535,  
-1.055109005337564,  
0.30548258474769546,  
0.8153937738463674,  
0.5082537250510629,  
-0.2973639305797175,  
0.0034742209991892575,  
1.5168338311712208,  
0.0971904670135119,  
0.5305672799342332,  
-0.08170159551874663,  
0.4909203029282298,  
-1.1771354207712392,  
0.038725619801271274,  
-0.6655680746562402,  
1.312626970471223,  
-1.0115568894576918,  
0.16290676730453105,

0.3074286838975462,  
0.013117345918778788],  
[ 0.4866654913190249,  
0.4866654913190249,  
1.4314116389487666,  
1.4314116389487666,  
1.548608655381947,  
1.5552664901547235,  
1.662920497545568,  
1.676155881591226,  
1.6952532774325564,  
1.6952532774325564,  
2.46741851740979,  
2.50102877426778,  
3.636145431120801,  
3.6361454311208004,  
3.6361454311208004,  
3.6361454311208004,  
4.0161273218482085,  
4.0161273218482085,  
4.5411636896776235,  
4.5411636896776235,  
4.922545565757144,  
5.624338470516907,  
5.642847901355697,  
5.904037934138086,  
5.915382265322609,  
6.860930229950661,  
6.860930229950661,  
9.422517992567101,  
9.467623480195014,  
9.467623480195014,  
0.40091998571272736,  
-0.3581846438287994,  
-0.32033246941904975,  
0.24409866553117068,  
0.176560178011825,  
0.4452285262890565,  
-0.37150326481454765,  
-1.0185408309777293,  
1.6197684873006286,  
2.0095194673452026,  
-0.20342804182482532,  
-0.4471079471088122,  
0.37127155242298737,  
0.4199607045713712,  
0.11145558426636207,  
-0.289968410859463,  
0.9752004498173846,  
-0.11972987215087512,  
-0.8215210043660294,  
-0.4144105549344152,  
0.04966095047933562,  
0.6091224412599766,  
-0.2481186610805342,  
-0.9036735819055022,  
0.22922493224752044,  
-0.04567884568114995,  
-0.40529506738584414,  
-0.44609185937563545,  
1.1000542207972743,  
0.8995834380092431,  
-0.4391184290327733,  
-1.623814742575614,  
0.11121717167805684,  
-0.15344289124808663,  
0.7072346226342329,  
0.013911394934765222,  
1.1008239636292285,  
1.1342299046285917,  
-0.1605718532112884,  
-0.8521154510350495,  
-0.9726520318623231,  
-0.11078467990736285,  
1.2893067940177063,

-0.8656847782514395,  
-0.4554157535410911,  
0.46752563535079134,  
1.0115326820592876,  
-0.017465678177200683,  
0.7555243091795097,  
0.2225241128439446,  
-0.6129237770264853,  
0.36249038141661666,  
-0.1470816778834455,  
-0.23781939745964606,  
0.7410640700988803,  
-0.10219672891678527,  
-0.9043863030697507,  
-0.054446492384892985,  
-0.23618927113386157,  
-0.3971482428910102,  
0.42980979959963467,  
-0.4511512430809565,  
-0.3322123782853245,  
0.15031459204805087,  
-1.4287283715133035,  
-0.026859055017604255,  
0.20826999854501216,  
-0.016397767746330064,  
-0.026711091547853946,  
0.15899307013846248,  
0.18349959987180348,  
-0.019181103141429404,  
-1.3777401647916119,  
0.05578672583947999,  
-0.17191397249005735,  
0.08492618339903452,  
0.2781511329827625,  
1.6853098582374997,  
-0.7964285169174421,  
0.13628687772581302,  
-0.26524580358677924,  
1.3615146942088054,  
-0.18163849035743365,  
-1.5476669195398023,  
0.2740670870741208,  
0.19740142577560438,  
0.18567840551061798,  
0.43288784764736754,  
-0.8069341399605817,  
1.5139336080928714,  
-0.7594440385529729,  
-0.20443587392639553,  
0.0916888700165231,  
-0.03922249489745327,  
0.4135801157921025,  
-0.06731598775715468,  
0.5038720973518589,  
-0.7705715736697758,  
-1.4775324565516457,  
0.061950004909204714,  
-0.9555167624183505,  
3.1277455162888304,  
-1.137887484425651,  
-0.09852947784569874,  
0.042597844143281625,  
0.06134264537966588,  
0.3384848933516047,  
0.012002169875906457,  
1.5732417764972468,  
-0.3550969359952667,  
0.37821230776206083,  
1.4914211446267915,  
-1.2027836619303884,  
0.22421848814312553,  
-0.2072711571643093,  
0.05122655754886873,  
-1.5578500765322636,  
1.5918641150141506,



```
1.2635397829742223,
-1.2452354025631063]],
'run_time_sec': 43720.81102514267}}],
'redundant': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0}},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}}},
'init_param': { 'value': [ 0.01970245038838479,
0.18403088824160574,
0.23516669011749736,
0.3619340287619915,
0.7559235356843684,
0.8037553588156275,
0.8037553588156274,
0.8037553588156274,
1.523650120002224,
1.5399034674182392,
3.5267025169505333,
3.526702516950533,
4.657784878324055,
4.735234101549794,
4.768060921347247,
6.910522417024203,
6.910522417024203,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
8.950027818739875,
8.950027818739875,
8.950027818739875,
8.950027818739875,
8.950027818739875,
9.275481401407285,
0.034552241786943605,
0.7960682992937013,
-0.16960774395822967,
-0.13488653659207303,
-0.07127010448742209,
0.7213919487775996,
0.07517487951530155,
0.7669403129297154,
-0.0980146039609658,
0.2841753594230342,
0.41897129078802076,
0.7644737129881134,
0.21659836679204617,
0.40978346593820614,
0.23386906952753808,
0.6351364889148511,
0.33021983360135304,
0.3518425622667454,
-0.16759580526603354,
1.1955178055405769,
-0.1119172073880175,
-1.6647459335605923,
-0.09499524124538847,
1.171044098528735,
```

-0.022137095989983098,  
0.46479840085551427,  
0.5434533112600137,  
0.7953483283824695,  
-0.23791626316884204,  
-0.34327459028867535,  
0.9770824990177593,  
0.3972109926583832,  
0.031305244787475206,  
0.06660894739153407,  
-0.4270300066285869,  
-1.4580475210852422,  
0.18899331747125298,  
-0.5789031865333153,  
0.2203088633995836,  
-0.028805094274594364,  
-0.21236041446549625,  
0.00835869807102751,  
1.8444421334304235,  
-0.36021419267454113,  
-1.0777998782841605,  
0.7201309879688491,  
-0.07151832135087417,  
0.013523038580686776,  
-0.5101061898109359,  
1.528477364550823,  
-0.24055091899624312,  
1.595727742687772,  
1.181011187425284,  
-0.07205139039345279,  
-0.3645912646252544,  
0.922259297261975,  
0.47504473393792157,  
-1.4582846498754758,  
-1.1041238978674286,  
-0.08619812725702276,  
1.5348185477516838,  
-0.034799821636765677,  
0.34854563969795865,  
-0.3057886345189525,  
0.3435344949085216,  
2.387989506593159,  
0.5928805156422549,  
-0.02250711897690342,  
0.734685803060112,  
1.1230348216575474,  
0.9339212770561773,  
0.5429657194529808,  
-0.9530889967003539,  
1.2607191116533525,  
-0.18262479735843284,  
0.2292294020716647,  
0.484625167272873,  
2.2621526738562925,  
0.3832060422832924,  
0.2504382199240898,  
-1.1186566372739195,  
1.0354182359738777,  
-0.9045076995614423,  
1.0282595509077306,  
1.805679851173207,  
0.9332861023326164,  
1.4396403686507162,  
1.6178312922032976,  
-0.22196274260736226,  
0.19030625281227892,  
-0.32840557234129963,  
1.004592356770436,  
1.8720477930131976,  
-0.06388076228748135,  
0.12235432131563899,  
-0.5998878734536057,  
-0.5461403115162753,  
-0.17116133229966776,  
0.6826247841010238,

[illegible]

```

                                '0.5 Z 5 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -7.512595875373561],
                              [12, 6, 0, 0, -6.004303631668366],
                              [20, 10, 0, 0, -4.83491199768215]],
  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                       'identity_factors': [0, 0, 0, 0],
                       'noise_level': [4, 2, 0, 0],
                       'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
0.001,
0.001,
                                'noise_prob': [
                                0,
                                0],
                                'status': True,
                                'type':
'depolarizing'},
                                'odd_wires': 4},
                                { 'gates_num': [12, 3, 1, 0],
                                'identity_factors': [1, 1, 0, 0],
                                'noise_level': [12, 6, 0, 0],
                                'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
0.001,
0.001,
                                'noise_prob': [
                                0,
                                0],
                                'status': True,
                                'type':
'depolarizing'},
                                'odd_wires': 4},
                                { 'gates_num': [20, 5, 1, 0],
                                'identity_factors': [2, 2, 0, 0],
                                'noise_level': [20, 10, 0, 0],
                                'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
0.001,
0.001,
                                'noise_prob': [
                                0,
                                0],
                                'status': True,
                                'type':
'depolarizing'},
                                'odd_wires': 4}],
  'run_time_sec': 7.652128219604492}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'xy-iss'}},
  'init_param': { 'value': [ 0.2383708143795501,
                              0.8137820253985804,
                              1.0561141201801563,
                              1.2070683478267785,
                              1.9518166906091101,
                              2.08301823027678,
                              2.6774459967535513,

```

2.7270096866449576,  
3.7369434259122447,  
3.7421546540398443,  
4.458327272130387,  
4.463102384700506,  
4.463102384700506,  
4.482690585412051,  
4.482694652744643,  
4.498978826283554,  
6.3580266266370415,  
7.886395999997723,  
7.886532810158634,  
8.060529572035655,  
8.06234783983503,  
8.127555772505229,  
8.130166630032164,  
8.42408407139234,  
8.433074307328475,  
9.412401860498063,  
9.420584174895616,  
9.429609653004679,  
9.434851407347677,  
11.283524698808058,  
0.19157417616433814,  
0.42257952171340063,  
0.3129095694283805,  
0.28360255750055535,  
-0.7229159635345903,  
2.545731433831817,  
1.1687892956196542,  
0.5222949375721274,  
0.9482151911772319,  
0.28742832079435787,  
1.1627391357840349,  
-0.27939056132165146,  
-0.07574334812551493,  
-0.529119211391362,  
-0.08653083237786212,  
0.042544229108731915,  
-0.09154582517805988,  
0.2776265525620834,  
0.373637405241428,  
-0.666296500917012,  
-0.729825790392568,  
0.36164641825124294,  
1.2066181407380305,  
0.18327070025757417,  
2.2757552060408917,  
-0.004789158452516104,  
0.49019439516235463,  
2.190622553796523,  
0.6131206832540379,  
1.0987721265230228,  
1.9413219378309259,  
0.07975169469268534,  
0.17531082109327745,  
0.01770145552231998,  
0.22429808435825893,  
1.1460098869067579,  
-0.25766861736092417,  
0.4386465248337572,  
0.7521614434169624,  
0.07039918338308593,  
-0.23913727928604284,  
0.062497116873310714,  
0.27575365987954265,  
-0.8268952220573135,  
0.8599765782432734,  
0.6958325703328606,  
-0.16792542378671177,  
-0.13186811496768225,  
0.17745018848846658,  
-0.13764108606901534,  
-0.34798347931108986,  
0.3901205214779397,

```

-0.12832331396189006,
0.7623260417931323,
-0.08745728181826747,
0.22448567111633413,
0.5103689813486589,
0.020179740460913417,
-0.4639048953982949,
1.8052783293547816,
-0.06895296635033099,
-0.46137869531525183,
-0.7694587159951923,
-0.1507074275764489,
-3.159084078074864,
1.5556721360426484,
0.9802025173412374,
-1.5980562353917622,
0.9974678614222413,
0.11965749551778265,
-0.5964068365118492,
1.00912773091807,
1.2674306548806673,
1.7418320010188646,
-1.2223756485879664,
-0.006270145144671745,
0.7863824204489233,
-0.08410721186616651,
0.13420385894759826,
0.6686584151585806,
-0.7946689395347296,
-1.448768973512125,
-0.4158373205099576,
-0.1003664997933048,
0.5370971852976741,
-0.013369261455621718,
-1.2134070474127567,
2.71822204346588,
-0.8266087910498845,
-0.04274152999618493,
0.627725493238542,
-0.10714625448592663,
1.4055199595750496,
-0.08877591733311402,
-0.6400618055168635,
0.27990653766167567,
0.27230874688701184,
1.8329367216853043,
0.12128377229042309,
0.03719209379786179,
0.7558193864298689,
-0.027085062677120984,
0.7947118159580207,
-0.18810209431195668,
0.008294184744538372,
-0.9110921816475059,
1.3065108206329406,
0.004810940817056788,
1.4030602129547465,
0.03878633149748846,
0.29850504257680605,
-0.9524583070906825,
0.10037229527914636,
0.4277056649647598,
-2.2528322583674503,
0.030724614514628212,
0.8416350822543037,
1.5579013461800135,
0.5696673724928452,
-1.5352194543526818]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,

```

```

1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#4'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
'1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
'1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
'6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
'0.5 Z 0 Z 1 + '
'0.5 X 1 X 2 + '
'0.5 Z 1 Z 2 + '
'0.5 X 2 X 3 + '
'0.5 Z 2 Z 3 + '
'0.5 X 3 X 4 + '
'0.5 Z 3 Z 4 + '
'0.5 X 4 X 5 + '
'0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + '
'0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.418732841657521],
[12, 6, 0, 0, -5.815573107517698],
[20, 10, 0, 0, -4.600391600363878]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,

```

```

0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'noise_prob': [

0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 8.07330322265625}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ 4.1837705414928806e-17,
1.1742327239243593,
1.1742327239243593,
1.174232723924359,
1.3021435979041922,
1.3883521076730898,
1.4901272631800928,
1.490127263180093,
1.490127263180093,
2.542545188872923,
2.56739133991554,
2.677178516908646,
5.624946341909109,
5.624946341909109,
5.63924283183031,
5.672838193807689,
5.672838193807689,
5.672838193807689,
5.672838193807689,
5.672838193807689,
5.805507018952099,
5.858678454346443,
7.374841183417447,
7.374841183417447,
9.078346087689514,
9.17910617229311,
9.185363997877552,
9.550522060955204,
9.715006087156702,
0.5380723684568228,
0.20346632529178696,
-0.28402043001150323,
-0.013694659434132353,
-0.8491217472851175,

```



-0.13891219530245408,  
-0.7902948900320785,  
0.02035105936303376,  
0.35891510624171696,  
0.07011262472067725,  
0.2571910630887441,  
0.09727807922224965,  
-0.4253506785797692,  
-0.08201618636277365,  
-0.5629942371157008,  
0.4984357070329931,  
0.22460606922422946,  
0.6436861273901548,  
0.5581387866543217,  
0.6438048424266741,  
0.6625810608832491,  
-0.2877740698749285,  
0.03400434270310955,  
0.6598198228171638,  
0.15695492486622947,  
-0.23277712193728803,  
0.3379436543817524,  
0.6679629986711755,  
0.4913802101172593,  
-0.6543304626041586,  
1.2398324170787045,  
0.10868488610295632,  
0.4726806257545104,  
-1.0278416218016544,  
-0.5660236088762642,  
-0.06627186605932975,  
0.3527547117645279,  
0.3944014355355292,  
0.33709190475341266,  
0.16707772676088822,  
0.29195080738380563,  
1.0354529601392413,  
0.12500585138196232,  
-0.037178956773431956,  
0.7823218278561086,  
-0.04464215343745706,  
-0.36923576305262273,  
-0.9863817864437636,  
0.039519076991602065,  
-0.35646400258617383,  
0.04542480304419608,  
-0.46125271135496354,  
0.40472620693719735,  
0.7802480661953589,  
-0.6757172179201896,  
0.6396142241310521,  
0.2327897749192615,  
0.8954622299286413,  
0.7158405805761733,  
0.1382139633537826,  
1.0616928944303126,  
-0.6122315420380016,  
-0.6738539946512315,  
1.0433459792659807,  
0.494526070112864,  
0.20621322780405107,  
-0.05318175489586881,  
-0.11213659998229918,  
0.32941262943060273,  
0.13931786347259914,  
-0.07640781308377202,  
0.31450116184408605,  
0.3658109215963646,  
0.04460349089074807,  
-0.12913310998017427,  
0.31890485610090735,  
-0.005491508360761248,  
1.2692063073436923,  
-0.3006174703747285,  
-0.41404661321397057,

```

-0.5199199797590206,
0.44225909618051784,
-0.4233007342169607,
0.7456354776212751,
-0.32484988424610756,
0.9268151291603125,
0.8385591284905366,
0.027219364270413358,
-0.5520387125082392,
1.3757901840365965,
0.02933419406725825,
-0.2915193842748469,
0.33917094344303517,
0.10828106345120646,
-0.5650186064180197,
-0.6041651963720519,
-0.19230834783869816,
1.9848826966849449,
0.0632219631903188,
0.04804551511145073,
0.47752350144148015,
1.3406847618100746,
-1.3722262204383469,
-1.0513455672656666,
0.7121308231347245,
0.13278942055995957,
1.9758312031522887,
2.19648222646383,
0.8936788375205645,
0.05510909660880629,
-0.18765678539637448,
0.45031205104496697,
-0.6542716355161553,
0.5783583754336702,
-0.18844184232604352,
-1.5667303012058793,
0.36110899429768645,
-0.275182998952267,
0.30367576290775045,
-0.1532687178202341]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [ 0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5],
                                'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#2'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},

```

```
'zne': { 'data_points': None,  
        'degree': 0,  
        'method': 'richardson',  
        'sampling': 'default'}},  
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '  
        '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '  
        '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '  
        '6 + 1 Z 5 + 1 Z 6',  
        'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '  
        '0.5 Z 0 Z 1 + '  
        '0.5 X 1 X 2 + '  
        '0.5 Z 1 Z 2 + '  
        '0.5 X 2 X 3 + '  
        '0.5 Z 2 Z 3 + '  
        '0.5 X 3 X 4 + '  
        '0.5 Z 3 Z 4 + '  
        '0.5 X 4 X 5 + '  
        '0.5 Z 4 Z 5 + '  
        '0.5 X 5 X 6 + '  
        '0.5 Z 5 Z 6']},  
  
'output': { 'data_points': [ [4, 2, 0, 0, -7.130214875567141],  
        [12, 6, 0, 0, -5.622281179564727],  
        [20, 10, 0, 0, -4.4547314200293675]],  
        'noise_details': [ { 'gates_num': [4, 1, 1, 0],  
        'identity_factors': [0, 0, 0, 0],  
        'noise_level': [4, 2, 0, 0],  
        'noise_profile': {  
  
            'noise_prob': [  
  
                0,  
                0],  
            'status': True,  
            'type':  
  
            'depolarizing'},  
  
            'odd_wires': 4},  
        { 'gates_num': [12, 3, 1, 0],  
        'identity_factors': [1, 1, 0, 0],  
        'noise_level': [12, 6, 0, 0],  
        'noise_profile': {  
  
            'noise_prob': [  
  
                0,  
                0],  
            'status': True,  
            'type':  
  
            'depolarizing'},  
  
            'odd_wires': 4},  
        { 'gates_num': [20, 5, 1, 0],  
        'identity_factors': [2, 2, 0, 0],  
        'noise_level': [20, 10, 0, 0],  
        'noise_profile': {  
  
            'noise_prob': [  
  
                0,  
                0],  
            'status': True,  
            'type':  
  
            'depolarizing'},  
  
            'odd_wires': 4}},  
        'run_time_sec': 7.930702447891235}},  
    { 'config': { 'ansatz': { 'gateset': 1,  
        'layer': 30,  
        'ugate': { 'coefficients': { 'bn': [ 0,  
        0,  
        0,  
        0,
```

```
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.3442332088020621,
0.7247295953616149,
0.7247295953616149,
0.7610537291022658,
1.7162580174489597,
2.0119282772467635,
2.0119282772467635,
3.369934702704019,
3.369934702704019,
5.00211845115155,
5.212181786011135,
5.346566249705437,
6.103091648910964,
6.103091648910964,
7.050711873868975,
7.050711873868975,
7.492144583370162,
7.492144583370162,
7.606105711064038,
7.606105711064038,
8.717193051662631,
8.753101318062777,
8.877107151002964,
8.889590522678484,
8.982812044989718,
8.982812044989718,
9.499874357008034,
9.499874357008034,
9.659025604148875,
9.671110590806489,
0.02814413440270558,
0.250593445582179,
0.17496868989230024,
-0.19749991731592192,
-0.5878125517240043,
1.1370895496823794,
0.3339578948727643,
0.30833012680275795,
0.21147160367429677,
0.5518340573364652,
0.9816766119937317,
-1.3427949214182668,
2.2864376119784486,
0.673664283367827,
0.4767745045632036,
-0.47480445681581174,
0.05912449937800317,
0.9513757199218045,
1.079093875588678,
-0.4313388366547843,
0.43347513808131466,
-0.3381632209207048,
-0.42699598389932686,
-1.1528003206699722,
0.2505681368756031,
1.1900947118566725,
-0.38260053073473543,
-0.6405385159573362,
0.08926968472452403,
-0.04834256297702397,
1.603027736914297,
-0.44672812120859223,
-0.5759172165575565,
```

1.25237714334681,  
0.04254918814060746,  
-0.002429292667880943,  
0.47732275422632153,  
-0.10204026491637587,  
0.02357869435971368,  
0.06910865492863566,  
-0.5942663805386644,  
1.1629666490831163,  
0.28625726751699415,  
0.4183193427753825,  
0.33026699893767814,  
1.8860632823719743,  
-0.37929215782635534,  
0.8251027249542411,  
-0.13937217921728381,  
-0.35829122981546885,  
-0.11830319301401378,  
-1.1307480811476716,  
-0.33746884247229475,  
1.7161163093033744,  
-0.03517175574182253,  
-0.4044561448132672,  
-0.7301790593832838,  
-0.10496992427986328,  
-0.0377875273258637,  
0.11576685707785253,  
-0.9348023198901909,  
2.132577954045408,  
-0.47199808297503054,  
0.09642080758509694,  
-1.5590866370005203,  
0.10045413530924742,  
-0.3215930726850239,  
-0.7020784722315541,  
1.2376661808413174,  
0.5709879203761018,  
-0.820670510834149,  
0.1634866307612446,  
0.06270250983710676,  
-0.03570422816362065,  
-0.5699745682010601,  
-0.26488761312159137,  
1.795803611544861,  
-0.4017001375917998,  
-1.757541020399501,  
-0.05132347348943386,  
0.8521664539464072,  
0.4812990598336637,  
-0.7041980923594973,  
0.6941905718406797,  
1.5589556954504384,  
1.9089912382579748,  
0.4849438728523755,  
0.03939482159422182,  
-0.2564597588944596,  
-0.16675906759041134,  
2.5610800117093855,  
0.9927310518963223,  
1.3170410278463267,  
0.6281459286410694,  
-0.07878692694615999,  
0.5865838795710373,  
0.4894408136056478,  
-0.043552207832595204,  
0.8988064624972067,  
-0.35279792613941824,  
1.5088457985023234,  
-0.32174328535909336,  
0.41978129355629945,  
0.014567846908235548,  
-0.17446008524494477,  
0.35494980160059775,  
1.44166715836895,  
0.027787407199764528,

```

-0.2573832607835415,
0.9605798444843694,
-0.08907047543629609,
-0.012116788408097524,
1.2676248549462201,
-0.2512276837340942,
0.7869834357157488,
-2.3607393050467915,
0.1914341630047483,
-1.0542342437530707,
0.8454261921281611,
0.02027118187750096]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#5'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                '6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                                         '0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + '
                                                         '0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + '
                                                         '0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + '
                                                         '0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + '
                                                         '0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + '
                                                         '0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.407206817517894],
                             [12, 6, 0, 0, -5.829141582765496],
                             [20, 10, 0, 0, -4.618573032874505]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                     'identity_factors': [0, 0, 0, 0],
                     'noise_level': [4, 2, 0, 0],
                     'noise_profile': {
'noise_on_init_param': { 'status': False,

```

```

'value': 0},

0.001,
0.001,

'noise_prob': [
0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {

'noise_prob': [
0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'noise_prob': [
0,
0],
'status': True,
'type':

'depolarizing'},

'noise_on_init_param': { 'status': False,
'value': 0},

0.001,
0.001,

'noise_prob': [
0,
0],
'status': True,
'type':

'depolarizing'},

'noise_on_init_param': { 'status': False,
'value': 0},

0.001,
0.001,

'noise_prob': [
0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 7.742349624633789}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.5482907189468895,
0.6413620809492503,
0.6422482149552934,
1.5892409709442974,
1.850708229814058,
1.850708229814058,
1.8745552660050262,
2.400679867939261,
2.402212278134192,
2.485190345183722,
2.485190345183722,
2.4851903451837223,
2.488397493491329,
2.4883974934913287,
5.077476636438464,
5.077476636438464,

```

5.732990197214016,  
5.806868622878696,  
5.817834245705687,  
6.166757373752113,  
7.3114292874931905,  
7.311858449036949,  
8.346734585466223,  
8.350435170229554,  
8.354614694314481,  
8.35659817980371,  
8.356905245901928,  
9.313534396314816,  
9.313534396314816,  
10.443787047737276,  
-0.5971318801423705,  
-0.6830583120471296,  
0.053446928626708114,  
-1.488251087277441,  
0.7409998345617078,  
-0.020561007687691084,  
-0.47029189134787985,  
-0.9187802118512801,  
-0.07390570205801456,  
0.6091612085770479,  
0.5696050095749661,  
-2.634874245900948,  
0.14733366015521565,  
1.0781100436188797,  
0.3459269460772517,  
1.2820636645787713,  
-1.605623121104658,  
0.856791024529966,  
0.16374864437029604,  
-0.7377840957855112,  
0.7603752030179747,  
0.4958590077418653,  
1.0293890027768824,  
0.4862585296205842,  
-1.0838654128292502,  
1.2632637762941026,  
-1.1043454462318527,  
-0.7867654190654241,  
0.8818217647037212,  
1.0406267750063978,  
0.05770567519039498,  
-0.5922070722918433,  
-0.3271403288282926,  
0.5980786503295974,  
-0.02050375112330311,  
-0.9007241609880184,  
0.5239405469453117,  
0.7601496703420288,  
-0.6449049942439851,  
1.7340858429103823,  
0.10050113333288421,  
0.3143347863780438,  
0.28408386490618526,  
-0.1222389867527315,  
-0.09502282329152913,  
-1.3004368662949968,  
0.16856179320059875,  
0.6790103402211991,  
0.3355977478652572,  
0.0935957266804422,  
0.42936820813464754,  
0.5148227650107633,  
0.10764356588532305,  
-0.054251737808208085,  
0.06525040933822983,  
-0.21143245853075732,  
-1.5801988491404158,  
0.023513208971767067,  
1.0921277689034055,  
-0.11501776583679489,  
-0.14182911234947893,



```

1.8716225858725093,
-1.0747761250482988,
-0.01873186129021693,
0.9952348515577564,
1.5589645169221944,
2.4625123021717044,
1.5320934484141422,
0.6264578101560674,
0.015802850908690148,
0.6559295719723718,
0.5030706883609005,
0.010357532831659657,
-0.6971755064049523,
-1.334963536555068,
0.05714132580252865,
0.9478292633237722,
1.541635767019547,
-1.2357775558070643,
1.5753066317572375,
1.2206753513411082,
-0.013882574638756213,
2.102115305768464,
0.6867648509985108,
-1.0810617894892982,
0.608205793929093,
-1.0701207529796843,
-0.008804617073740417,
1.0802724219136723,
1.4472704941581649,
-0.525983160453369,
0.10347757085774918,
0.07451664808136123,
0.8113743025574697,
-0.19830571509994802,
0.20760359505818776,
-0.5709476706639499,
0.1791350390980861,
-0.32061652775092425,
-1.6382844876022806,
2.271046687924862,
0.09972766177435569,
1.671157305178672,
1.0596955078067567,
-0.7395801076185267,
-0.8217251410877643,
1.2660358026872456,
-0.149859182069558,
1.7386861885389688,
-0.003505497297480453,
0.677126408740769,
-1.0541684899696007,
0.9437251450981726,
1.7354017388586316,
-0.8022872949930118,
0.01881044769021433,
-0.013699411839369284,
1.5965466699123847,
0.4486397166383021,
1.5669137279484207]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5]

```

```

0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#1'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                '6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                                         '0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + '
                                                         '0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + '
                                                         '0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + '
                                                         '0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + '
                                                         '0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + '
                                                         '0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.463351332654991],
                             [12, 6, 0, 0, -5.841676652164559],
                             [20, 10, 0, 0, -4.604434423168806]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_level': [20, 10, 0, 0],

```

```

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,

'noise_prob': [
    0,
    0],
    'status': True,
    'type':

'depolarizing'},

    'odd_wires': 4]],
    'run_time_sec': 7.26769757270813}},
{ 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [ 0,
        0,
        0,
        0,
        0,
        0,
        0],
        'cn': [ 0.5,
            0.5,
            0.5,
            0.5,
            0.5,
            0.5],
        'r': 0},
        'time': {'max': 10.0, 'min': 0.0},
        'type': 'xy-iss'}}},
    'init_param': { 'value': [ 0.17961742860022237,
        0.4029745783400613,
        0.4271020388774394,
        0.6998927493507625,
        1.1444327445959492,
        1.4463150894355827,
        1.7859669797147917,
        1.7859669797147917,
        1.8910076260348616,
        2.1568466639380097,
        2.184715675260106,
        2.3241261579565067,
        5.221288254664872,
        5.360678146313719,
        5.572749542622228,
        6.315664711217606,
        6.332942041057151,
        7.225695385348529,
        7.238714694082236,
        7.767863290353532,
        7.947954629935657,
        8.045079231148478,
        8.080705184182557,
        8.235317994608641,
        8.52967785406855,
        8.920755162601605,
        8.920755162601605,
        8.920755162601605,
        9.75907480462672,
        11.068402571583377,
        -0.07026370230905016,
        1.2758275954101812,
        0.1960569796315372,
        -0.7454998985427054,
        0.5260870873255556,
        1.3632265149428353,
        0.06759709485075166,
        0.7201883678889174,
        0.7780364770341424,
        0.7034018811814728,
        -0.3281225120527201,
        -0.21523884970562404,
        0.3525948786581971,
        0.10058439953616755,

```

0.8489242437750127,  
0.4102210250930649,  
-1.1239274808373552,  
-0.07527028057729333,  
-0.662823747816413,  
-0.09016589559770041,  
0.0005078927131911535,  
-0.9974030724775158,  
1.2973260682530905,  
0.6207513445119947,  
-0.06959715000945968,  
0.01479447508324883,  
0.5707366547040263,  
0.8024230791007029,  
0.11580671533830131,  
0.5319238260215059,  
2.029703693625361,  
0.8476591202353092,  
-0.5985490132202251,  
-1.0850372047073247,  
-0.13885829158476937,  
0.6160884575951602,  
-0.6119315652443118,  
0.25456754270344084,  
1.6135141314150674,  
1.6101080474118592,  
-1.0046888465114787,  
-1.2174288348798858,  
-0.8801790341822278,  
-0.01998793431745051,  
-1.007194981866689,  
-1.6365882266166358,  
3.524880820008825,  
1.5399950054830251,  
-1.401820445976074,  
-0.04945776017633801,  
0.9565666812114323,  
-0.20490442564626934,  
-0.5632271134618189,  
1.0033608730635488,  
0.12368927199762578,  
-0.06153617179775209,  
1.0557374829951787,  
1.532632985657107,  
-0.3069192599686721,  
1.8620498010178619,  
0.18083984306067874,  
-0.9702971127887235,  
-0.4866438529829019,  
0.2527358034573417,  
0.46390718912935613,  
0.05253485630073179,  
-0.15957905175444287,  
0.5064463362180326,  
0.6588516997606392,  
0.036226022952260704,  
-1.5941274572195923,  
0.3692191472654626,  
0.31840120283705997,  
0.8741993879399423,  
0.4802653460337955,  
0.3012459045041651,  
0.5102022084743536,  
0.3727970282915065,  
0.6665750190815365,  
-0.7773615380935764,  
0.12852119124454983,  
0.6774482070442244,  
-0.34235651892527574,  
-1.1577831131801597,  
-0.2879120353476077,  
1.157549789799121,  
-0.1818163295634488,  
-0.034519908964088415,  
-0.6744130553492667,

```

1.1322140576298956,
0.5044463860518625,
1.5469749343656427,
-0.19451127779487945,
0.16868157432748737,
0.3887158384137858,
1.179393002549757,
0.4377598134949622,
0.42273561999328285,
0.17555703442650725,
0.7637154786900613,
0.3204620558964089,
-1.0127445325141415,
-0.3366137672636463,
-0.6128563234467006,
-0.19959799618607235,
-0.22993024268879514,
0.6548635589470768,
0.5449412421525476,
0.11171602982233311,
0.5174688869584806,
-0.0926785574168733,
-0.012796553414024043,
0.872831179387319,
-0.3738274777631416,
0.708424995234135,
1.1207261796968788,
0.39043722964884914,
1.5466373285390471,
-0.0566526099067629,
-1.544789451209757]},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                '6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '

```



```
        'r': 0},
        'time': {'max': 10.0, 'min': 0.0},
        'type': 'xy-iss'}},
'init_param': { 'value': [ -3.641081222961908e-17,
                             0.6149788059529836,
                             0.7190202634465676,
                             1.227117923902744,
                             1.282995668258181,
                             1.320146784613617,
                             1.320146784613617,
                             3.1464089486715623,
                             3.1464089486715623,
                             5.021180125711677,
                             5.021180125711677,
                             5.021180125711677,
                             6.703692809170789,
                             6.703692809170789,
                             7.791601108223033,
                             7.8369202041803225,
                             7.951907692650894,
                             7.98389042115583,
                             8.258376681022987,
                             8.258376681022987,
                             8.264818959972613,
                             8.264818959972613,
                             8.264818959972613,
                             8.264818959972613,
                             8.265620267330194,
                             8.265620267330194,
                             9.412842541483705,
                             9.412842541483705,
                             10.502716174481437,
                             10.502716174481437,
                             0.1665558361704551,
                             0.0766182276072886,
                             -0.06331706305100791,
                             0.03225035272845343,
                             -0.2265177184784691,
                             0.6859734408919996,
                             0.358399999202588,
                             -0.31490649734707366,
                             0.03084506070978915,
                             0.8141179515629021,
                             -0.05751068028622007,
                             0.9013204998454583,
                             -0.325467390457223,
                             -0.16027539072229496,
                             0.19756436832536928,
                             0.17875052394899651,
                             0.07441990946369173,
                             -1.7121562848350094,
                             0.5411900571694856,
                             0.025994665514066265,
                             -1.0547594680221428,
                             -0.3558195097906033,
                             0.2575282902752545,
                             -0.32652811387218433,
                             -0.17477771883072452,
                             0.05603758809983181,
                             -0.31531793685177084,
                             0.24953935818155465,
                             -0.21945102528047247,
                             0.016201452486715968,
                             -0.47139285875704856,
                             0.8354485366702803,
                             0.28783787212142514,
                             -1.483190369052958,
                             -0.05324490057492157,
                             0.00808064868141892,
                             -1.3894868155533049,
                             0.07648399162880297,
                             0.28128388531065984,
                             -0.8032486745370345,
                             0.9961277979922681,
                             0.7271807873997648,
```

-0.2598267503182047,  
0.058937213125893145,  
1.4176939090014022,  
1.5623836495300838,  
-1.2281014386266311,  
1.627596878633186,  
0.150437982354294,  
0.017798034487339433,  
-0.2091243023446671,  
0.08776907917710067,  
0.637527078885032,  
1.2603122563899933,  
1.0910453886717337,  
0.001707278941889729,  
-0.5366140699752073,  
-0.04457743756443993,  
0.708269991966563,  
1.6757260639955311,  
0.6610325406900899,  
-0.508228690084442,  
-0.5178693625521746,  
-0.2955589105377924,  
-0.47790822054112786,  
0.31077598178920485,  
0.020632196003020267,  
1.5538854336639996,  
1.2816443511581943,  
-0.6926864187150775,  
0.73698114320343,  
0.3645818015611773,  
-0.2097443780477125,  
0.1421287040679699,  
0.052774836076248374,  
-0.7306191772967899,  
1.107856618529218,  
0.3743379513498811,  
1.2959169452837032,  
0.8858564921663113,  
0.03370518740548656,  
-1.0860983069970114,  
1.2199055901240408,  
-1.0630806559423625,  
1.3748402618369016,  
0.9943926078324806,  
0.7116645059379805,  
-0.21098608064682703,  
0.04581715611274856,  
-0.17117312830066983,  
1.2229557830916487,  
-1.6273428514067598,  
1.8508927721454946,  
0.851693435560975,  
1.0946646161197402,  
0.43088380554694883,  
-0.6171985422875839,  
1.6866137951313547,  
-0.2289359575496427,  
-0.09152362655526167,  
1.6917359096449291,  
0.22722692961233917,  
0.49434218233553445,  
1.2228162165990006,  
-0.4070166799423108,  
0.00966082758630671,  
-0.3344922737632815,  
-1.0755692755599169,  
1.1846485271761396,  
-0.06070659712292082,  
0.6384418838463358,  
-0.034216786122488324,  
-0.6519049362670448,  
-0.0019231105719348242,  
0.503764046349436,  
0.5779702041064313,  
-0.8610978040126155,



```

0.5832069567020347,
0.07954533618121334,
0.016329041774977193]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [ 0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5],
                                'r': 1},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#3'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                '6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                                         '0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + '
                                                         '0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + '
                                                         '0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + '
                                                         '0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + '
                                                         '0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + '
                                                         '0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.475700783925181],
                             [12, 6, 0, 0, -5.921149282782479],
                             [20, 10, 0, 0, -4.7240834286119355]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
                          'noise_prob': [
0.001,
0.001,
0,
0],
                          'status': True,
                          'type':
'depolarizing'},

```

```

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,

'depolarizing'},

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {

'noise_prob': [

0,
0],

'status': True,
'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {

'noise_prob': [

0,
0],

'status': True,
'type':

'odd_wires': 4}],
'run_time_sec': 7.921310901641846}},
{ 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [ 0,
    0,
    0,
    0,
    0,
    0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 0},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'xy-iss'}},
'init_param': { 'value': [ 0.003408343124459994,
    0.0034083431244599804,
    0.006710027629051694,
    0.2484817728699434,
    1.1672656342280407,
    1.167470260322433,
    3.1453440534904744,
    3.166261678218574,
    3.2843704266652405,
    4.089250903115526,
    4.091989893807717,
    4.091989893807717,
    5.181052167254873,
    5.181052167254873,
    5.184972473956635,
    5.585122024093685,
    5.5990893229720795,
    5.630355974178803,
    5.704160317443757,
    8.658831571647385,
    8.66505230970618,
    8.712765508205756,
    8.712765508205756,
    8.712765508205756,
    9.168875276976076,

```

9.176734348833309,  
9.262471352200725,  
9.262471352200725,  
10.578606537988184,  
10.578606537988184,  
1.5905119084430799,  
0.8691136234632737,  
0.04907693052707525,  
-0.23336553986203207,  
0.4284777328779486,  
2.2866815267075147,  
0.1760352312050406,  
0.27820168999860917,  
2.067264415281462,  
0.5755331494929522,  
-0.06858856463703264,  
-0.7222667597755238,  
0.7750924366303688,  
-0.278304785792398,  
0.5352624789798245,  
-1.1702690163303244,  
-0.012717570027659048,  
-0.07125250327360101,  
1.7927644689789062,  
1.3752915621891346,  
-1.1981440291126808,  
-0.30737164793891514,  
0.2657743539912098,  
0.04156274567190095,  
1.1363043468044227,  
0.059217925806269944,  
0.7608352104096147,  
-0.1513784586666425,  
0.025696061144845524,  
0.861481321747562,  
-0.48544656000194114,  
-0.006033515622113467,  
0.473431667961849,  
1.5469119181224316,  
0.1871819193791605,  
1.555475823471471,  
0.9001349633565042,  
-1.5961139272878428,  
-0.6749613217725859,  
-1.5596468027729833,  
0.5296186936496604,  
-0.8549575199843406,  
1.7649719371938613,  
1.5569889217595585,  
-0.9244334407213903,  
-1.5804326845781602,  
0.3840271097002098,  
-0.8070678340768227,  
-0.48791686278645724,  
0.13110829311357092,  
-2.023238766590243,  
-0.8997043584182223,  
0.8435119798114825,  
0.12108034013815198,  
-0.7013572315179941,  
0.05813246571029178,  
-1.3645229029121433,  
-1.704441396215925,  
0.6160899239086374,  
-1.6580292769388947,  
-1.550797918270104,  
-0.033040246679508146,  
-0.7595754539148374,  
0.6024045095197653,  
0.446745843265138,  
0.9717727329863253,  
-1.3190014690683383,  
-3.180952616822137,  
-0.47685451708111876,  
0.03958388950097112,

```

-0.04894683660460036,
-0.013869967587830365,
0.9715551393376142,
-0.2688733257646762,
-1.7112803723577967,
-0.06346862095088202,
1.2756440828431679,
0.4087049517265435,
-0.4433737535464867,
0.07044159255576982,
0.877714241226598,
-0.33059433004855665,
-0.41683973817974146,
-0.09123983383660174,
1.153451542408442,
1.5381060924707182,
1.4432055127327397,
0.7948381511053778,
0.12126271666707081,
0.3736422837955817,
-0.06595460407520624,
-0.1569219765005705,
1.4053035958769775,
-0.3443177603686477,
0.14604377230684606,
0.733462484703497,
1.2365404639754205,
-0.020105376528163625,
-0.09631958929266826,
-0.16876809298151013,
0.42184799028013376,
0.8803036484986011,
-0.4148292271104988,
0.011464734896518355,
1.0895788780475535,
-0.006017115067308532,
0.6476481463328121,
-0.4792828310008005,
1.7145504838049759,
0.9300252591703124,
1.4147034805691376,
-0.04601267898776636,
-0.34579443398211707,
0.006107561937391137,
2.7608588509789516,
-2.470402787070412,
-0.2193552778493498,
-0.43636419827955597,
0.5036040054264609,
-0.006776779992121664]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':

```

```

'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#7'},
    'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                           [1, 1, 0, 0],
                                           [2, 2, 0, 0]]},

    'run': 'redundant',
    'state': 'dmatrix',
    'vqe': { 'iteration': 1,
              'optimization': { 'algorithm': 'SLSQP',
                                'constraint': True,
                                'status': False}},

    'zne': { 'data_points': None,
              'degree': 0,
              'method': 'richardson',
              'sampling': 'default'}},
  'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                    '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                    '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                    '6 + 1 Z 5 + 1 Z 6',
              'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                                            '0.5 Z 0 Z 1 + '
                                                            '0.5 X 1 X 2 + '
                                                            '0.5 Z 1 Z 2 + '
                                                            '0.5 X 2 X 3 + '
                                                            '0.5 Z 2 Z 3 + '
                                                            '0.5 X 3 X 4 + '
                                                            '0.5 Z 3 Z 4 + '
                                                            '0.5 X 4 X 5 + '
                                                            '0.5 Z 4 Z 5 + '
                                                            '0.5 X 5 X 6 + '
                                                            '0.5 Z 5 Z 6']},

  'output': { 'data_points': [ [4, 2, 0, 0, -7.568863804770513],
                                [12, 6, 0, 0, -6.084665473601483],
                                [20, 10, 0, 0, -4.914126798758423]],
    'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                          'identity_factors': [0, 0, 0, 0],
                          'noise_level': [4, 2, 0, 0],
                          'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},

                                'noise_prob': [

0.001,
0.001,

                                0,
                                0],

                                'status': True,
                                'type':

'depolarizing'},

                                'odd_wires': 4},
                                { 'gates_num': [12, 3, 1, 0],
                                  'identity_factors': [1, 1, 0, 0],
                                  'noise_level': [12, 6, 0, 0],
                                  'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},

                                'noise_prob': [

0.001,
0.001,

                                0,
                                0],

                                'status': True,
                                'type':

'depolarizing'},

                                'odd_wires': 4},
                                { 'gates_num': [20, 5, 1, 0],
                                  'identity_factors': [2, 2, 0, 0],
                                  'noise_level': [20, 10, 0, 0],
                                  'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},

                                'noise_prob': [

0.001,
0.001,

                                0,
                                0],

                                'status': True,

```

```

'depolarizing'},

'run_time_sec': 8.946808815002441}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'xy-iss'}}},
  'init_param': { 'value': [ 0.5698358581496117,
                              1.0111463732621893,
                              1.116254023022104,
                              1.116254023022104,
                              1.4543153683590362,
                              1.4543153683590362,
                              1.551144943675129,
                              1.551144943675129,
                              2.3321866923810566,
                              2.4857852178760083,
                              3.837593499897418,
                              3.837593499897418,
                              3.837593499897418,
                              3.837593499897418,
                              4.847467397840062,
                              5.03660309473088,
                              5.176578602594472,
                              5.176578602594472,
                              5.214332760543968,
                              6.547255537065404,
                              6.547255537065404,
                              7.083633091144979,
                              7.083633091144979,
                              7.133204014188821,
                              7.133204014188821,
                              7.133204014188821,
                              7.133204014188821,
                              7.937225733864811,
                              8.370661235857398,
                              8.62656679928389,
                              8.759707620277526,
                              9.424598849529344,
                              0.24247733923543782,
                              0.79275118507479,
                              -0.012314768690710378,
                              1.2247395896468714,
                              -0.6087890007814074,
                              0.9804698093938512,
                              0.19554007335952167,
                              -0.18291383394130525,
                              -0.08254523307317092,
                              0.18380200005144362,
                              -0.06242013495608768,
                              -0.18902966193120999,
                              0.4846770511497838,
                              1.2162916157423216,
                              0.4476502570273604,
                              -0.5204828708955642,
                              1.1525916637240337,
                              0.9814837501696517,
                              1.2019836737296188,
                              0.10039944576408244,
                              -1.165620769823409,
                              0.5709783345435084,
                              0.04690539627488982,

```

0.3150855883896384,  
0.6835833386917337,  
0.7350671828581666,  
0.15105693185753874,  
0.7851129846448224,  
-0.290237804763004,  
0.02628688844012564,  
-0.3427838784588314,  
-0.12202424723691215,  
0.30368921729231485,  
-0.08398845633414893,  
-0.34421225485285395,  
-1.0992299599969957,  
-0.6679166311787512,  
-0.4925602784337871,  
-0.7607905356843834,  
-0.061822787578292515,  
-0.33643902903801526,  
1.7237644621079549,  
1.1087838048318122,  
1.4391293107545464,  
-0.2688865923867924,  
0.07238699078201241,  
-0.7262166431073663,  
-0.8607492696026928,  
0.1828620517189283,  
-1.5556021786529124,  
-0.5230641559705965,  
-0.023465829708141782,  
0.5773817105800866,  
-0.6189512057198875,  
-0.1704298219551506,  
0.6935490081871019,  
0.43024761601627914,  
-1.3818053283072975,  
0.32069867830077864,  
0.11223505487625844,  
-0.6642209341325642,  
-0.7163563578386999,  
0.9533459704680486,  
-2.5373567196844773,  
-0.3530595330204968,  
-0.36744271288254204,  
-0.4105700661159024,  
-0.529185988706723,  
-0.5074466275713505,  
0.5969687397167245,  
0.1454479675984071,  
0.9510340399481164,  
-0.16051754924491393,  
0.168676911677473,  
1.6243103666539225,  
-0.3533677275828062,  
0.23248347317288842,  
1.550100715213732,  
0.3540002793004863,  
0.11004939052123668,  
0.0026309322638186474,  
1.0023099891482978,  
1.3075603782358884,  
0.06614039249633322,  
0.12696883216368457,  
0.4650745950568721,  
0.09288306127511851,  
-0.05535633254466518,  
1.0893487961438044,  
0.1856572010619516,  
-0.3369565165204948,  
1.1993442715596423,  
-0.1637322799431796,  
-0.05574034797393315,  
-0.6499132821077687,  
-1.1854402746414112,  
-0.20554021240749126,  
-0.697991352679575,

[illegible]



```

'0.5 X 5 X 6 + '
'0.5 Z 5 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -7.159167099826597],
                             [12, 6, 0, 0, -5.573237410199788],
                             [20, 10, 0, 0, -4.355904736591592]],
  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                      'identity_factors': [0, 0, 0, 0],
                      'noise_level': [4, 2, 0, 0],
                      'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

0.001,
0.001,

'noise_prob': [

0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

0.001,
0.001,

'noise_prob': [

0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

0.001,
0.001,

'noise_prob': [

0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4}],
'run_time_sec': 8.069846868515015}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'xy-iss'}},
  'init_param': { 'value': [ 0.02240293444906766,
                              0.9863710197203618,
                              1.3708545038264748,
                              1.3757718928414557,
                              1.7844795346244002,
                              2.029643659915566,

```

2.029643659915566,  
4.135298362317422,  
4.181946654536538,  
4.392782597821499,  
4.473609589126697,  
4.474471668054438,  
4.475838923576404,  
4.4785869343507265,  
4.4785869343507265,  
5.467009291914798,  
5.470281162008999,  
5.840541346188122,  
5.842392372241278,  
6.505508038171383,  
6.505508038171383,  
7.536348099553183,  
7.536348099553183,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
1.1150074339792337,  
-0.03535947987647509,  
1.1918755403807781,  
-0.20191103850925227,  
-0.268362117189328,  
-0.3595192771004685,  
1.2614204066704717,  
-2.9429228213034166,  
-1.054810371869961,  
0.9594255841252335,  
-0.09538831740389547,  
0.3965663197177072,  
-0.22182226409641906,  
-0.2653718580482209,  
0.1686090968331403,  
1.6516484362324146,  
-0.3049608013883917,  
0.49165272629600476,  
1.9061569916625292,  
1.241422732345657,  
-0.11527538328521378,  
-0.22895223610637053,  
-0.06124477487110871,  
0.6193220715745159,  
1.372932614853267,  
-1.1538384701543527,  
-0.1139440760455718,  
0.16973094341798492,  
-0.5943234340378932,  
0.21399932498003596,  
-0.18156105319883253,  
-1.0504702368491705,  
0.7232808408606985,  
-0.018870518436612777,  
-0.29343981279013404,  
0.30960592292227684,  
0.13511542022922338,  
0.5096669954667911,  
-1.097576281455009,  
0.12047585913747774,  
-0.5585503308065869,  
1.2279608447421912,  
1.3012401380411538,  
0.3769592231863052,  
-0.5692023175942067,  
-0.4567508363134565,  
-0.679549924864495,  
-0.24647993267323956,  
0.6292567546169889,  
0.9587256267378846,  
1.7268825428143277,

```
0.1413792259593793,  
0.6520451922983643,  
0.6152471684019365,  
-1.1240317980448378,  
-0.9856730455453077,  
-1.2455074642265085,  
0.2235091354354849,  
-0.8870861048674711,  
0.5299724059178798,  
-0.21820971616414211,  
-0.09687180933262383,  
-0.9247884680119297,  
-0.4566833626656702,  
-0.4285291193052864,  
-0.6406026728496247,  
0.9023578506051637,  
0.03748900229192909,  
0.7551248935414285,  
-0.18980887545414976,  
-0.1497604267964229,  
-0.4253730408988226,  
-0.4157675203773789,  
1.677209169409502,  
0.2126888490300174,  
-0.13481167544410624,  
-1.6951458494505263,  
-0.006476362637627559,  
-0.5490470525961781,  
0.3195499617454318,  
1.077429849794694,  
0.6725724542747005,  
-0.10235701747439804,  
-0.014129818782246995,  
2.382406086835482,  
0.008866515589568993,  
1.0282503794544984,  
-0.6899701634722577,  
0.3510134577654823,  
0.6918405669356381,  
-0.08667968085870373,  
-0.0005005962237103964,  
1.3805542469189591,  
1.011514915181436,  
-0.4623191099783579,  
1.397645255720587,  
-0.7813361449321683,  
-0.9940660424170442,  
-0.6570734018108508,  
1.0171740600492052,  
0.14480072689925969,  
1.157289980717297,  
1.019472554492438,  
1.0029573776528096,  
-0.20406480565208354,  
-0.011076077177880707,  
-0.30566521016454584,  
-0.4775965459909992,  
-0.7158801142606765,  
1.5610067764386268,  
1.5187465408730505,  
0.21158961058436962,  
-0.38098352608767794,  
-0.046999172842648596,  
0.5964180792256618,  
-0.6260168044949087,  
-0.7215592053840503,  
-0.5706802740378752,  
0.11995346168986934,  
0.17053214926260635]],  
'noise_profile': { 'noise_on_init_param': { 'status': False,  
                                             'value': 0},  
                    'noise_prob': [0.001, 0.001, 0, 0],  
                    'status': True,  
                    'type': 'depolarizing'},  
'nqubits': 7,
```

```

'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#6'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': None,
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
'1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
'1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
'6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
'0.5 Z 0 Z 1 + '
'0.5 X 1 X 2 + '
'0.5 Z 1 Z 2 + '
'0.5 X 2 X 3 + '
'0.5 Z 2 Z 3 + '
'0.5 X 3 X 4 + '
'0.5 Z 3 Z 4 + '
'0.5 X 4 X 5 + '
'0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + '
'0.5 Z 5 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -7.259703059772281],
[12, 6, 0, 0, -5.766278116709839],
[20, 10, 0, 0, -4.58319338434511]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
'identity_factors': [0, 0, 0, 0],
'noise_level': [4, 2, 0, 0],
'noise_profile': {
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4}
]
}
}

```

```

0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {
'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4}},
'run_time_sec': 7.59516716003418}}],
'vqe': [ { 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': {'value': 'random'},
'noise_profile': { 'noise_on_init_param': { 'status': False,
'value': 0},
'noise_prob': [0.001, 0.001, 0, 0],
'status': True,
'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': True,
'type': 'png'},
'file_name_prefix': 'xy_noiseefree_time_evo'},
'redundant': { 'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'vqe',
'state': 'dmatrix',
'vqe': { 'iteration': 10,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': True}},
'zne': { 'data_points': None,

```

```

        'degree': 1,
        'method': 'richardson',
        'sampling': 'default'}},
'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 '
        'X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
        '4 X 5 + 1 Z 4 + 1 X 5 X 6 + 1 Z 5 + 1 Z 6',
        'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Z '
        '0 Z 1 + 0.5 X 1 X 2 '
        '+ 0.5 Z 1 Z 2 + 0.5 '
        'X 2 X 3 + 0.5 Z 2 Z '
        '3 + 0.5 X 3 X 4 + '
        '0.5 Z 3 Z 4 + 0.5 X '
        '4 X 5 + 0.5 Z 4 Z 5 '
        '+ 0.5 X 5 X 6 + 0.5 '
        'Z 5 Z 6']},

'output': { 'exact_sol': -8.56677223350563,
        'initial_cost_history': [ 3.450586259258812,
        2.2577647098356715,
        3.220573399525229,
        2.813569497850412,
        2.356577849154886,
        2.484693017894963,
        2.751192081705436,
        3.0939254363357245,
        3.3455601721392987,
        2.9399815036188865],
        'noise_details': { 'gates_num': [4, 1, 1, 0],
        'identity_factors': [0, 0, 0, 0],
        'noise_level': [4, 2, 0, 0],
        'noise_profile': { 'noise_on_init_param': {

'noise_prob': [ 0.001,
        0.001,
        0,
        0],

        'status': True,
        'type': 'depolarizing'}},

        'odd_wires': 4},
        'optimized_minimum_cost': [ -7.463351332655033,
        -7.130214875567174,
        -7.475700783925261,
        -7.41873284165754,
        -7.407206817517966,
        -7.259703059772282,
        -7.568863804770619,
        -7.15916709982671,
        -7.395384341095537,
        -7.512595875373624],
        'optimized_parameters': [ [ 0.5482907189468895,
        0.6413620809492503,
        0.6422482149552934,
        1.5892409709442974,
        1.850708229814058,
        1.850708229814058,
        1.8745552660050262,
        2.400679867939261,
        2.402212278134192,
        2.485190345183722,
        2.485190345183722,
        2.4851903451837223,
        2.488397493491329,
        2.4883974934913287,
        5.077476636438464,
        5.077476636438464,
        5.732990197214016,
        5.806868622878696,
        5.817834245705687,
        6.166757373752113,
        7.3114292874931905,
        7.311858449036949,
        8.346734585466223,
        8.350435170229554,
        8.354614694314481,
        8.35659817980371,

```

8.356905245901928,  
9.313534396314816,  
9.313534396314816,  
10.443787047737276,  
-0.5971318801423705,  
-0.6830583120471296,  
0.053446928626708114,  
-1.488251087277441,  
0.7409998345617078,  
-0.020561007687691084,  
-0.47029189134787985,  
-0.9187802118512801,  
-0.07390570205801456,  
0.6091612085770479,  
0.5696050095749661,  
-2.634874245900948,  
0.14733366015521565,  
1.0781100436188797,  
0.3459269460772517,  
1.2820636645787713,  
-1.605623121104658,  
0.856791024529966,  
0.16374864437029604,  
-0.7377840957855112,  
0.7603752030179747,  
0.4958590077418653,  
1.0293890027768824,  
0.4862585296205842,  
-1.0838654128292502,  
1.2632637762941026,  
-1.1043454462318527,  
-0.7867654190654241,  
0.8818217647037212,  
1.0406267750063978,  
0.05770567519039498,  
-0.5922070722918433,  
-0.3271403288282926,  
0.5980786503295974,  
-0.02050375112330311,  
-0.9007241609880184,  
0.5239405469453117,  
0.7601496703420288,  
-0.6449049942439851,  
1.7340858429103823,  
0.10050113333288421,  
0.3143347863780438,  
0.28408386490618526,  
-0.1222389867527315,  
-0.09502282329152913,  
-1.3004368662949968,  
0.16856179320059875,  
0.6790103402211991,  
0.3355977478652572,  
0.0935957266804422,  
0.42936820813464754,  
0.5148227650107633,  
0.10764356588532305,  
-0.054251737808208085,  
0.06525040933822983,  
-0.21143245853075732,  
-1.5801988491404158,  
0.023513208971767067,  
1.0921277689034055,  
-0.11501776583679489,  
-0.14182911234947893,  
1.8716225858725093,  
-1.0747761250482988,  
-0.01873186129021693,  
0.9952348515577564,  
1.5589645169221944,  
2.4625123021717044,  
1.5320934484141422,  
0.6264578101560674,  
0.015802850908690148,  
0.6559295719723718,

0.5030706883609005,  
0.010357532831659657,  
-0.6971755064049523,  
-1.334963536555068,  
0.05714132580252865,  
0.9478292633237722,  
1.541635767019547,  
-1.2357775558070643,  
1.5753066317572375,  
1.2206753513411082,  
-0.013882574638756213,  
2.102115305768464,  
0.6867648509985108,  
-1.0810617894892982,  
0.608205793929093,  
-1.0701207529796843,  
-0.008804617073740417,  
1.0802724219136723,  
1.4472704941581649,  
-0.525983160453369,  
0.10347757085774918,  
0.07451664808136123,  
0.8113743025574697,  
-0.19830571509994802,  
0.20760359505818776,  
-0.5709476706639499,  
0.1791350390980861,  
-0.32061652775092425,  
-1.6382844876022806,  
2.271046687924862,  
0.09972766177435569,  
1.671157305178672,  
1.0596955078067567,  
-0.7395801076185267,  
-0.8217251410877643,  
1.2660358026872456,  
-0.149859182069558,  
1.7386861885389688,  
-0.003505497297480453,  
0.677126408740769,  
-1.0541684899696007,  
0.9437251450981726,  
1.7354017388586316,  
-0.8022872949930118,  
0.01881044769021433,  
-0.013699411839369284,  
1.5965466699123847,  
0.4486397166383021,  
1.5669137279484207],  
[ 4.1837705414928806e-17,  
1.1742327239243593,  
1.1742327239243593,  
1.174232723924359,  
1.3021435979041922,  
1.3883521076730898,  
1.4901272631800928,  
1.490127263180093,  
1.490127263180093,  
2.542545188872923,  
2.56739133991554,  
2.677178516908646,  
5.624946341909109,  
5.624946341909109,  
5.63924283183031,  
5.672838193807689,  
5.672838193807689,  
5.672838193807689,  
5.672838193807689,  
5.672838193807689,  
5.672838193807689,  
5.805507018952099,  
5.858678454346443,  
7.374841183417447,  
7.374841183417447,  
9.078346087689514,



9.17910617229311,  
9.185363997877552,  
9.550522060955204,  
9.715006087156702,  
0.5380723684568228,  
0.20346632529178696,  
-0.28402043001150323,  
-0.013694659434132353,  
-0.8491217472851175,  
-0.13891219530245408,  
-0.7902948900320785,  
0.02035105936303376,  
0.35891510624171696,  
0.07011262472067725,  
0.2571910630887441,  
0.09727807922224965,  
-0.4253506785797692,  
-0.08201618636277365,  
-0.5629942371157008,  
0.4984357070329931,  
0.22460606922422946,  
0.6436861273901548,  
0.5581387866543217,  
0.6438048424266741,  
0.6625810608832491,  
-0.2877740698749285,  
0.03400434270310955,  
0.6598198228171638,  
0.15695492486622947,  
-0.23277712193728803,  
0.3379436543817524,  
0.6679629986711755,  
0.4913802101172593,  
-0.6543304626041586,  
1.2398324170787045,  
0.10868488610295632,  
0.4726806257545104,  
-1.0278416218016544,  
-0.5660236088762642,  
-0.06627186605932975,  
0.3527547117645279,  
0.3944014355355292,  
0.33709190475341266,  
0.16707772676088822,  
0.29195080738380563,  
1.0354529601392413,  
0.12500585138196232,  
-0.037178956773431956,  
0.7823218278561086,  
-0.04464215343745706,  
-0.36923576305262273,  
-0.9863817864437636,  
0.039519076991602065,  
-0.35646400258617383,  
0.04542480304419608,  
-0.46125271135496354,  
0.40472620693719735,  
0.7802480661953589,  
-0.6757172179201896,  
0.6396142241310521,  
0.2327897749192615,  
0.8954622299286413,  
0.7158405805761733,  
0.1382139633537826,  
1.0616928944303126,  
-0.6122315420380016,  
-0.6738539946512315,  
1.0433459792659807,  
0.494526070112864,  
0.20621322780405107,  
-0.05318175489586881,  
-0.11213659998229918,  
0.32941262943060273,  
0.13931786347259914,  
-0.07640781308377202,

0.31450116184408605,  
0.3658109215963646,  
0.04460349089074807,  
-0.12913310998017427,  
0.31890485610090735,  
-0.005491508360761248,  
1.2692063073436923,  
-0.3006174703747285,  
-0.41404661321397057,  
-0.5199199797590206,  
0.44225909618051784,  
-0.4233007342169607,  
0.7456354776212751,  
-0.32484988424610756,  
0.9268151291603125,  
0.8385591284905366,  
0.027219364270413358,  
-0.5520387125082392,  
1.3757901840365965,  
0.02933419406725825,  
-0.2915193842748469,  
0.33917094344303517,  
0.10828106345120646,  
-0.5650186064180197,  
-0.6041651963720519,  
-0.19230834783869816,  
1.9848826966849449,  
0.0632219631903188,  
0.04804551511145073,  
0.47752350144148015,  
1.3406847618100746,  
-1.3722262204383469,  
-1.0513455672656666,  
0.7121308231347245,  
0.13278942055995957,  
1.9758312031522887,  
2.19648222646383,  
0.8936788375205645,  
0.05510909660880629,  
-0.18765678539637448,  
0.45031205104496697,  
-0.6542716355161553,  
0.5783583754336702,  
-0.18844184232604352,  
-1.5667303012058793,  
0.36110899429768645,  
-0.275182998952267,  
0.30367576290775045,  
-0.1532687178202341],  
[-3.641081222961908e-17,  
0.6149788059529836,  
0.7190202634465676,  
1.227117923902744,  
1.282995668258181,  
1.320146784613617,  
1.320146784613617,  
3.1464089486715623,  
3.1464089486715623,  
5.021180125711677,  
5.021180125711677,  
5.021180125711677,  
6.703692809170789,  
6.703692809170789,  
7.791601108223033,  
7.8369202041803225,  
7.951907692650894,  
7.98389042115583,  
8.258376681022987,  
8.258376681022987,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.265620267330194,  
8.265620267330194,

9.412842541483705,  
9.412842541483705,  
10.502716174481437,  
10.502716174481437,  
0.1665558361704551,  
0.0766182276072886,  
-0.06331706305100791,  
0.03225035272845343,  
-0.2265177184784691,  
0.6859734408919996,  
0.358399999202588,  
-0.31490649734707366,  
0.03084506070978915,  
0.8141179515629021,  
-0.05751068028622007,  
0.9013204998454583,  
-0.325467390457223,  
-0.16027539072229496,  
0.19756436832536928,  
0.17875052394899651,  
0.07441990946369173,  
-1.7121562848350094,  
0.5411900571694856,  
0.025994665514066265,  
-1.0547594680221428,  
-0.3558195097906033,  
0.2575282902752545,  
-0.32652811387218433,  
-0.17477771883072452,  
0.05603758809983181,  
-0.31531793685177084,  
0.24953935818155465,  
-0.21945102528047247,  
0.016201452486715968,  
-0.47139285875704856,  
0.8354485366702803,  
0.28783787212142514,  
-1.483190369052958,  
-0.05324490057492157,  
0.00808064868141892,  
-1.3894868155533049,  
0.07648399162880297,  
0.28128388531065984,  
-0.8032486745370345,  
0.9961277979922681,  
0.7271807873997648,  
-0.2598267503182047,  
0.058937213125893145,  
1.4176939090014022,  
1.5623836495300838,  
-1.2281014386266311,  
1.627596878633186,  
0.150437982354294,  
0.017798034487339433,  
-0.2091243023446671,  
0.08776907917710067,  
0.637527078885032,  
1.2603122563899933,  
1.0910453886717337,  
0.001707278941889729,  
-0.5366140699752073,  
-0.04457743756443993,  
0.708269991966563,  
1.6757260639955311,  
0.6610325406900899,  
-0.508228690084442,  
-0.5178693625521746,  
-0.2955589105377924,  
-0.47790822054112786,  
0.31077598178920485,  
0.020632196003020267,  
1.5538854336639996,  
1.2816443511581943,  
-0.6926864187150775,  
0.73698114320343,

0.3645818015611773,  
-0.2097443780477125,  
0.1421287040679699,  
0.052774836076248374,  
-0.7306191772967899,  
1.107856618529218,  
0.3743379513498811,  
1.2959169452837032,  
0.8858564921663113,  
0.03370518740548656,  
-1.0860983069970114,  
1.2199055901240408,  
-1.0630806559423625,  
1.3748402618369016,  
0.9943926078324806,  
0.7116645059379805,  
-0.21098608064682703,  
0.04581715611274856,  
-0.17117312830066983,  
1.2229557830916487,  
-1.6273428514067598,  
1.8508927721454946,  
0.851693435560975,  
1.0946646161197402,  
0.43088380554694883,  
-0.6171985422875839,  
1.6866137951313547,  
-0.2289359575496427,  
-0.09152362655526167,  
1.6917359096449291,  
0.22722692961233917,  
0.49434218233553445,  
1.2228162165990006,  
-0.4070166799423108,  
0.00966082758630671,  
-0.3344922737632815,  
-1.0755692755599169,  
1.1846485271761396,  
-0.06070659712292082,  
0.6384418838463358,  
-0.034216786122488324,  
-0.6519049362670448,  
-0.0019231105719348242,  
0.503764046349436,  
0.5779702041064313,  
-0.8610978040126155,  
0.5832069567020347,  
0.07954533618121334,  
0.016329041774977193],  
[ 0.2383708143795501,  
0.8137820253985804,  
1.0561141201801563,  
1.2070683478267785,  
1.9518166906091101,  
2.08301823027678,  
2.6774459967535513,  
2.7270096866449576,  
3.7369434259122447,  
3.7421546540398443,  
4.458327272130387,  
4.463102384700506,  
4.463102384700506,  
4.482690585412051,  
4.482694652744643,  
4.498978826283554,  
6.3580266266370415,  
7.886395999997723,  
7.886532810158634,  
8.060529572035655,  
8.06234783983503,  
8.127555772505229,  
8.130166630032164,  
8.42408407139234,  
8.433074307328475,  
9.412401860498063,

9.420584174895616,  
9.429609653004679,  
9.434851407347677,  
11.283524698808058,  
0.19157417616433814,  
0.42257952171340063,  
0.3129095694283805,  
0.28360255750055535,  
-0.7229159635345903,  
2.545731433831817,  
1.1687892956196542,  
0.5222949375721274,  
0.9482151911772319,  
0.28742832079435787,  
1.1627391357840349,  
-0.27939056132165146,  
-0.07574334812551493,  
-0.529119211391362,  
-0.08653083237786212,  
0.042544229108731915,  
-0.09154582517805988,  
0.2776265525620834,  
0.373637405241428,  
-0.666296500917012,  
-0.729825790392568,  
0.36164641825124294,  
1.2066181407380305,  
0.18327070025757417,  
2.2757552060408917,  
-0.004789158452516104,  
0.49019439516235463,  
2.190622553796523,  
0.6131206832540379,  
1.0987721265230228,  
1.9413219378309259,  
0.07975169469268534,  
0.17531082109327745,  
0.01770145552231998,  
0.22429808435825893,  
1.1460098869067579,  
-0.25766861736092417,  
0.4386465248337572,  
0.7521614434169624,  
0.07039918338308593,  
-0.23913727928604284,  
0.062497116873310714,  
0.27575365987954265,  
-0.8268952220573135,  
0.8599765782432734,  
0.6958325703328606,  
-0.16792542378671177,  
-0.13186811496768225,  
0.17745018848846658,  
-0.13764108606901534,  
-0.34798347931108986,  
0.3901205214779397,  
-0.12832331396189006,  
0.7623260417931323,  
-0.08745728181826747,  
0.22448567111633413,  
0.5103689813486589,  
0.020179740460913417,  
-0.4639048953982949,  
1.8052783293547816,  
-0.06895296635033099,  
-0.46137869531525183,  
-0.7694587159951923,  
-0.1507074275764489,  
-3.159084078074864,  
1.5556721360426484,  
0.9802025173412374,  
-1.5980562353917622,  
0.9974678614222413,  
0.11965749551778265,  
-0.5964068365118492,

1.00912773091807,  
1.2674306548806673,  
1.7418320010188646,  
-1.2223756485879664,  
-0.006270145144671745,  
0.7863824204489233,  
-0.08410721186616651,  
0.13420385894759826,  
0.6686584151585806,  
-0.7946689395347296,  
-1.448768973512125,  
-0.4158373205099576,  
-0.1003664997933048,  
0.5370971852976741,  
-0.013369261455621718,  
-1.2134070474127567,  
2.71822204346588,  
-0.8266087910498845,  
-0.04274152999618493,  
0.627725493238542,  
-0.10714625448592663,  
1.4055199595750496,  
-0.08877591733311402,  
-0.6400618055168635,  
0.27990653766167567,  
0.27230874688701184,  
1.8329367216853043,  
0.12128377229042309,  
0.03719209379786179,  
0.7558193864298689,  
-0.027085062677120984,  
0.7947118159580207,  
-0.18810209431195668,  
0.008294184744538372,  
-0.9110921816475059,  
1.3065108206329406,  
0.004810940817056788,  
1.4030602129547465,  
0.03878633149748846,  
0.29850504257680605,  
-0.9524583070906825,  
0.10037229527914636,  
0.4277056649647598,  
-2.2528322583674503,  
0.030724614514628212,  
0.8416350822543037,  
1.5579013461800135,  
0.5696673724928452,  
-1.5352194543526818],  
[ 0.3442332088020621,  
0.7247295953616149,  
0.7247295953616149,  
0.7610537291022658,  
1.7162580174489597,  
2.0119282772467635,  
2.0119282772467635,  
3.369934702704019,  
3.369934702704019,  
5.00211845115155,  
5.212181786011135,  
5.346566249705437,  
6.103091648910964,  
6.103091648910964,  
7.050711873868975,  
7.050711873868975,  
7.492144583370162,  
7.492144583370162,  
7.606105711064038,  
7.606105711064038,  
8.717193051662631,  
8.753101318062777,  
8.877107151002964,  
8.889590522678484,  
8.982812044989718,  
8.982812044989718,

9.499874357008034,  
9.499874357008034,  
9.659025604148875,  
9.671110590806489,  
0.02814413440270558,  
0.250593445582179,  
0.17496868989230024,  
-0.19749991731592192,  
-0.5878125517240043,  
1.1370895496823794,  
0.3339578948727643,  
0.30833012680275795,  
0.21147160367429677,  
0.5518340573364652,  
0.9816766119937317,  
-1.3427949214182668,  
2.2864376119784486,  
0.673664283367827,  
0.4767745045632036,  
-0.47480445681581174,  
0.05912449937800317,  
0.9513757199218045,  
1.079093875588678,  
-0.4313388366547843,  
0.43347513808131466,  
-0.3381632209207048,  
-0.42699598389932686,  
-1.1528003206699722,  
0.2505681368756031,  
1.1900947118566725,  
-0.38260053073473543,  
-0.6405385159573362,  
0.08926968472452403,  
-0.04834256297702397,  
1.603027736914297,  
-0.44672812120859223,  
-0.5759172165575565,  
1.25237714334681,  
0.04254918814060746,  
-0.002429292667880943,  
0.47732275422632153,  
-0.10204026491637587,  
0.02357869435971368,  
0.06910865492863566,  
-0.5942663805386644,  
1.1629666490831163,  
0.28625726751699415,  
0.4183193427753825,  
0.33026699893767814,  
1.8860632823719743,  
-0.37929215782635534,  
0.8251027249542411,  
-0.13937217921728381,  
-0.35829122981546885,  
-0.11830319301401378,  
-1.1307480811476716,  
-0.33746884247229475,  
1.7161163093033744,  
-0.03517175574182253,  
-0.4044561448132672,  
-0.7301790593832838,  
-0.10496992427986328,  
-0.0377875273258637,  
0.11576685707785253,  
-0.9348023198901909,  
2.132577954045408,  
-0.47199808297503054,  
0.09642080758509694,  
-1.5590866370005203,  
0.10045413530924742,  
-0.3215930726850239,  
-0.7020784722315541,  
1.2376661808413174,  
0.5709879203761018,  
-0.820670510834149,

0.1634866307612446,  
0.06270250983710676,  
-0.03570422816362065,  
-0.5699745682010601,  
-0.26488761312159137,  
1.795803611544861,  
-0.4017001375917998,  
-1.757541020399501,  
-0.05132347348943386,  
0.8521664539464072,  
0.4812990598336637,  
-0.7041980923594973,  
0.6941905718406797,  
1.5589556954504384,  
1.9089912382579748,  
0.4849438728523755,  
0.03939482159422182,  
-0.2564597588944596,  
-0.16675906759041134,  
2.5610800117093855,  
0.9927310518963223,  
1.3170410278463267,  
0.6281459286410694,  
-0.07878692694615999,  
0.5865838795710373,  
0.4894408136056478,  
-0.043552207832595204,  
0.8988064624972067,  
-0.35279792613941824,  
1.5088457985023234,  
-0.32174328535909336,  
0.41978129355629945,  
0.014567846908235548,  
-0.17446008524494477,  
0.35494980160059775,  
1.44166715836895,  
0.027787407199764528,  
-0.2573832607835415,  
0.9605798444843694,  
-0.08907047543629609,  
-0.012116788408097524,  
1.2676248549462201,  
-0.2512276837340942,  
0.7869834357157488,  
-2.3607393050467915,  
0.1914341630047483,  
-1.0542342437530707,  
0.8454261921281611,  
0.02027118187750096],  
[ 0.02240293444906766,  
0.9863710197203618,  
1.3708545038264748,  
1.3757718928414557,  
1.7844795346244002,  
2.029643659915566,  
2.029643659915566,  
4.135298362317422,  
4.181946654536538,  
4.392782597821499,  
4.473609589126697,  
4.474471668054438,  
4.475838923576404,  
4.4785869343507265,  
4.4785869343507265,  
5.467009291914798,  
5.470281162008999,  
5.840541346188122,  
5.842392372241278,  
6.505508038171383,  
6.505508038171383,  
7.536348099553183,  
7.536348099553183,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,



9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
1.1150074339792337,  
-0.03535947987647509,  
1.1918755403807781,  
-0.20191103850925227,  
-0.268362117189328,  
-0.3595192771004685,  
1.2614204066704717,  
-2.9429228213034166,  
-1.054810371869961,  
0.9594255841252335,  
-0.09538831740389547,  
0.3965663197177072,  
-0.22182226409641906,  
-0.2653718580482209,  
0.1686090968331403,  
1.6516484362324146,  
-0.3049608013883917,  
0.49165272629600476,  
1.9061569916625292,  
1.241422732345657,  
-0.11527538328521378,  
-0.22895223610637053,  
-0.06124477487110871,  
0.6193220715745159,  
1.372932614853267,  
-1.1538384701543527,  
-0.1139440760455718,  
0.16973094341798492,  
-0.5943234340378932,  
0.21399932498003596,  
-0.18156105319883253,  
-1.0504702368491705,  
0.7232808408606985,  
-0.018870518436612777,  
-0.29343981279013404,  
0.30960592292227684,  
0.13511542022922338,  
0.5096669954667911,  
-1.097576281455009,  
0.12047585913747774,  
-0.5585503308065869,  
1.2279608447421912,  
1.3012401380411538,  
0.3769592231863052,  
-0.5692023175942067,  
-0.4567508363134565,  
-0.679549924864495,  
-0.24647993267323956,  
0.6292567546169889,  
0.9587256267378846,  
1.7268825428143277,  
0.1413792259593793,  
0.6520451922983643,  
0.6152471684019365,  
-1.1240317980448378,  
-0.9856730455453077,  
-1.2455074642265085,  
0.2235091354354849,  
-0.8870861048674711,  
0.5299724059178798,  
-0.21820971616414211,  
-0.09687180933262383,  
-0.9247884680119297,  
-0.4566833626656702,  
-0.4285291193052864,  
-0.6406026728496247,  
0.9023578506051637,  
0.03748900229192909,  
0.7551248935414285,  
-0.18980887545414976,  
-0.1497604267964229,

-0.4253730408988226,  
-0.4157675203773789,  
1.677209169409502,  
0.2126888490300174,  
-0.13481167544410624,  
-1.6951458494505263,  
-0.006476362637627559,  
-0.5490470525961781,  
0.3195499617454318,  
1.077429849794694,  
0.6725724542747005,  
-0.10235701747439804,  
-0.014129818782246995,  
2.382406086835482,  
0.008866515589568993,  
1.0282503794544984,  
-0.6899701634722577,  
0.3510134577654823,  
0.6918405669356381,  
-0.08667968085870373,  
-0.0005005962237103964,  
1.3805542469189591,  
1.011514915181436,  
-0.4623191099783579,  
1.397645255720587,  
-0.7813361449321683,  
-0.9940660424170442,  
-0.6570734018108508,  
1.0171740600492052,  
0.14480072689925969,  
1.157289980717297,  
1.019472554492438,  
1.0029573776528096,  
-0.20406480565208354,  
-0.011076077177880707,  
-0.30566521016454584,  
-0.4775965459909992,  
-0.7158801142606765,  
1.5610067764386268,  
1.5187465408730505,  
0.21158961058436962,  
-0.38098352608767794,  
-0.046999172842648596,  
0.5964180792256618,  
-0.6260168044949087,  
-0.7215592053840503,  
-0.5706802740378752,  
0.11995346168986934,  
0.17053214926260635],  
[ 0.003408343124459994,  
0.0034083431244599804,  
0.006710027629051694,  
0.2484817728699434,  
1.1672656342280407,  
1.167470260322433,  
3.1453440534904744,  
3.166261678218574,  
3.2843704266652405,  
4.089250903115526,  
4.091989893807717,  
4.091989893807717,  
5.181052167254873,  
5.181052167254873,  
5.184972473956635,  
5.585122024093685,  
5.5990893229720795,  
5.630355974178803,  
5.704160317443757,  
8.658831571647385,  
8.66505230970618,  
8.712765508205756,  
8.712765508205756,  
8.712765508205756,  
9.168875276976076,  
9.176734348833309,

9.262471352200725,  
9.262471352200725,  
10.578606537988184,  
10.578606537988184,  
1.5905119084430799,  
0.8691136234632737,  
0.04907693052707525,  
-0.23336553986203207,  
0.4284777328779486,  
2.2866815267075147,  
0.1760352312050406,  
0.27820168999860917,  
2.067264415281462,  
0.5755331494929522,  
-0.06858856463703264,  
-0.7222667597755238,  
0.7750924366303688,  
-0.278304785792398,  
0.5352624789798245,  
-1.1702690163303244,  
-0.012717570027659048,  
-0.07125250327360101,  
1.7927644689789062,  
1.3752915621891346,  
-1.1981440291126808,  
-0.30737164793891514,  
0.2657743539912098,  
0.04156274567190095,  
1.1363043468044227,  
0.059217925806269944,  
0.7608352104096147,  
-0.1513784586666425,  
0.025696061144845524,  
0.861481321747562,  
-0.48544656000194114,  
-0.006033515622113467,  
0.473431667961849,  
1.5469119181224316,  
0.1871819193791605,  
1.555475823471471,  
0.9001349633565042,  
-1.5961139272878428,  
-0.6749613217725859,  
-1.5596468027729833,  
0.5296186936496604,  
-0.8549575199843406,  
1.7649719371938613,  
1.5569889217595585,  
-0.9244334407213903,  
-1.5804326845781602,  
0.3840271097002098,  
-0.8070678340768227,  
-0.48791686278645724,  
0.13110829311357092,  
-2.023238766590243,  
-0.8997043584182223,  
0.8435119798114825,  
0.12108034013815198,  
-0.7013572315179941,  
0.05813246571029178,  
-1.3645229029121433,  
-1.704441396215925,  
0.6160899239086374,  
-1.6580292769388947,  
-1.550797918270104,  
-0.033040246679508146,  
-0.7595754539148374,  
0.6024045095197653,  
0.446745843265138,  
0.9717727329863253,  
-1.3190014690683383,  
-3.180952616822137,  
-0.47685451708111876,  
0.03958388950097112,  
-0.04894683660460036,

-0.013869967587830365,  
0.9715551393376142,  
-0.2688733257646762,  
-1.7112803723577967,  
-0.06346862095088202,  
1.2756440828431679,  
0.4087049517265435,  
-0.4433737535464867,  
0.07044159255576982,  
0.877714241226598,  
-0.33059433004855665,  
-0.41683973817974146,  
-0.09123983383660174,  
1.153451542408442,  
1.5381060924707182,  
1.4432055127327397,  
0.7948381511053778,  
0.12126271666707081,  
0.3736422837955817,  
-0.06595460407520624,  
-0.1569219765005705,  
1.4053035958769775,  
-0.3443177603686477,  
0.14604377230684606,  
0.733462484703497,  
1.2365404639754205,  
-0.020105376528163625,  
-0.09631958929266826,  
-0.16876809298151013,  
0.42184799028013376,  
0.8803036484986011,  
-0.4148292271104988,  
0.011464734896518355,  
1.0895788780475535,  
-0.006017115067308532,  
0.6476481463328121,  
-0.4792828310008005,  
1.7145504838049759,  
0.9300252591703124,  
1.4147034805691376,  
-0.04601267898776636,  
-0.34579443398211707,  
0.006107561937391137,  
2.7608588509789516,  
-2.470402787070412,  
-0.2193552778493498,  
-0.43636419827955597,  
0.5036040054264609,  
-0.006776779992121664],  
[ 0.5698358581496117,  
1.0111463732621893,  
1.116254023022104,  
1.116254023022104,  
1.4543153683590362,  
1.4543153683590362,  
1.551144943675129,  
1.551144943675129,  
2.3321866923810566,  
2.4857852178760083,  
3.837593499897418,  
3.837593499897418,  
3.837593499897418,  
4.847467397840062,  
5.03660309473088,  
5.176578602594472,  
5.176578602594472,  
5.214332760543968,  
6.547255537065404,  
6.547255537065404,  
7.083633091144979,  
7.083633091144979,  
7.133204014188821,  
7.133204014188821,  
7.133204014188821,  
7.937225733864811,

8.370661235857398,  
8.62656679928389,  
8.759707620277526,  
9.424598849529344,  
0.24247733923543782,  
0.79275118507479,  
-0.012314768690710378,  
1.2247395896468714,  
-0.6087890007814074,  
0.9804698093938512,  
0.19554007335952167,  
-0.18291383394130525,  
-0.08254523307317092,  
0.18380200005144362,  
-0.06242013495608768,  
-0.18902966193120999,  
0.4846770511497838,  
1.2162916157423216,  
0.4476502570273604,  
-0.5204828708955642,  
1.1525916637240337,  
0.9814837501696517,  
1.2019836737296188,  
0.10039944576408244,  
-1.165620769823409,  
0.5709783345435084,  
0.04690539627488982,  
0.3150855883896384,  
0.6835833386917337,  
0.7350671828581666,  
0.15105693185753874,  
0.7851129846448224,  
-0.290237804763004,  
0.02628688844012564,  
-0.3427838784588314,  
-0.12202424723691215,  
0.30368921729231485,  
-0.08398845633414893,  
-0.34421225485285395,  
-1.0992299599969957,  
-0.6679166311787512,  
-0.4925602784337871,  
-0.7607905356843834,  
-0.061822787578292515,  
-0.33643902903801526,  
1.7237644621079549,  
1.1087838048318122,  
1.4391293107545464,  
-0.2688865923867924,  
0.07238699078201241,  
-0.7262166431073663,  
-0.8607492696026928,  
0.1828620517189283,  
-1.5556021786529124,  
-0.5230641559705965,  
-0.023465829708141782,  
0.5773817105800866,  
-0.6189512057198875,  
-0.1704298219551506,  
0.6935490081871019,  
0.43024761601627914,  
-1.3818053283072975,  
0.32069867830077864,  
0.11223505487625844,  
-0.6642209341325642,  
-0.7163563578386999,  
0.9533459704680486,  
-2.5373567196844773,  
-0.3530595330204968,  
-0.36744271288254204,  
-0.4105700661159024,  
-0.529185988706723,  
-0.5074466275713505,  
0.5969687397167245,  
0.1454479675984071,

0.9510340399481164,  
-0.16051754924491393,  
0.168676911677473,  
1.6243103666539225,  
-0.3533677275828062,  
0.23248347317288842,  
1.550100715213732,  
0.3540002793004863,  
0.11004939052123668,  
0.0026309322638186474,  
1.0023099891482978,  
1.3075603782358884,  
0.06614039249633322,  
0.12696883216368457,  
0.4650745950568721,  
0.09288306127511851,  
-0.05535633254466518,  
1.0893487961438044,  
0.1856572010619516,  
-0.3369565165204948,  
1.1993442715596423,  
-0.1637322799431796,  
-0.05574034797393315,  
-0.6499132821077687,  
-1.1854402746414112,  
-0.20554021240749126,  
-0.697991352679575,  
0.7715290435685477,  
0.27728540290360154,  
-0.7490020286422794,  
0.6727458447445039,  
-1.3928966895283914,  
-1.1123692530480307,  
1.2429888713160355,  
0.5002310144425463,  
1.0425617895549082,  
-0.41250228671824735,  
-0.20782873770333182,  
0.952256354944612,  
-0.2180059005687231,  
0.8024032545701543,  
-1.0975152466418368,  
0.6192383355749876,  
-0.44420258004771784,  
-1.3605235580058401,  
1.4196204597477091,  
-1.1230853758949062,  
0.09475958663430169,  
0.9412942473630452],  
[ 0.17961742860022237,  
0.4029745783400613,  
0.4271020388774394,  
0.6998927493507625,  
1.1444327445959492,  
1.4463150894355827,  
1.7859669797147917,  
1.7859669797147917,  
1.8910076260348616,  
2.1568466639380097,  
2.184715675260106,  
2.3241261579565067,  
5.221288254664872,  
5.360678146313719,  
5.572749542622228,  
6.315664711217606,  
6.332942041057151,  
7.225695385348529,  
7.238714694082236,  
7.767863290353532,  
7.947954629935657,  
8.045079231148478,  
8.080705184182557,  
8.235317994608641,  
8.52967785406855,  
8.920755162601605,

8.920755162601605,  
8.920755162601605,  
9.75907480462672,  
11.068402571583377,  
-0.07026370230905016,  
1.2758275954101812,  
0.1960569796315372,  
-0.7454998985427054,  
0.5260870873255556,  
1.3632265149428353,  
0.06759709485075166,  
0.7201883678889174,  
0.7780364770341424,  
0.7034018811814728,  
-0.3281225120527201,  
-0.21523884970562404,  
0.3525948786581971,  
0.10058439953616755,  
0.8489242437750127,  
0.4102210250930649,  
-1.1239274808373552,  
-0.07527028057729333,  
-0.662823747816413,  
-0.09016589559770041,  
0.0005078927131911535,  
-0.9974030724775158,  
1.2973260682530905,  
0.6207513445119947,  
-0.06959715000945968,  
0.01479447508324883,  
0.5707366547040263,  
0.8024230791007029,  
0.11580671533830131,  
0.5319238260215059,  
2.029703693625361,  
0.8476591202353092,  
-0.5985490132202251,  
-1.0850372047073247,  
-0.13885829158476937,  
0.6160884575951602,  
-0.6119315652443118,  
0.25456754270344084,  
1.6135141314150674,  
1.6101080474118592,  
-1.0046888465114787,  
-1.2174288348798858,  
-0.8801790341822278,  
-0.01998793431745051,  
-1.007194981866689,  
-1.6365882266166358,  
3.524880820008825,  
1.5399950054830251,  
-1.401820445976074,  
-0.04945776017633801,  
0.9565666812114323,  
-0.20490442564626934,  
-0.5632271134618189,  
1.0033608730635488,  
0.12368927199762578,  
-0.06153617179775209,  
1.0557374829951787,  
1.532632985657107,  
-0.3069192599686721,  
1.8620498010178619,  
0.18083984306067874,  
-0.9702971127887235,  
-0.4866438529829019,  
0.2527358034573417,  
0.46390718912935613,  
0.05253485630073179,  
-0.15957905175444287,  
0.5064463362180326,  
0.6588516997606392,  
0.036226022952260704,  
-1.5941274572195923,

0.3692191472654626,  
0.31840120283705997,  
0.8741993879399423,  
0.4802653460337955,  
0.3012459045041651,  
0.5102022084743536,  
0.3727970282915065,  
0.6665750190815365,  
-0.7773615380935764,  
0.12852119124454983,  
0.6774482070442244,  
-0.34235651892527574,  
-1.1577831131801597,  
-0.2879120353476077,  
1.157549789799121,  
-0.1818163295634488,  
-0.034519908964088415,  
-0.6744130553492667,  
1.1322140576298956,  
0.5044463860518625,  
1.5469749343656427,  
-0.19451127779487945,  
0.16868157432748737,  
0.3887158384137858,  
1.179393002549757,  
0.4377598134949622,  
0.42273561999328285,  
0.17555703442650725,  
0.7637154786900613,  
0.3204620558964089,  
-1.0127445325141415,  
-0.3366137672636463,  
-0.6128563234467006,  
-0.19959799618607235,  
-0.22993024268879514,  
0.6548635589470768,  
0.5449412421525476,  
0.11171602982233311,  
0.5174688869584806,  
-0.0926785574168733,  
-0.012796553414024043,  
0.872831179387319,  
-0.3738274777631416,  
0.708424995234135,  
1.1207261796968788,  
0.39043722964884914,  
1.5466373285390471,  
-0.0566526099067629,  
-1.544789451209757],  
[ 0.01970245038838479,  
0.18403088824160574,  
0.23516669011749736,  
0.3619340287619915,  
0.7559235356843684,  
0.8037553588156275,  
0.8037553588156274,  
0.8037553588156274,  
1.523650120002224,  
1.5399034674182392,  
3.5267025169505333,  
3.526702516950533,  
4.657784878324055,  
4.735234101549794,  
4.768060921347247,  
6.910522417024203,  
6.910522417024203,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
8.950027818739875,  
8.950027818739875,



8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
9.275481401407285,  
0.034552241786943605,  
0.7960682992937013,  
-0.16960774395822967,  
-0.13488653659207303,  
-0.07127010448742209,  
0.7213919487775996,  
0.07517487951530155,  
0.7669403129297154,  
-0.0980146039609658,  
0.2841753594230342,  
0.41897129078802076,  
0.7644737129881134,  
0.21659836679204617,  
0.40978346593820614,  
0.23386906952753808,  
0.6351364889148511,  
0.33021983360135304,  
0.3518425622667454,  
-0.16759580526603354,  
1.1955178055405769,  
-0.1119172073880175,  
-1.6647459335605923,  
-0.09499524124538847,  
1.171044098528735,  
-0.022137095989983098,  
0.46479840085551427,  
0.5434533112600137,  
0.7953483283824695,  
-0.23791626316884204,  
-0.34327459028867535,  
0.9770824990177593,  
0.3972109926583832,  
0.031305244787475206,  
0.06660894739153407,  
-0.4270300066285869,  
-1.4580475210852422,  
0.18899331747125298,  
-0.5789031865333153,  
0.2203088633995836,  
-0.028805094274594364,  
-0.21236041446549625,  
0.00835869807102751,  
1.8444421334304235,  
-0.36021419267454113,  
-1.0777998782841605,  
0.7201309879688491,  
-0.07151832135087417,  
0.013523038580686776,  
-0.5101061898109359,  
1.528477364550823,  
-0.24055091899624312,  
1.595727742687772,  
1.181011187425284,  
-0.07205139039345279,  
-0.3645912646252544,  
0.922259297261975,  
0.47504473393792157,  
-1.4582846498754758,  
-1.1041238978674286,  
-0.08619812725702276,  
1.5348185477516838,  
-0.034799821636765677,  
0.34854563969795865,  
-0.3057886345189525,  
0.3435344949085216,  
2.387989506593159,  
0.5928805156422549,  
-0.02250711897690342,  
0.734685803060112,  
1.1230348216575474,  
0.9339212770561773,



3.369934702704019,  
3.369934702704019,  
5.00211845115155,  
5.212181786011135,  
5.346566249705437,  
6.103091648910964,  
6.103091648910964,  
7.050711873868975,  
7.050711873868975,  
7.492144583370162,  
7.492144583370162,  
7.606105711064038,  
7.606105711064038,  
8.717193051662631,  
8.753101318062777,  
8.877107151002964,  
8.889590522678484,  
8.982812044989718,  
8.982812044989718,  
9.499874357008034,  
9.499874357008034,  
9.659025604148875,  
9.671110590806489,  
0.02814413440270558,  
0.250593445582179,  
0.17496868989230024,  
-0.19749991731592192,  
-0.5878125517240043,  
1.1370895496823794,  
0.3339578948727643,  
0.30833012680275795,  
0.21147160367429677,  
0.5518340573364652,  
0.9816766119937317,  
-1.3427949214182668,  
2.2864376119784486,  
0.673664283367827,  
0.4767745045632036,  
-0.47480445681581174,  
0.05912449937800317,  
0.9513757199218045,  
1.079093875588678,  
-0.4313388366547843,  
0.43347513808131466,  
-0.3381632209207048,  
-0.42699598389932686,  
-1.1528003206699722,  
0.2505681368756031,  
1.1900947118566725,  
-0.38260053073473543,  
-0.6405385159573362,  
0.08926968472452403,  
-0.04834256297702397,  
1.603027736914297,  
-0.44672812120859223,  
-0.5759172165575565,  
1.25237714334681,  
0.04254918814060746,  
-0.002429292667880943,  
0.47732275422632153,  
-0.10204026491637587,  
0.02357869435971368,  
0.06910865492863566,  
-0.5942663805386644,  
1.1629666490831163,  
0.28625726751699415,  
0.4183193427753825,  
0.33026699893767814,  
1.8860632823719743,  
-0.37929215782635534,  
0.8251027249542411,  
-0.13937217921728381,  
-0.35829122981546885,  
-0.11830319301401378,  
-1.1307480811476716,

```

-0.33746884247229475,
1.7161163093033744,
-0.03517175574182253,
-0.4044561448132672,
-0.7301790593832838,
-0.10496992427986328,
-0.0377875273258637,
0.11576685707785253,
-0.9348023198901909,
2.132577954045408,
-0.47199808297503054,
0.09642080758509694,
-1.5590866370005203,
0.10045413530924742,
-0.3215930726850239,
-0.7020784722315541,
1.2376661808413174,
0.5709879203761018,
-0.820670510834149,
0.1634866307612446,
0.06270250983710676,
-0.03570422816362065,
-0.5699745682010601,
-0.26488761312159137,
1.795803611544861,
-0.4017001375917998,
-1.757541020399501,
-0.05132347348943386,
0.8521664539464072,
0.4812990598336637,
-0.7041980923594973,
0.6941905718406797,
1.5589556954504384,
1.9089912382579748,
0.4849438728523755,
0.03939482159422182,
-0.2564597588944596,
-0.16675906759041134,
2.5610800117093855,
0.9927310518963223,
1.3170410278463267,
0.6281459286410694,
-0.07878692694615999,
0.5865838795710373,
0.4894408136056478,
-0.043552207832595204,
0.8988064624972067,
-0.35279792613941824,
1.5088457985023234,
-0.32174328535909336,
0.41978129355629945,
0.014567846908235548,
-0.17446008524494477,
0.35494980160059775,
1.44166715836895,
0.027787407199764528,
-0.2573832607835415,
0.9605798444843694,
-0.08907047543629609,
-0.012116788408097524,
1.2676248549462201,
-0.2512276837340942,
0.7869834357157488,
-2.3607393050467915,
0.1914341630047483,
-1.0542342437530707,
0.8454261921281611,
0.02027118187750096]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,

```

```

1.0,
1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#5'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.407206817517894],
[12, 6, 0, 0, -5.829141582765496],
[20, 10, 0, 0, -4.618573032874505]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 9.202957153320312e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -8.33405069171712,
'others': { 'beta_coeffieicients': [ 1.875,
-1.25,
0.375],
'cost_richardson_zne': 5.21875,
'sorted_expectation_vals': [
-7.407206817517894,
-5.829141582765496,
-4.618573032874505],
'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
2,
0,
0,
-7.407206817517894],
[ 12,
6,
0,
0,
-5.829141582765496],
[ 20,
10,
0,
0,
-4.618573032874505]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5,
0.5]

```

```
0.5,  
0.5,  
0.5],  
    'r': 0},  
    'time': {'max': 10.0, 'min': 0.0},  
    'type': 'xy-iss'}},  
'init_param': { 'value': [ 0.02240293444906766,  
    0.9863710197203618,  
    1.3708545038264748,  
    1.3757718928414557,  
    1.7844795346244002,  
    2.029643659915566,  
    2.029643659915566,  
    4.135298362317422,  
    4.181946654536538,  
    4.392782597821499,  
    4.473609589126697,  
    4.474471668054438,  
    4.475838923576404,  
    4.4785869343507265,  
    4.4785869343507265,  
    5.467009291914798,  
    5.470281162008999,  
    5.840541346188122,  
    5.842392372241278,  
    6.505508038171383,  
    6.505508038171383,  
    7.536348099553183,  
    7.536348099553183,  
    9.63019412694799,  
    9.63019412694799,  
    9.63019412694799,  
    9.63019412694799,  
    9.63019412694799,  
    9.63019412694799,  
    9.63019412694799,  
    1.1150074339792337,  
    -0.03535947987647509,  
    1.1918755403807781,  
    -0.20191103850925227,  
    -0.268362117189328,  
    -0.3595192771004685,  
    1.2614204066704717,  
    -2.9429228213034166,  
    -1.054810371869961,  
    0.9594255841252335,  
    -0.09538831740389547,  
    0.3965663197177072,  
    -0.22182226409641906,  
    -0.2653718580482209,  
    0.1686090968331403,  
    1.6516484362324146,  
    -0.3049608013883917,  
    0.49165272629600476,  
    1.9061569916625292,  
    1.241422732345657,  
    -0.11527538328521378,  
    -0.22895223610637053,  
    -0.06124477487110871,  
    0.6193220715745159,  
    1.372932614853267,  
    -1.1538384701543527,  
    -0.1139440760455718,  
    0.16973094341798492,  
    -0.5943234340378932,  
    0.21399932498003596,  
    -0.18156105319883253,  
    -1.0504702368491705,  
    0.7232808408606985,  
    -0.018870518436612777,  
    -0.29343981279013404,  
    0.30960592292227684,  
    0.13511542022922338,  
    0.5096669954667911,  
    -1.097576281455009,
```

0.12047585913747774,  
-0.5585503308065869,  
1.2279608447421912,  
1.3012401380411538,  
0.3769592231863052,  
-0.5692023175942067,  
-0.4567508363134565,  
-0.679549924864495,  
-0.24647993267323956,  
0.6292567546169889,  
0.9587256267378846,  
1.7268825428143277,  
0.1413792259593793,  
0.6520451922983643,  
0.6152471684019365,  
-1.1240317980448378,  
-0.9856730455453077,  
-1.2455074642265085,  
0.2235091354354849,  
-0.8870861048674711,  
0.5299724059178798,  
-0.21820971616414211,  
-0.09687180933262383,  
-0.9247884680119297,  
-0.4566833626656702,  
-0.4285291193052864,  
-0.6406026728496247,  
0.9023578506051637,  
0.03748900229192909,  
0.7551248935414285,  
-0.18980887545414976,  
-0.1497604267964229,  
-0.4253730408988226,  
-0.4157675203773789,  
1.677209169409502,  
0.2126888490300174,  
-0.13481167544410624,  
-1.6951458494505263,  
-0.006476362637627559,  
-0.5490470525961781,  
0.3195499617454318,  
1.077429849794694,  
0.6725724542747005,  
-0.10235701747439804,  
-0.014129818782246995,  
2.382406086835482,  
0.008866515589568993,  
1.0282503794544984,  
-0.6899701634722577,  
0.3510134577654823,  
0.6918405669356381,  
-0.08667968085870373,  
-0.0005005962237103964,  
1.3805542469189591,  
1.011514915181436,  
-0.4623191099783579,  
1.397645255720587,  
-0.7813361449321683,  
-0.9940660424170442,  
-0.6570734018108508,  
1.0171740600492052,  
0.14480072689925969,  
1.157289980717297,  
1.019472554492438,  
1.0029573776528096,  
-0.20406480565208354,  
-0.011076077177880707,  
-0.30566521016454584,  
-0.4775965459909992,  
-0.7158801142606765,  
1.5610067764386268,  
1.5187465408730505,  
0.21158961058436962,  
-0.38098352608767794,  
-0.046999172842648596,

```

0.5964180792256618,
-0.6260168044949087,
-0.7215592053840503,
-0.5706802740378752,
0.11995346168986934,
0.17053214926260635]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#6'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]],
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.259703059772281],
                          [12, 6, 0, 0, -5.766278116709839],
                          [20, 10, 0, 0, -4.58319338434511]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.1961669921875e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -8.122793110315145,
                           'others': { 'beta_coeffieicients': [ 1.875,
                                                                -1.25,
                                                                0.375],
                                         'cost_richardson_zne': 5.21875,
                                         'sorted_expectation_vals': [
-7.259703059772281,
-5.766278116709839,
-4.58319338434511],

'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -7.259703059772281],
                  [ 12,
                    6,
                    0,
                    0,
                    -5.766278116709839],
                  [ 20,
                    10,
                    0,
                    0,
                    -4.58319338434511]],

```



```

        'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'xy-iss'}}},
  'init_param': { 'value': [ 0.2383708143795501,
                              0.8137820253985804,
                              1.0561141201801563,
                              1.2070683478267785,
                              1.9518166906091101,
                              2.08301823027678,
                              2.6774459967535513,
                              2.7270096866449576,
                              3.7369434259122447,
                              3.7421546540398443,
                              4.458327272130387,
                              4.463102384700506,
                              4.463102384700506,
                              4.482690585412051,
                              4.482694652744643,
                              4.498978826283554,
                              6.3580266266370415,
                              7.88639599997723,
                              7.886532810158634,
                              8.060529572035655,
                              8.06234783983503,
                              8.127555772505229,
                              8.130166630032164,
                              8.42408407139234,
                              8.433074307328475,
                              9.412401860498063,
                              9.420584174895616,
                              9.429609653004679,
                              9.434851407347677,
                              11.283524698808058,
                              0.19157417616433814,
                              0.42257952171340063,
                              0.3129095694283805,
                              0.28360255750055535,
                              -0.7229159635345903,
                              2.545731433831817,
                              1.1687892956196542,
                              0.5222949375721274,
                              0.9482151911772319,
                              0.28742832079435787,
                              1.1627391357840349,
                              -0.27939056132165146,
                              -0.07574334812551493,
                              -0.529119211391362,
                              -0.08653083237786212,
                              0.042544229108731915,
                              -0.09154582517805988,
                              0.2776265525620834,
                              0.373637405241428,
                              -0.666296500917012,
                              -0.729825790392568,
                              0.36164641825124294,
                              1.2066181407380305,
                              0.18327070025757417,
                              2.2757552060408917,
                              -0.004789158452516104,

```

0.49019439516235463,  
2.190622553796523,  
0.6131206832540379,  
1.0987721265230228,  
1.9413219378309259,  
0.07975169469268534,  
0.17531082109327745,  
0.01770145552231998,  
0.22429808435825893,  
1.1460098869067579,  
-0.25766861736092417,  
0.4386465248337572,  
0.7521614434169624,  
0.07039918338308593,  
-0.23913727928604284,  
0.062497116873310714,  
0.27575365987954265,  
-0.8268952220573135,  
0.8599765782432734,  
0.6958325703328606,  
-0.16792542378671177,  
-0.13186811496768225,  
0.17745018848846658,  
-0.13764108606901534,  
-0.34798347931108986,  
0.3901205214779397,  
-0.12832331396189006,  
0.7623260417931323,  
-0.08745728181826747,  
0.22448567111633413,  
0.5103689813486589,  
0.020179740460913417,  
-0.4639048953982949,  
1.8052783293547816,  
-0.06895296635033099,  
-0.46137869531525183,  
-0.7694587159951923,  
-0.1507074275764489,  
-3.159084078074864,  
1.5556721360426484,  
0.9802025173412374,  
-1.5980562353917622,  
0.9974678614222413,  
0.11965749551778265,  
-0.5964068365118492,  
1.00912773091807,  
1.2674306548806673,  
1.7418320010188646,  
-1.2223756485879664,  
-0.006270145144671745,  
0.7863824204489233,  
-0.08410721186616651,  
0.13420385894759826,  
0.6686584151585806,  
-0.7946689395347296,  
-1.448768973512125,  
-0.4158373205099576,  
-0.1003664997933048,  
0.5370971852976741,  
-0.013369261455621718,  
-1.2134070474127567,  
2.71822204346588,  
-0.8266087910498845,  
-0.04274152999618493,  
0.627725493238542,  
-0.10714625448592663,  
1.4055199595750496,  
-0.08877591733311402,  
-0.6400618055168635,  
0.27990653766167567,  
0.27230874688701184,  
1.8329367216853043,  
0.12128377229042309,  
0.03719209379786179,  
0.7558193864298689,

```

-0.027085062677120984,
0.7947118159580207,
-0.18810209431195668,
0.008294184744538372,
-0.9110921816475059,
1.3065108206329406,
0.004810940817056788,
1.4030602129547465,
0.03878633149748846,
0.29850504257680605,
-0.9524583070906825,
0.10037229527914636,
0.4277056649647598,
-2.2528322583674503,
0.030724614514628212,
0.8416350822543037,
1.5579013461800135,
0.5696673724928452,
-1.5352194543526818}},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#4'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.418732841657521],
                          [12, 6, 0, 0, -5.815573107517698],
                          [20, 10, 0, 0, -4.600391600363878]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.838539123535156e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -8.365804543847183,
                           'others': { 'beta_coeffieicients': [ 1.875,
                                                                -1.25,
                                                                0.375],
                           'cost_richardson_zne': 5.21875,
                           'sorted_expectation_vals': [
-7.418732841657521,
-5.815573107517698,
-4.600391600363878],
                           'sorted_noise': [6, 18, 30]},
                           'sampled data': [ [ 4,
                                                2,

```

```

0,
0,
-7.418732841657521]],
[ 12,
6,
0,
0,
-5.815573107517698],
[ 20,
10,
0,
0,
-4.600391600363878]],
'sampling': 'default']]],
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}}},
'init_param': { 'value': [ 0.003408343124459994,
0.0034083431244599804,
0.006710027629051694,
0.2484817728699434,
1.1672656342280407,
1.167470260322433,
3.1453440534904744,
3.166261678218574,
3.2843704266652405,
4.089250903115526,
4.091989893807717,
4.091989893807717,
5.181052167254873,
5.181052167254873,
5.184972473956635,
5.585122024093685,
5.5990893229720795,
5.630355974178803,
5.704160317443757,
8.658831571647385,
8.66505230970618,
8.712765508205756,
8.712765508205756,
8.712765508205756,
9.168875276976076,
9.176734348833309,
9.262471352200725,
9.262471352200725,
10.578606537988184,
10.578606537988184,
1.5905119084430799,
0.8691136234632737,
0.04907693052707525,
-0.23336553986203207,
0.4284777328779486,
2.2866815267075147,
0.1760352312050406,
0.27820168999860917,
2.067264415281462,
0.5755331494929522,
-0.06858856463703264,
-0.7222667597755238,
0.7750924366303688,

```

-0.278304785792398,  
0.5352624789798245,  
-1.1702690163303244,  
-0.012717570027659048,  
-0.07125250327360101,  
1.7927644689789062,  
1.3752915621891346,  
-1.1981440291126808,  
-0.30737164793891514,  
0.2657743539912098,  
0.04156274567190095,  
1.1363043468044227,  
0.059217925806269944,  
0.7608352104096147,  
-0.1513784586666425,  
0.025696061144845524,  
0.861481321747562,  
-0.48544656000194114,  
-0.006033515622113467,  
0.473431667961849,  
1.5469119181224316,  
0.1871819193791605,  
1.555475823471471,  
0.9001349633565042,  
-1.5961139272878428,  
-0.6749613217725859,  
-1.5596468027729833,  
0.5296186936496604,  
-0.8549575199843406,  
1.7649719371938613,  
1.5569889217595585,  
-0.9244334407213903,  
-1.5804326845781602,  
0.3840271097002098,  
-0.8070678340768227,  
-0.48791686278645724,  
0.13110829311357092,  
-2.023238766590243,  
-0.8997043584182223,  
0.8435119798114825,  
0.12108034013815198,  
-0.7013572315179941,  
0.05813246571029178,  
-1.3645229029121433,  
-1.704441396215925,  
0.6160899239086374,  
-1.6580292769388947,  
-1.550797918270104,  
-0.033040246679508146,  
-0.7595754539148374,  
0.6024045095197653,  
0.446745843265138,  
0.9717727329863253,  
-1.3190014690683383,  
-3.180952616822137,  
-0.47685451708111876,  
0.03958388950097112,  
-0.04894683660460036,  
-0.013869967587830365,  
0.9715551393376142,  
-0.2688733257646762,  
-1.7112803723577967,  
-0.06346862095088202,  
1.2756440828431679,  
0.4087049517265435,  
-0.4433737535464867,  
0.07044159255576982,  
0.877714241226598,  
-0.33059433004855665,  
-0.41683973817974146,  
-0.09123983383660174,  
1.153451542408442,  
1.5381060924707182,  
1.4432055127327397,  
0.7948381511053778,

```

0.12126271666707081,
0.3736422837955817,
-0.06595460407520624,
-0.1569219765005705,
1.4053035958769775,
-0.3443177603686477,
0.14604377230684606,
0.733462484703497,
1.2365404639754205,
-0.020105376528163625,
-0.09631958929266826,
-0.16876809298151013,
0.42184799028013376,
0.8803036484986011,
-0.4148292271104988,
0.011464734896518355,
1.0895788780475535,
-0.006017115067308532,
0.6476481463328121,
-0.4792828310008005,
1.7145504838049759,
0.9300252591703124,
1.4147034805691376,
-0.04601267898776636,
-0.34579443398211707,
0.006107561937391137,
2.7608588509789516,
-2.470402787070412,
-0.2193552778493498,
-0.43636419827955597,
0.5036040054264609,
-0.006776779992121664]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#7'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.568863804770513],
                          [12, 6, 0, 0, -6.084665473601483],
                          [20, 10, 0, 0, -4.914126798758423]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.981590270996094e-05,

```

-7.568863804770513,  
-6.084665473601483,  
-4.914126798758423]],

```
'zne_values': { 'degree': 0,  
                'extrapolated_value': -8.428585341477266,  
                'others': { 'beta_coefficients': [ 1.875,  
                                                    -1.25,  
                                                    0.375],  
                'cost_richardson_zne': 5.21875,  
                'sorted_expectation_vals': [  
  
                'sorted_noise': [6, 18, 30]],  
        'sampled data': [ [ 4,  
                            2,  
                            0,  
                            0,  
                            -7.568863804770513],  
                          [ 12,  
                            6,  
                            0,  
                            0,  
                            -6.084665473601483],  
                          [ 20,  
                            10,  
                            0,  
                            0,  
                            -4.914126798758423]],  
        'sampling': 'default'}},  
{ 'config': { 'ansatz': { 'gateset': 1,  
                          'layer': 30,  
                          'ugate': { 'coefficients': { 'bn': [ 0,  
                                                              0,  
                                                              0,  
                                                              0,  
                                                              0,  
                                                              0],  
                                                              'cn': [ 0.5,  
                                                              0.5,  
                                                              0.5,  
                                                              0.5,  
                                                              0.5,  
                                                              0.5],  
                                                              'r': 0},  
                          'time': {'max': 10.0, 'min': 0.0},  
                          'type': 'xy-iss'}},  
  'init_param': { 'value': [ -3.641081222961908e-17,  
                              0.6149788059529836,  
                              0.7190202634465676,  
                              1.227117923902744,  
                              1.282995668258181,  
                              1.320146784613617,  
                              1.320146784613617,  
                              3.1464089486715623,  
                              3.1464089486715623,  
                              5.021180125711677,  
                              5.021180125711677,  
                              5.021180125711677,  
                              6.703692809170789,  
                              6.703692809170789,  
                              7.791601108223033,  
                              7.8369202041803225,  
                              7.951907692650894,  
                              7.98389042115583,  
                              8.258376681022987,  
                              8.258376681022987,  
                              8.264818959972613,  
                              8.264818959972613,  
                              8.264818959972613,  
                              8.264818959972613,  
                              8.265620267330194,  
                              8.265620267330194,  
                              9.412842541483705,  
                              9.412842541483705,  
                              10.502716174481437,  
                              10.502716174481437,
```

0.1665558361704551,  
0.0766182276072886,  
-0.06331706305100791,  
0.03225035272845343,  
-0.2265177184784691,  
0.6859734408919996,  
0.358399999202588,  
-0.31490649734707366,  
0.03084506070978915,  
0.8141179515629021,  
-0.05751068028622007,  
0.9013204998454583,  
-0.325467390457223,  
-0.16027539072229496,  
0.19756436832536928,  
0.17875052394899651,  
0.07441990946369173,  
-1.7121562848350094,  
0.5411900571694856,  
0.025994665514066265,  
-1.0547594680221428,  
-0.3558195097906033,  
0.2575282902752545,  
-0.32652811387218433,  
-0.17477771883072452,  
0.05603758809983181,  
-0.31531793685177084,  
0.24953935818155465,  
-0.21945102528047247,  
0.016201452486715968,  
-0.47139285875704856,  
0.8354485366702803,  
0.28783787212142514,  
-1.483190369052958,  
-0.05324490057492157,  
0.00808064868141892,  
-1.3894868155533049,  
0.07648399162880297,  
0.28128388531065984,  
-0.8032486745370345,  
0.9961277979922681,  
0.7271807873997648,  
-0.2598267503182047,  
0.058937213125893145,  
1.4176939090014022,  
1.5623836495300838,  
-1.2281014386266311,  
1.627596878633186,  
0.150437982354294,  
0.017798034487339433,  
-0.2091243023446671,  
0.08776907917710067,  
0.637527078885032,  
1.2603122563899933,  
1.0910453886717337,  
0.001707278941889729,  
-0.5366140699752073,  
-0.04457743756443993,  
0.708269991966563,  
1.6757260639955311,  
0.6610325406900899,  
-0.508228690084442,  
-0.5178693625521746,  
-0.2955589105377924,  
-0.47790822054112786,  
0.31077598178920485,  
0.020632196003020267,  
1.5538854336639996,  
1.2816443511581943,  
-0.6926864187150775,  
0.73698114320343,  
0.3645818015611773,  
-0.2097443780477125,  
0.1421287040679699,  
0.052774836076248374,



```
-0.7306191772967899,  
1.107856618529218,  
0.3743379513498811,  
1.2959169452837032,  
0.8858564921663113,  
0.03370518740548656,  
-1.0860983069970114,  
1.2199055901240408,  
-1.0630806559423625,  
1.3748402618369016,  
0.9943926078324806,  
0.7116645059379805,  
-0.21098608064682703,  
0.04581715611274856,  
-0.17117312830066983,  
1.2229557830916487,  
-1.6273428514067598,  
1.8508927721454946,  
0.851693435560975,  
1.0946646161197402,  
0.43088380554694883,  
-0.6171985422875839,  
1.6866137951313547,  
-0.2289359575496427,  
-0.09152362655526167,  
1.6917359096449291,  
0.22722692961233917,  
0.49434218233553445,  
1.2228162165990006,  
-0.4070166799423108,  
0.00966082758630671,  
-0.3344922737632815,  
-1.0755692755599169,  
1.1846485271761396,  
-0.06070659712292082,  
0.6384418838463358,  
-0.034216786122488324,  
-0.6519049362670448,  
-0.0019231105719348242,  
0.503764046349436,  
0.5779702041064313,  
-0.8610978040126155,  
0.5832069567020347,  
0.07954533618121334,  
0.016329041774977193]],  
'noise_profile': { 'noise_on_init_param': { 'status': False,  
                                              'value': 0},  
                    'noise_prob': [0.001, 0.001, 0, 0],  
                    'status': True,  
                    'type': 'depolarizing'},  
'nqubits': 7,  
'observable': { 'coefficients': { 'bn': [ 1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0],  
                                'cn': [ 0.5,  
                                         0.5,  
                                         0.5,  
                                         0.5,  
                                         0.5,  
                                         0.5],  
                                'r': 1}},  
                 'def': 'ising'},  
'output': { 'draw': { 'fig_dpi': 100,  
                       'status': False,  
                       'type': 'png'},  
             'file_name_prefix':  
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#3'},  
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],  
                                                  [1, 1, 0, 0],  
                                                  [2, 2, 0, 0]]},  
            'run': 'zne',
```



7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
9.275481401407285,  
0.034552241786943605,  
0.7960682992937013,  
-0.16960774395822967,  
-0.13488653659207303,  
-0.07127010448742209,  
0.7213919487775996,  
0.07517487951530155,  
0.7669403129297154,  
-0.0980146039609658,  
0.2841753594230342,  
0.41897129078802076,  
0.7644737129881134,  
0.21659836679204617,  
0.40978346593820614,  
0.23386906952753808,  
0.6351364889148511,  
0.33021983360135304,  
0.3518425622667454,  
-0.16759580526603354,  
1.1955178055405769,  
-0.1119172073880175,  
-1.6647459335605923,  
-0.09499524124538847,  
1.171044098528735,  
-0.022137095989983098,  
0.46479840085551427,  
0.5434533112600137,  
0.7953483283824695,  
-0.23791626316884204,  
-0.34327459028867535,  
0.9770824990177593,  
0.3972109926583832,  
0.031305244787475206,  
0.06660894739153407,  
-0.4270300066285869,  
-1.4580475210852422,  
0.18899331747125298,  
-0.5789031865333153,  
0.2203088633995836,  
-0.028805094274594364,  
-0.21236041446549625,  
0.00835869807102751,  
1.8444421334304235,  
-0.36021419267454113,  
-1.0777998782841605,  
0.7201309879688491,  
-0.07151832135087417,  
0.013523038580686776,  
-0.5101061898109359,  
1.528477364550823,  
-0.24055091899624312,  
1.595727742687772,  
1.181011187425284,  
-0.07205139039345279,  
-0.3645912646252544,  
0.922259297261975,  
0.47504473393792157,  
-1.4582846498754758,  
-1.1041238978674286,  
-0.08619812725702276,  
1.5348185477516838,  
-0.034799821636765677,

```
0.34854563969795865,  
-0.3057886345189525,  
0.3435344949085216,  
2.387989506593159,  
0.5928805156422549,  
-0.02250711897690342,  
0.734685803060112,  
1.1230348216575474,  
0.9339212770561773,  
0.5429657194529808,  
-0.9530889967003539,  
1.2607191116533525,  
-0.18262479735843284,  
0.2292294020716647,  
0.484625167272873,  
2.2621526738562925,  
0.3832060422832924,  
0.2504382199240898,  
-1.1186566372739195,  
1.0354182359738777,  
-0.9045076995614423,  
1.0282595509077306,  
1.805679851173207,  
0.9332861023326164,  
1.4396403686507162,  
1.6178312922032976,  
-0.22196274260736226,  
0.19030625281227892,  
-0.32840557234129963,  
1.004592356770436,  
1.8720477930131976,  
-0.06388076228748135,  
0.12235432131563899,  
-0.5998878734536057,  
-0.5461403115162753,  
-0.17116133229966776,  
0.6826247841010238,  
0.6607748570434985,  
0.7854114346995006,  
0.5612002866021459,  
-0.2559995100181322,  
-0.8863827207156498,  
0.2553569774973194,  
0.6372473265785513,  
-0.14017909069433732,  
0.016226196464851673,  
-0.10437448541592237,  
2.5268983957827906,  
2.3709647446626767,  
-0.8108547070158446,  
0.5698393243760288,  
-1.2042979310590165,  
-0.5004321415825274,  
-1.0362881146071494,  
-0.18531750144204898,  
1.5646886079478448,  
0.08968487420602586,  
-1.6120268318409705]],  
'noise_profile': { 'noise_on_init_param': { 'status': False,  
                                              'value': 0},  
                  'noise_prob': [0.001, 0.001, 0, 0],  
                  'status': True,  
                  'type': 'depolarizing'},  
'nqubits': 7,  
'observable': { 'coefficients': { 'bn': [ 1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0],  
                                'cn': [ 0.5,  
                                         0.5,  
                                         0.5,  
                                         0.5,
```

```

0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#10'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.512595875373561],
                          [12, 6, 0, 0, -6.004303631668366],
                          [20, 10, 0, 0, -4.83491199768215]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.38690185546875e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -8.393829725870777,
                           'others': { 'beta_coeffieicients': [ 1.875,
                                                                -1.25,
                                                                0.375],
                           'cost_richardson_zne': 5.21875,
                           'sorted_expectation_vals': [
-7.512595875373561,
-6.004303631668366,
-4.83491199768215],
'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -7.512595875373561],
                  [ 12,
                    6,
                    0,
                    0,
                    -6.004303631668366],
                  [ 20,
                    10,
                    0,
                    0,
                    -4.83491199768215]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                          'cn': [ 0.5,
                                  0.5,
                                  0.5,
                                  0.5,
                                  0.5,
                                  0.5],
                          'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'xy-iss'}}},
  'init_param': { 'value': [ 0.5482907189468895,
                              0.6413620809492503,
                              0.6422482149552934,
                              1.5892409709442974,

```

1.850708229814058,  
1.850708229814058,  
1.8745552660050262,  
2.400679867939261,  
2.402212278134192,  
2.485190345183722,  
2.485190345183722,  
2.4851903451837223,  
2.488397493491329,  
2.4883974934913287,  
5.077476636438464,  
5.077476636438464,  
5.732990197214016,  
5.806868622878696,  
5.817834245705687,  
6.166757373752113,  
7.3114292874931905,  
7.311858449036949,  
8.346734585466223,  
8.350435170229554,  
8.354614694314481,  
8.35659817980371,  
8.356905245901928,  
9.313534396314816,  
9.313534396314816,  
10.443787047737276,  
-0.5971318801423705,  
-0.6830583120471296,  
0.053446928626708114,  
-1.488251087277441,  
0.7409998345617078,  
-0.020561007687691084,  
-0.47029189134787985,  
-0.9187802118512801,  
-0.07390570205801456,  
0.6091612085770479,  
0.5696050095749661,  
-2.634874245900948,  
0.14733366015521565,  
1.0781100436188797,  
0.3459269460772517,  
1.2820636645787713,  
-1.605623121104658,  
0.856791024529966,  
0.16374864437029604,  
-0.7377840957855112,  
0.7603752030179747,  
0.4958590077418653,  
1.0293890027768824,  
0.4862585296205842,  
-1.0838654128292502,  
1.2632637762941026,  
-1.1043454462318527,  
-0.7867654190654241,  
0.8818217647037212,  
1.0406267750063978,  
0.05770567519039498,  
-0.5922070722918433,  
-0.3271403288282926,  
0.5980786503295974,  
-0.02050375112330311,  
-0.9007241609880184,  
0.5239405469453117,  
0.7601496703420288,  
-0.6449049942439851,  
1.7340858429103823,  
0.10050113333288421,  
0.3143347863780438,  
0.28408386490618526,  
-0.1222389867527315,  
-0.09502282329152913,  
-1.3004368662949968,  
0.16856179320059875,  
0.6790103402211991,  
0.3355977478652572,

```
0.0935957266804422,  
0.42936820813464754,  
0.5148227650107633,  
0.10764356588532305,  
-0.054251737808208085,  
0.06525040933822983,  
-0.21143245853075732,  
-1.5801988491404158,  
0.023513208971767067,  
1.0921277689034055,  
-0.11501776583679489,  
-0.14182911234947893,  
1.8716225858725093,  
-1.0747761250482988,  
-0.01873186129021693,  
0.9952348515577564,  
1.5589645169221944,  
2.4625123021717044,  
1.5320934484141422,  
0.6264578101560674,  
0.015802850908690148,  
0.6559295719723718,  
0.5030706883609005,  
0.010357532831659657,  
-0.6971755064049523,  
-1.334963536555068,  
0.05714132580252865,  
0.9478292633237722,  
1.541635767019547,  
-1.2357775558070643,  
1.5753066317572375,  
1.2206753513411082,  
-0.013882574638756213,  
2.102115305768464,  
0.6867648509985108,  
-1.0810617894892982,  
0.608205793929093,  
-1.0701207529796843,  
-0.008804617073740417,  
1.0802724219136723,  
1.4472704941581649,  
-0.525983160453369,  
0.10347757085774918,  
0.07451664808136123,  
0.8113743025574697,  
-0.19830571509994802,  
0.20760359505818776,  
-0.5709476706639499,  
0.1791350390980861,  
-0.32061652775092425,  
-1.6382844876022806,  
2.271046687924862,  
0.09972766177435569,  
1.671157305178672,  
1.0596955078067567,  
-0.7395801076185267,  
-0.8217251410877643,  
1.2660358026872456,  
-0.149859182069558,  
1.7386861885389688,  
-0.003505497297480453,  
0.677126408740769,  
-1.0541684899696007,  
0.9437251450981726,  
1.7354017388586316,  
-0.8022872949930118,  
0.01881044769021433,  
-0.013699411839369284,  
1.5965466699123847,  
0.4486397166383021,  
1.5669137279484207]],  
'noise_profile': { 'noise_on_init_param': { 'status': False,  
                                             'value': 0},  
                  'noise_prob': [0.001, 0.001, 0, 0],  
                  'status': True,
```

```

        'type': 'depolarizing'},
    'nqubits': 7,
    'observable': { 'coefficients': { 'bn': [ 1.0,
        1.0,
        1.0,
        1.0,
        1.0,
        1.0],
        'cn': [ 0.5,
        0.5,
        0.5,
        0.5,
        0.5,
        0.5],
        'r': 1},
        'def': 'ising'},
    'output': { 'draw': { 'fig_dpi': 100,
        'status': False,
        'type': 'png'},
        'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#1'},
    'redundant': { 'identity_factors': [ [0, 0, 0, 0],
        [1, 1, 0, 0],
        [2, 2, 0, 0]]},
    'run': 'zne',
    'state': 'dmatrix',
    'vqe': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
        'constraint': True,
        'status': False}},
    'zne': { 'data_points': [ [4, 2, 0, 0, -7.463351332654991],
        [12, 6, 0, 0, -5.841676652164559],
        [20, 10, 0, 0, -4.604434423168806]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
    'output': { 'exact_sol': -8.566772233505624,
    'run_time_sec': 3.6716461181640625e-05,
    'zne_values': { 'degree': 0,
        'extrapolated_value': -8.41835084221071,
        'others': { 'beta_coeffieicients': [ 1.875,
        -1.25,
        0.375],
        'cost_richardson_zne': 5.21875,
        'sorted_expectation_vals': [
-7.463351332654991,
-5.841676652164559,
-4.604434423168806],

        'sorted_noise': [6, 18, 30]},
        'sampled data': [ [ 4,
        2,
        0,
        0,
        -7.463351332654991],
        [ 12,
        6,
        0,
        0,
        -5.841676652164559],
        [ 20,
        10,
        0,
        0,
        -4.604434423168806]],
        'sampling': 'default'}}},
    { 'config': { 'ansatz': { 'gateset': 1,
        'layer': 30,
        'ugate': { 'coefficients': { 'bn': [ 0,
        0,
        0,
        0,
        0,
        0,
        0],

```



```
        'cn': [ 0.5,
                0.5,
                0.5,
                0.5,
                0.5,
                0.5],
        'r': 0},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'xy-iss'}},
'init_param': { 'value': [ 0.17961742860022237,
                            0.4029745783400613,
                            0.4271020388774394,
                            0.6998927493507625,
                            1.1444327445959492,
                            1.4463150894355827,
                            1.7859669797147917,
                            1.7859669797147917,
                            1.8910076260348616,
                            2.1568466639380097,
                            2.184715675260106,
                            2.3241261579565067,
                            5.221288254664872,
                            5.360678146313719,
                            5.572749542622228,
                            6.315664711217606,
                            6.332942041057151,
                            7.225695385348529,
                            7.238714694082236,
                            7.767863290353532,
                            7.947954629935657,
                            8.045079231148478,
                            8.080705184182557,
                            8.235317994608641,
                            8.52967785406855,
                            8.920755162601605,
                            8.920755162601605,
                            8.920755162601605,
                            9.75907480462672,
                            11.068402571583377,
                            -0.07026370230905016,
                            1.2758275954101812,
                            0.1960569796315372,
                            -0.7454998985427054,
                            0.5260870873255556,
                            1.3632265149428353,
                            0.06759709485075166,
                            0.7201883678889174,
                            0.7780364770341424,
                            0.7034018811814728,
                            -0.3281225120527201,
                            -0.21523884970562404,
                            0.3525948786581971,
                            0.10058439953616755,
                            0.8489242437750127,
                            0.4102210250930649,
                            -1.1239274808373552,
                            -0.07527028057729333,
                            -0.662823747816413,
                            -0.09016589559770041,
                            0.0005078927131911535,
                            -0.9974030724775158,
                            1.2973260682530905,
                            0.6207513445119947,
                            -0.06959715000945968,
                            0.01479447508324883,
                            0.5707366547040263,
                            0.8024230791007029,
                            0.11580671533830131,
                            0.5319238260215059,
                            2.029703693625361,
                            0.8476591202353092,
                            -0.5985490132202251,
                            -1.0850372047073247,
                            -0.13885829158476937,
                            0.6160884575951602,
```

-0.6119315652443118,  
0.25456754270344084,  
1.6135141314150674,  
1.6101080474118592,  
-1.0046888465114787,  
-1.2174288348798858,  
-0.8801790341822278,  
-0.01998793431745051,  
-1.007194981866689,  
-1.6365882266166358,  
3.524880820008825,  
1.5399950054830251,  
-1.401820445976074,  
-0.04945776017633801,  
0.9565666812114323,  
-0.20490442564626934,  
-0.5632271134618189,  
1.0033608730635488,  
0.12368927199762578,  
-0.06153617179775209,  
1.0557374829951787,  
1.532632985657107,  
-0.3069192599686721,  
1.8620498010178619,  
0.18083984306067874,  
-0.9702971127887235,  
-0.4866438529829019,  
0.2527358034573417,  
0.46390718912935613,  
0.05253485630073179,  
-0.15957905175444287,  
0.5064463362180326,  
0.6588516997606392,  
0.036226022952260704,  
-1.5941274572195923,  
0.3692191472654626,  
0.31840120283705997,  
0.8741993879399423,  
0.4802653460337955,  
0.3012459045041651,  
0.5102022084743536,  
0.3727970282915065,  
0.6665750190815365,  
-0.7773615380935764,  
0.12852119124454983,  
0.6774482070442244,  
-0.34235651892527574,  
-1.1577831131801597,  
-0.2879120353476077,  
1.157549789799121,  
-0.1818163295634488,  
-0.034519908964088415,  
-0.6744130553492667,  
1.1322140576298956,  
0.5044463860518625,  
1.5469749343656427,  
-0.19451127779487945,  
0.16868157432748737,  
0.3887158384137858,  
1.179393002549757,  
0.4377598134949622,  
0.42273561999328285,  
0.17555703442650725,  
0.7637154786900613,  
0.3204620558964089,  
-1.0127445325141415,  
-0.3366137672636463,  
-0.6128563234467006,  
-0.19959799618607235,  
-0.22993024268879514,  
0.6548635589470768,  
0.5449412421525476,  
0.11171602982233311,  
0.5174688869584806,  
-0.0926785574168733,

```

-0.012796553414024043,
0.872831179387319,
-0.3738274777631416,
0.708424995234135,
1.1207261796968788,
0.39043722964884914,
1.5466373285390471,
-0.0566526099067629,
-1.544789451209757]},
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.395384341095475],
                          [12, 6, 0, 0, -5.790856073500347],
                          [20, 10, 0, 0, -4.565524427603155]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.933906555175781e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -8.339847208029765,
                           'others': { 'beta_coeffieicients': [ 1.875,
                                                                -1.25,
                                                                0.375],
                                       'cost_richardson_zne': 5.21875,
                                       'sorted_expectation_vals': [
-7.395384341095475,
-5.790856073500347,
-4.565524427603155],
'sorted_noise': [6, 18, 30]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -7.395384341095475],
                  [ 12,
                    6,
                    0,
                    0,
                    -5.790856073500347],
                  [ 20,
                    10,

```

```

0,
0,
-4.565524427603155]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}}},
'init_param': { 'value': [ 0.5698358581496117,
1.0111463732621893,
1.116254023022104,
1.116254023022104,
1.4543153683590362,
1.4543153683590362,
1.551144943675129,
1.551144943675129,
2.3321866923810566,
2.4857852178760083,
3.837593499897418,
3.837593499897418,
3.837593499897418,
3.837593499897418,
4.847467397840062,
5.03660309473088,
5.176578602594472,
5.176578602594472,
5.214332760543968,
6.547255537065404,
6.547255537065404,
7.083633091144979,
7.083633091144979,
7.133204014188821,
7.133204014188821,
7.133204014188821,
7.937225733864811,
8.370661235857398,
8.62656679928389,
8.759707620277526,
9.424598849529344,
0.24247733923543782,
0.79275118507479,
-0.012314768690710378,
1.2247395896468714,
-0.6087890007814074,
0.9804698093938512,
0.19554007335952167,
-0.18291383394130525,
-0.08254523307317092,
0.18380200005144362,
-0.06242013495608768,
-0.18902966193120999,
0.4846770511497838,
1.2162916157423216,
0.4476502570273604,
-0.5204828708955642,
1.1525916637240337,
0.9814837501696517,
1.2019836737296188,
0.10039944576408244,
-1.165620769823409,
0.5709783345435084,
0.04690539627488982,

```

0.3150855883896384,  
0.6835833386917337,  
0.7350671828581666,  
0.15105693185753874,  
0.7851129846448224,  
-0.290237804763004,  
0.02628688844012564,  
-0.3427838784588314,  
-0.12202424723691215,  
0.30368921729231485,  
-0.08398845633414893,  
-0.34421225485285395,  
-1.0992299599969957,  
-0.6679166311787512,  
-0.4925602784337871,  
-0.7607905356843834,  
-0.061822787578292515,  
-0.33643902903801526,  
1.7237644621079549,  
1.1087838048318122,  
1.4391293107545464,  
-0.2688865923867924,  
0.07238699078201241,  
-0.7262166431073663,  
-0.8607492696026928,  
0.1828620517189283,  
-1.5556021786529124,  
-0.5230641559705965,  
-0.023465829708141782,  
0.5773817105800866,  
-0.6189512057198875,  
-0.1704298219551506,  
0.6935490081871019,  
0.43024761601627914,  
-1.3818053283072975,  
0.32069867830077864,  
0.11223505487625844,  
-0.6642209341325642,  
-0.7163563578386999,  
0.9533459704680486,  
-2.5373567196844773,  
-0.3530595330204968,  
-0.36744271288254204,  
-0.4105700661159024,  
-0.529185988706723,  
-0.5074466275713505,  
0.5969687397167245,  
0.1454479675984071,  
0.9510340399481164,  
-0.16051754924491393,  
0.168676911677473,  
1.6243103666539225,  
-0.3533677275828062,  
0.23248347317288842,  
1.550100715213732,  
0.3540002793004863,  
0.11004939052123668,  
0.0026309322638186474,  
1.0023099891482978,  
1.3075603782358884,  
0.06614039249633322,  
0.12696883216368457,  
0.4650745950568721,  
0.09288306127511851,  
-0.05535633254466518,  
1.0893487961438044,  
0.1856572010619516,  
-0.3369565165204948,  
1.1993442715596423,  
-0.1637322799431796,  
-0.05574034797393315,  
-0.6499132821077687,  
-1.1854402746414112,  
-0.20554021240749126,  
-0.697991352679575,

```

0.7715290435685477,
0.27728540290360154,
-0.7490020286422794,
0.6727458447445039,
-1.3928966895283914,
-1.1123692530480307,
1.2429888713160355,
0.5002310144425463,
1.0425617895549082,
-0.41250228671824735,
-0.20782873770333182,
0.952256354944612,
-0.2180059005687231,
0.8024032545701543,
-1.0975152466418368,
0.6192383355749876,
-0.44420258004771784,
-1.3605235580058401,
1.4196204597477091,
-1.1230853758949062,
0.09475958663430169,
0.9412942473630452]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                      [1, 1, 0, 0],
                                      [2, 2, 0, 0]],
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.159167099826597],
                           [12, 6, 0, 0, -5.573237410199788],
                           [20, 10, 0, 0, -4.355904736591592]],
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.695487976074219e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -8.090355825646983,
                           'others': { 'beta_coeffieicients': [ 1.875,
                                                                -1.25,
                                                                0.375],
                           'cost_richardson_zne': 5.21875,
                           'sorted_expectation_vals': [
-7.159167099826597,
-5.573237410199788,
-4.355904736591592],

```

```

        'sorted_noise': [6, 18, 30]],
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -7.159167099826597],
                  [ 12,
                    6,
                    0,
                    0,
                    -5.573237410199788],
                  [ 20,
                    10,
                    0,
                    0,
                    -4.355904736591592]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'xy-iss'}}},
  'init_param': { 'value': [ 4.1837705414928806e-17,
                              1.1742327239243593,
                              1.1742327239243593,
                              1.174232723924359,
                              1.3021435979041922,
                              1.3883521076730898,
                              1.4901272631800928,
                              1.490127263180093,
                              1.490127263180093,
                              2.542545188872923,
                              2.56739133991554,
                              2.677178516908646,
                              5.624946341909109,
                              5.624946341909109,
                              5.63924283183031,
                              5.672838193807689,
                              5.672838193807689,
                              5.672838193807689,
                              5.672838193807689,
                              5.672838193807689,
                              5.672838193807689,
                              5.805507018952099,
                              5.858678454346443,
                              7.374841183417447,
                              7.374841183417447,
                              9.078346087689514,
                              9.17910617229311,
                              9.185363997877552,
                              9.550522060955204,
                              9.715006087156702,
                              0.5380723684568228,
                              0.20346632529178696,
                              -0.28402043001150323,
                              -0.013694659434132353,
                              -0.8491217472851175,
                              -0.13891219530245408,
                              -0.7902948900320785,
                              0.02035105936303376,
                              0.35891510624171696,
                              0.07011262472067725,

```

0.2571910630887441,  
0.09727807922224965,  
-0.4253506785797692,  
-0.08201618636277365,  
-0.5629942371157008,  
0.4984357070329931,  
0.22460606922422946,  
0.6436861273901548,  
0.5581387866543217,  
0.6438048424266741,  
0.6625810608832491,  
-0.2877740698749285,  
0.03400434270310955,  
0.6598198228171638,  
0.15695492486622947,  
-0.23277712193728803,  
0.3379436543817524,  
0.6679629986711755,  
0.4913802101172593,  
-0.6543304626041586,  
1.2398324170787045,  
0.10868488610295632,  
0.4726806257545104,  
-1.0278416218016544,  
-0.5660236088762642,  
-0.06627186605932975,  
0.3527547117645279,  
0.3944014355355292,  
0.33709190475341266,  
0.16707772676088822,  
0.29195080738380563,  
1.0354529601392413,  
0.12500585138196232,  
-0.037178956773431956,  
0.7823218278561086,  
-0.04464215343745706,  
-0.36923576305262273,  
-0.9863817864437636,  
0.039519076991602065,  
-0.35646400258617383,  
0.04542480304419608,  
-0.46125271135496354,  
0.40472620693719735,  
0.7802480661953589,  
-0.6757172179201896,  
0.6396142241310521,  
0.2327897749192615,  
0.8954622299286413,  
0.7158405805761733,  
0.1382139633537826,  
1.0616928944303126,  
-0.6122315420380016,  
-0.6738539946512315,  
1.0433459792659807,  
0.494526070112864,  
0.20621322780405107,  
-0.05318175489586881,  
-0.11213659998229918,  
0.32941262943060273,  
0.13931786347259914,  
-0.07640781308377202,  
0.31450116184408605,  
0.3658109215963646,  
0.04460349089074807,  
-0.12913310998017427,  
0.31890485610090735,  
-0.005491508360761248,  
1.2692063073436923,  
-0.3006174703747285,  
-0.41404661321397057,  
-0.5199199797590206,  
0.44225909618051784,  
-0.4233007342169607,  
0.7456354776212751,  
-0.32484988424610756,



```

0.9268151291603125,
0.8385591284905366,
0.027219364270413358,
-0.5520387125082392,
1.3757901840365965,
0.02933419406725825,
-0.2915193842748469,
0.33917094344303517,
0.10828106345120646,
-0.5650186064180197,
-0.6041651963720519,
-0.19230834783869816,
1.9848826966849449,
0.0632219631903188,
0.04804551511145073,
0.47752350144148015,
1.3406847618100746,
-1.3722262204383469,
-1.0513455672656666,
0.7121308231347245,
0.13278942055995957,
1.9758312031522887,
2.19648222646383,
0.8936788375205645,
0.05510909660880629,
-0.18765678539637448,
0.45031205104496697,
-0.6542716355161553,
0.5783583754336702,
-0.18844184232604352,
-1.5667303012058793,
0.36110899429768645,
-0.275182998952267,
0.30367576290775045,
-0.1532687178202341]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'ngubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric3_unifrom_scaling_sample#2'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.130214875567141],
                          [12, 6, 0, 0, -5.622281179564727],
                          [20, 10, 0, 0, -4.4547314200293675]],
        'degree': 0,
        'method': 'richardson',

```

```

'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.7670135498046875e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.011825699743495,
                            'others': { 'beta_coefficients': [ 1.875,
                                                                -1.25,
                                                                0.375],
                            'cost_richardson_zne': 5.21875,
                            'sorted_expectation_vals': [
-7.130214875567141,
-5.622281179564727,
-4.4547314200293675],

                            'sorted_noise': [6, 18, 30]},
            'sampled_data': [ [ 4,
                                2,
                                0,
                                0,
                                -7.130214875567141],
                              [ 12,
                                6,
                                0,
                                0,
                                -5.622281179564727],
                              [ 20,
                                10,
                                0,
                                0,
                                -4.4547314200293675]],
            'sampling': 'default'}}}],
'xy-ric4-uniform-scaling': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
                            'layer': 30,
                            'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                            'cn': [ 0.5,
                                    0.5,
                                    0.5,
                                    0.5,
                                    0.5,
                                    0.5],
                            'r': 0},
                            'time': {'max': 10.0, 'min': 0.0},
                            'type': 'xy-iss'}},
            'init_param': {'value': 'random'},
            'noise_profile': { 'noise_on_init_param': { 'status': False,
                                                         'value': 0},
                              'noise_prob': [ 0.001,
                                                0.001,
                                                0.001,
                                                0.001],
                              'status': False,
                              'type': 'depolarizing'},
            'nqubits': 7,
            'observable': { 'coefficients': { 'bn': [ 1.0,
                                                        1.0,
                                                        1.0,
                                                        1.0,
                                                        1.0,
                                                        1.0],
                            'cn': [ 0.5,
                                    0.5,
                                    0.5,
                                    0.5,
                                    0.5],
                            'r': 1},
                            'def': 'ising'},
            'output': { 'draw': { 'fig_dpi': 100,
                                   'status': True,

```

[illegible]

3.800207092295721,  
3.800207092295721,  
3.800207092295721,  
3.800207092295721,  
4.798448841518561,  
4.812026604031267,  
6.02543601067661,  
6.02543601067661,  
6.5265343452987,  
6.5265343452987,  
6.526534345298701,  
6.528381158760148,  
6.528381158760148,  
7.113023968622042,  
7.113023968622042,  
7.593654062389684,  
7.5949106716383605,  
7.780058793305066,  
9.000370275113886,  
9.005799799983558,  
-0.22105281285875572,  
0.07196296170715184,  
1.0527781347416576,  
-0.4594806493129553,  
1.0526039239081737,  
-0.01709270509934428,  
0.3199675106146978,  
-0.0972220164715271,  
0.9145097677998977,  
0.09808103992344623,  
0.5373974901276602,  
-0.5786059880820694,  
-0.02594763303680847,  
-0.22132394348491485,  
-0.7274785930689547,  
-0.41090279602128,  
-0.520884263329148,  
-1.0260835302846771,  
0.1692597388493397,  
1.3250313995601488,  
1.510357845739394,  
-0.9233604808876308,  
-0.2049157632594096,  
-0.9894281051832,  
0.25772120620526445,  
-0.04822142329545429,  
-0.3912638297585932,  
-0.48486712444934904,  
1.4836649713082644,  
1.566996182191827,  
0.08093959953023218,  
-2.3562926055425963,  
-0.21876618997457167,  
0.10911407834571141,  
-1.3776955808248483,  
-0.31816531211057325,  
0.7083857256813267,  
0.5593482503842677,  
0.7483381318097894,  
0.010042025170353972,  
0.05290425882351868,  
0.20616876613540233,  
-0.8673924682871486,  
-0.08017548043713153,  
-0.3056222778255953,  
2.3981163154468383,  
0.37079365521682633,  
0.3870558721039623,  
0.19341028278759992,  
-0.3154248344945196,  
-0.12073260037561208,  
-1.5858414285227351,  
0.59830347262823,  
0.30388710178795286,  
-1.4558796844932331,

-0.3225618511944297,  
0.09243390755822743,  
-0.0006426173071943948,  
0.7561662109631148,  
-1.3902324585417218,  
0.1677701056843372,  
2.7311884232201735,  
-1.1122880815211051,  
0.0467986017971284,  
-0.020089420529231013,  
0.005481851366742631,  
1.3205596999819047,  
-0.1290403664286252,  
0.3870444394307043,  
-0.6549197738372419,  
-0.17656835190090397,  
-0.0008013451895215781,  
-0.8769883624496301,  
1.6929520910231297,  
0.7288671099890552,  
-0.6169673343691255,  
1.667217439782634,  
0.2554635335546482,  
-0.029515171705053127,  
-0.8290153205719569,  
0.042733616172741226,  
-0.5148227135977747,  
1.2301836750084596,  
-0.9175908300980525,  
0.5229779878549122,  
-1.5901934710811256,  
-0.07316585886439231,  
1.1195018365185199,  
-0.31111306362203306,  
0.7254709796877604,  
1.1995417479543053,  
0.6908225815252583,  
-0.2919630814941808,  
0.15955998483086176,  
1.2871422030548714,  
-1.2683991057896014,  
-0.3768598572966417,  
1.4863954796333156,  
-0.4300298743216642,  
0.19151460300148976,  
0.9665838873771405,  
-0.07244306377732504,  
-0.04169546816073936,  
-0.389029635704794,  
1.5218961812832925,  
-0.1772066326032777,  
-0.70949107362336,  
-0.015222466074935298,  
0.3587128629768407,  
1.5809494716454662,  
0.12428164288740734,  
1.5083554487395696,  
-0.044379618902227067,  
-0.03505579308192811,  
-0.6786538117837789,  
-0.007428157845337949,  
1.5281494732580478,  
-0.14124856089608578,  
2.726718429443767,  
-0.003106328084445967],  
[ 0.5270475437101116,  
0.7815425625485376,  
1.6469610445191378,  
1.6712876404917778,  
2.122904188877425,  
2.131106816606521,  
3.7367798442214175,  
3.7367798442219424,  
4.750276145421292,  
4.853973384996016,

4.865098072058574,  
4.873980651141647,  
4.987599328262889,  
5.00246239884106,  
5.520902021852277,  
5.793284849001337,  
5.8087832398624775,  
7.432729128414403,  
7.432953787975026,  
8.144896858715603,  
8.172580744083415,  
8.788071761144659,  
8.792288306719156,  
8.828260688191317,  
9.011586808740137,  
9.011995976067807,  
9.538729699920484,  
9.576884709106812,  
10.486750161390887,  
10.48675016212107,  
-0.15531374899360717,  
-0.0849039080739262,  
-0.8434555658556069,  
0.9447826609611266,  
-0.19482082661427938,  
2.4999420394249707,  
-2.7164831941210483,  
-1.5408169364026967,  
-0.8621482593978547,  
0.31547458537730877,  
1.4220435826823787,  
1.348860553316339,  
0.40827474166943256,  
1.063960383917828,  
-0.21906798993221652,  
-0.33263312803097533,  
0.4889869181158972,  
-0.25524084746075687,  
-1.3622146811064544,  
0.996105149433398,  
1.4161210728452394,  
-0.6491827941870941,  
0.7399329880002848,  
-0.11994422281276146,  
3.179573825543474,  
-0.034943024466848674,  
0.6075464711124173,  
-0.3019825794696199,  
0.029392952712390567,  
0.14840732209332994,  
0.08592470568620861,  
0.016725634393736574,  
-1.3697962205589145,  
-0.06155375586805023,  
0.16508080354919497,  
-0.5975014914051775,  
0.09635736997937351,  
1.254101402191796,  
-0.6193953337438176,  
0.47602269510847217,  
-1.7251540483535392,  
0.5378274350019089,  
-1.0159384367751108,  
1.0968223266795405,  
-0.79878134010976,  
0.10468891520322528,  
-0.2910173593847854,  
-0.7078981306941186,  
-0.3510837282628223,  
0.5371002854277007,  
-0.4911274293534503,  
1.7273270693440552,  
1.3500555714793954,  
0.9052059235505011,  
0.4771526028272018,

-0.1893747959421651,  
0.13989050072973697,  
-0.5930955187300607,  
0.36780210947560876,  
-0.5043370473487999,  
-0.4851893292987325,  
0.1987440888222681,  
-0.5806445532873666,  
2.3171646404124093,  
0.06032126128170586,  
-0.6389920437730593,  
0.9985359186149056,  
0.04870155999532171,  
0.16447399991313041,  
0.05315090520136875,  
0.15727255736970833,  
-1.3722292706433088,  
-0.33233649668322635,  
0.7758243461945761,  
-0.20476613404890107,  
0.06972046040604139,  
0.3143879960336948,  
-0.01452323353492752,  
-1.2901366074359686,  
-0.31033000747276407,  
-0.16264485166390844,  
-1.3914094473719103,  
-0.5273128620655095,  
0.02465459151953875,  
0.10942766294132272,  
1.0292094835171124,  
-1.882689768994833,  
-1.553216293090225,  
1.3287846024814622,  
0.20963913600213377,  
0.7195732642990699,  
0.0969787732183028,  
-0.9744344415633356,  
1.5822487402774768,  
0.7077471503862973,  
-0.766345302327988,  
0.3831437091022152,  
-0.12028853613988252,  
-0.8209919023748664,  
-0.21164805512089607,  
0.5290684330656528,  
-0.1040878870845114,  
1.1956945887281514,  
0.25703931501419025,  
0.6344733295912399,  
-0.02497584874729833,  
-0.20937697561532842,  
-1.4409411147319051,  
0.9707320454927133,  
1.4039378085761043,  
0.9760826987262126,  
-0.17314228405542512,  
0.16734556762922406,  
0.07881248116464283,  
-0.2924467918405051,  
1.4946430081327182,  
0.7516806171134963,  
0.799700486923224,  
-0.8440600324500036,  
-0.01069194371181784],  
[ 0.3388610072211759,  
0.3930923343746358,  
0.4059472295013711,  
0.4597995545870322,  
0.4597995545870322,  
0.4667083780713653,  
0.9924683364283498,  
1.054118787032341,  
1.3839145947816414,  
1.4469616998432806,

3.044048229936016,  
3.044048229936016,  
4.682975233106521,  
4.682975233106521,  
5.287925895396742,  
5.287925895396742,  
5.625677830869467,  
5.625677830869467,  
6.519005703020383,  
6.519005703020383,  
6.519005703020383,  
6.854665591577039,  
6.854665591577039,  
8.092962128458302,  
8.097830997780322,  
8.102159968176109,  
8.111954675742565,  
8.727038821401255,  
8.727038821401255,  
8.784424594255395,  
-0.8636093730812797,  
-0.04742973062196874,  
-0.37989856483295564,  
0.3750798322441465,  
-0.509087961968837,  
0.5366875438436245,  
0.1232704940065221,  
0.5249134835872401,  
0.13594138148710633,  
0.10802292582448766,  
-0.7156772546121367,  
0.34756877087651405,  
-0.5704812075854907,  
0.289395233495819,  
0.2674862930849357,  
0.8724143866961164,  
0.5770602988816299,  
0.658777432128999,  
-0.47288232304292416,  
-0.029663566814993374,  
-1.323180236232167,  
-0.2890901656039231,  
-0.015141732930961212,  
1.1846850771343012,  
-0.4506688471965015,  
0.22241980016839272,  
-0.015748484493019736,  
1.1522499025192263,  
0.2996907655672081,  
-1.7370631162182948,  
-0.35306232532663057,  
0.17322471105923057,  
-1.1855180134814352,  
-0.31537295018088835,  
-1.8120366955290261,  
0.6663892425075478,  
0.21874911670355193,  
1.2729693967005706,  
-0.14230256773273223,  
0.2012427441067739,  
-2.3269317425793643,  
-0.03299848401271634,  
-0.4074853136565566,  
-0.30371905431664253,  
-0.12037074206123735,  
0.8456676988075262,  
-0.21838328071319946,  
0.019494764922420988,  
0.16383099728733078,  
0.056056403895700845,  
-3.5632063709291613,  
0.6579904510057321,  
0.5207861046034454,  
-0.017180990359968364,  
0.2532807007765998,



-0.03315495616728509,  
0.7564905992030696,  
-0.11091568858030387,  
-0.9281890577202553,  
-0.6082181315906088,  
-0.4480511658411004,  
2.1953283079942025,  
-0.30446713497464617,  
-0.03359602431311142,  
0.28972943746372876,  
0.17817064395522006,  
0.7965754083210965,  
-0.9520780563921613,  
0.10150445450145726,  
1.3510884636720888,  
-0.37849615173878054,  
0.17729737647006832,  
0.1884683806301832,  
-0.03234547530918763,  
-1.338763456177623,  
-0.6711058962200585,  
-0.012976043431998471,  
0.027578392175021227,  
0.10161286285089129,  
-0.00939135247962935,  
-1.302164623174096,  
1.3715576399721376,  
0.737767307868418,  
1.5939269674119705,  
1.4291758244230544,  
0.5601859764306084,  
0.3488764286390935,  
-1.093762224545935,  
-1.1976831420922067,  
1.4557381665683378,  
0.8924472305311927,  
0.5300221300338881,  
1.0785280788144638,  
-0.6029509417428172,  
-0.6790632925762424,  
0.4138865114731201,  
0.2917474006869537,  
1.8050154062536312,  
0.05177383423831921,  
0.25467777497912664,  
1.4671356779039024,  
0.4422247342165525,  
-1.5431607378377095,  
1.8101814873938125,  
1.6870467346899987,  
0.7517920825884995,  
1.3622912362338087,  
0.13653050459472865,  
1.5210183141257738,  
-0.004247168330480351,  
0.26137218980413907,  
0.5451511562235306,  
-0.6705596749039198,  
1.2136085126593865,  
0.5231529087420831,  
-0.03279466120532818,  
0.2548954759886831,  
1.5797820110558691,  
1.075840789720537,  
1.5541818084195007],  
[ 3.821020346740443e-17,  
1.386496864345847,  
1.386496864345847,  
1.7951472089989222,  
1.8559400139285378,  
2.7980544315911504,  
2.7980544315911504,  
2.82954781812891,  
2.82954781812891,  
2.82954781812891,

2.956183634338348,  
3.840561875918348,  
3.840561875918348,  
4.79501776182173,  
4.79501776182173,  
5.670460018404704,  
5.670460018404704,  
5.670460018404704,  
6.865392250052202,  
6.865392250052202,  
7.506826147384778,  
7.506826147384778,  
8.737685173635683,  
8.737685173635683,  
8.737685173635683,  
8.737685173635683,  
9.601023092540274,  
9.601023092540274,  
9.853738132880634,  
9.853738132880634,  
0.5611658219809542,  
1.427331325859137,  
0.8881601644240952,  
-0.8937497791603879,  
0.5712044928850715,  
1.3195951619089188,  
0.5467792160605555,  
-0.6816630744322637,  
0.06707477836950569,  
0.6798692668930644,  
0.19576168860111362,  
0.5094724850631845,  
1.1424414477256812,  
0.30471145260454696,  
-0.08158911485577636,  
0.9585661478313002,  
1.0836238583568754,  
-0.3718197048926503,  
0.7841948506971846,  
0.3023515457437066,  
0.7662240328883452,  
0.9970048707689876,  
-0.8946064024093777,  
0.27649390200762114,  
-0.15342626519190924,  
-0.4015720487025046,  
1.460926694270634,  
-0.055421168101734586,  
0.6077050880702092,  
-0.7932081335349191,  
1.3188332541813446,  
0.01929555634963922,  
-1.1301845164589392,  
-0.1718174564221745,  
2.26154163970611,  
-0.9882028269623031,  
0.8038643847286138,  
0.6849304102208338,  
0.874798983022982,  
-0.016486064274954207,  
0.0264221098096002,  
-0.3625000384278827,  
1.4376331477886695,  
0.8499992740594865,  
0.10042171561200945,  
0.14542648933357244,  
1.3513090878714353,  
-0.22248922869259902,  
-0.4483175327546578,  
1.2345758678942387,  
-0.18983522552694923,  
0.019591210301167533,  
-1.3607248526627624,  
0.018375533581887468,  
-0.3730738776375715,

1.0123537416913542,  
0.7412601688930508,  
-1.6525919628732422,  
-0.8341682190885938,  
0.04519729634722039,  
-0.06718028327556408,  
-1.5649719285752928,  
-0.37531851249345394,  
-0.11822841604899964,  
0.008154106549025474,  
-1.4601449692077721,  
-0.0030993446167428395,  
1.462573870839384,  
-0.11887757571245174,  
-0.09361960188417112,  
-1.2543408854038138,  
-1.525280802664792,  
-1.241413372948363,  
0.008758808605552393,  
-1.6676332942965022,  
0.13826170532334445,  
0.7537363962746654,  
0.0833397476047736,  
-0.12216949704941273,  
0.02084807234445201,  
-0.3421949354726438,  
0.0017882611822728064,  
1.5186851123669147,  
-0.4603163345929323,  
-0.09956972276089109,  
0.7247597830417082,  
0.5304935691839561,  
0.003193152207841171,  
0.5581346990750625,  
0.010542051444639388,  
0.7553167297004638,  
0.5956891015800863,  
-0.05566254332595716,  
0.5362461335652635,  
0.009895282042162012,  
-0.3029901133286735,  
0.09399206534914867,  
0.8818812838713691,  
-0.06795832284115338,  
-1.580933930101608,  
0.3014975711017802,  
1.2092022074751856,  
-0.019692531397995948,  
0.9250981578351692,  
0.4673383297638096,  
0.03344339272872125,  
0.13058472572385768,  
0.036262684184263205,  
0.458095375934523,  
0.6492846129896516,  
1.3039221898344189,  
0.024764812872192767,  
0.7236926243101844,  
0.01444840086266692,  
-1.0388939706148563,  
-0.08359693344439546,  
-0.4698004238001188,  
-0.48055768545836347,  
0.4662000815300196,  
-0.041204969991243484],  
[ 0.01798320141016013,  
0.3393419127512466,  
0.7047697703765823,  
0.7064789163091142,  
0.7191656785855808,  
0.7198672068604162,  
0.719867206860416,  
1.0840512961729545,  
1.090003904895101,  
1.1926153174924548,

1.867054342490295,  
1.867054342490295,  
2.368094916985588,  
2.3683751276938714,  
3.6383003552329964,  
3.642527762446636,  
4.505845683894636,  
4.602446412902637,  
4.972427659100928,  
4.972427659100928,  
5.1148164150678035,  
5.8066136392845,  
5.820681023327439,  
6.727088267818048,  
8.352653016300794,  
8.773334122756978,  
9.065902540064004,  
9.065902540064004,  
9.74880092287043,  
11.30145464466351,  
-0.13904770480884485,  
0.23493722133539818,  
0.4497803172772882,  
-0.640584995353188,  
0.9779304528121034,  
0.0011745349607135795,  
-0.7175493520168287,  
0.373620380836484,  
0.08111255661159392,  
0.6653458367314794,  
0.0037967443269442437,  
0.6286122183467432,  
-0.03825426016359485,  
0.6896824961465278,  
-0.23916946602734285,  
0.4624850989736848,  
0.1419493525208794,  
0.7145176662978019,  
-0.316909964913161,  
0.6605458698076423,  
-0.39309909050950365,  
0.7623048158369822,  
0.7469736169282462,  
1.2400892032597353,  
0.12266455668869777,  
0.19578648318487166,  
-0.784043232212839,  
-0.10334183265831844,  
0.32774480702026265,  
-0.011491906972883237,  
0.322988869457402,  
-0.2027870428092001,  
0.1281571522083961,  
-0.1947961113336468,  
1.7114513053475526,  
0.005425684515457419,  
0.8136825826883561,  
-0.25903007981373005,  
-0.5015428579892063,  
-0.2600978115589891,  
-0.15405473476720474,  
-0.4207498663011112,  
1.04622682040645,  
-0.8642339256273757,  
0.6248691295250803,  
-0.3539240130838131,  
0.011689879721248103,  
-0.3068283940685192,  
-0.6048660879777619,  
-0.11704784670887185,  
-1.2745062338511486,  
-1.7890038533223112,  
-0.7818671277256136,  
-0.8877455887286905,  
0.3164818198590212,

-0.27477307924208777,  
1.8083251930535746,  
-0.5031479272825263,  
-0.9648993597903888,  
-0.41682962131770707,  
0.27040705073896654,  
1.0892900815418987,  
0.17779960873468054,  
0.020337033950376556,  
1.0551529464315492,  
-0.10705558118147128,  
-0.8851977322505518,  
0.2232945485845247,  
-0.5850403569085746,  
-0.7690595025978197,  
-0.4391673030332381,  
-0.9309566421919284,  
0.2973030450025941,  
0.6780545449896137,  
0.14045373030826291,  
-0.5109313900859794,  
-0.44070010469428217,  
1.6940975579604587,  
0.17062304524159472,  
-0.402681393200546,  
-0.7091187255059627,  
1.3132357546586793,  
0.2729391261599054,  
1.0115940175088693,  
1.0046673925246778,  
0.4982257464819494,  
0.04454679168285006,  
0.4863023994043421,  
-1.1433261311581624,  
-1.820308437409531,  
0.6035405700431521,  
0.04003907881711185,  
2.99381748600971,  
-1.0437523456620463,  
-0.22517480393070408,  
0.10746937069246698,  
-0.8788513722547997,  
1.286531186523234,  
-1.3157160458746164,  
-0.6979748907629274,  
-0.16573593981190854,  
0.2529194783090185,  
-0.2562517800846549,  
-0.7966921479109774,  
-0.4446940958312971,  
-1.052310031662883,  
-0.1506245930250076,  
0.1615975776996014,  
2.9220364155549214,  
-1.7197843955783065,  
-0.6592103621593355,  
-0.2007498223803255,  
-1.6188873615119244,  
-0.15193115939751467,  
-0.20866967970071015,  
1.2910791163230286,  
-0.4917152660712325,  
-0.42348313202027765,  
0.3518303936962707,  
-0.10034486495238693],  
[ 0.009039772647041902,  
1.1400526086001903,  
1.466905028683042,  
1.6524670085313564,  
1.987797816914966,  
1.9900950346150876,  
2.1413202332332344,  
2.390935514217652,  
2.402429399816812,  
2.81913686416337,

2.81913686416337,  
3.5656810200683298,  
3.5656810200683298,  
3.5656810200683298,  
3.76603447051701,  
3.76603447051701,  
5.499236323276389,  
5.4992363232763894,  
5.4992363232763894,  
5.532789537471719,  
5.532789537471719,  
7.371733777832876,  
7.371733777832876,  
7.680783486275433,  
7.706623781446164,  
7.706623781446164,  
8.457742149729329,  
8.457742149729329,  
8.95222736351662,  
8.95222736351662,  
0.18928393791812126,  
1.0354889043700823,  
0.3703113207409527,  
0.30988589523494625,  
-0.34669340410550803,  
0.09615284519636855,  
0.1011898884094612,  
0.6160115432573767,  
0.6148540393435122,  
0.07934943483664206,  
0.8557624329627399,  
-0.7672633290674925,  
-0.14188111026081618,  
0.1995320641320393,  
0.4594888802421805,  
-0.03593187081620776,  
1.2926591415659605,  
0.31433950962447343,  
0.8053272546604554,  
0.6634815559763872,  
0.311660786273531,  
0.0294653444200854,  
0.3044394736040779,  
0.7599259037372076,  
0.22962735656034647,  
0.22562971232722423,  
0.29511485598499815,  
0.02260075636691185,  
-0.9497096253675098,  
-0.5331371571917215,  
0.2192512323868535,  
1.104832430155296,  
0.8636617903941131,  
-0.6756684630428217,  
0.4169844309263729,  
1.1297527651723116,  
-1.160118439748996,  
-0.7971836651224,  
1.9169656561991728,  
-0.007260796290839314,  
0.3614132074474742,  
0.6243022778229537,  
1.8335025630018775,  
0.35139722497115833,  
-0.7247870129359816,  
-0.6744811297738377,  
0.49997538785346773,  
1.4139521212248116,  
-3.0799818401546553,  
-0.14768564076593044,  
0.06251500852230953,  
-0.8547134606957393,  
-0.30107856776262504,  
-0.7654972812734481,  
0.28603020918627825,

0.2129303248959857,  
-1.2077141264570097,  
-0.8488549318812054,  
0.6492574804166855,  
0.7751290676155554,  
0.40909519807061084,  
-1.2750630737105486,  
0.4187798718836698,  
0.33498424523924863,  
-0.19017028209895162,  
-0.03232931911977397,  
1.0621483440417678,  
0.452017889610544,  
1.0192767515800205,  
0.7290563184502946,  
-0.5286462788982386,  
-0.05512372609304388,  
1.3189151919853837,  
0.5865235617306253,  
-0.579843833868396,  
0.6980158293666034,  
0.027004860579276476,  
1.2876675233834314,  
-0.1718561727774212,  
-0.3827017785428823,  
-0.7286404996479297,  
1.1682112525473984,  
0.22765379123755217,  
1.4870969768845252,  
1.1642898801914527,  
-0.03976972562460009,  
-0.8163296820868416,  
-0.15318057329999143,  
0.0482918949035788,  
-0.06014345828968787,  
1.1478583262090496,  
-0.005141116181289305,  
-0.5820859555621626,  
1.086519910329415,  
-1.08558016317555,  
1.531511042803357,  
0.042734048269580674,  
0.7452599788242152,  
-1.3094923903018465,  
-0.9012205175381317,  
-0.0755166851159581,  
1.5493661520767013,  
-0.2278023712186688,  
0.8627212805492942,  
1.8523276191392382,  
-0.10961709979291216,  
0.6746606852631131,  
0.22566845572735392,  
0.5920154791154506,  
1.2709342533151342,  
0.26903045177842116,  
0.11724485476711638,  
0.621942277674204,  
0.15491924869980966,  
1.472217084758381,  
0.8975149794611956,  
0.3601026339731485,  
1.3234513983254743,  
0.0182465793142515,  
-0.11914786829986494],  
[-5.765348397008027e-18,  
0.3428984748224433,  
0.3655450682584724,  
0.704784031551808,  
1.5409081472811441,  
1.549300366088437,  
2.3787666619954635,  
2.3787666619954635,  
2.8808650819472406,  
2.884987740396357,

3.1308808834009203,  
3.1363836212549696,  
4.869321728501938,  
4.869321728501938,  
6.1150174264690085,  
6.2582278136815175,  
6.271636236200362,  
6.551203581243674,  
6.59741701640448,  
8.230564833747417,  
8.294003346338926,  
8.31431753208387,  
8.369586036193128,  
8.415319617883744,  
8.70447046242739,  
8.709120596281233,  
8.918659758853744,  
8.99410216914391,  
9.002256766523654,  
10.218690251738174,  
-0.6798627919679444,  
-1.1436724543472427,  
-0.1278269606092795,  
-0.9286552360068459,  
0.6524046490818174,  
0.06134572949387961,  
-0.49761179900021657,  
-1.3918471119443894,  
0.5858287319319103,  
0.18669127045720346,  
-0.4586789737568629,  
0.2400608953322058,  
0.022222124883641912,  
0.9282004764805514,  
0.6952358394741303,  
0.805684979006905,  
0.6146729452742722,  
0.6777524139082742,  
-0.8117842884117104,  
0.3426849285038029,  
0.7100299235979358,  
0.7658186509139059,  
-0.05418633990950139,  
0.1761917490887145,  
0.5744825473612316,  
0.31705937472296297,  
-0.9188523464356001,  
-0.7337446596965294,  
0.2061368312243915,  
-0.6645694031850036,  
-0.009871104765786294,  
-0.14388187083546433,  
-1.2485707106311008,  
2.849540809212292,  
-0.5119215846255833,  
-0.19381894062193808,  
-0.17310717674563775,  
0.8465397629359774,  
-0.46757240698237135,  
-0.05607605828560263,  
-0.40986137011816176,  
0.07649505002491204,  
-2.1522907800348112,  
-0.6653346582594515,  
0.4084801543759574,  
0.4028897820911683,  
0.16908117843954765,  
-0.07217026591146015,  
-0.72804755296126,  
-0.13548738477012795,  
-2.590679566047418,  
-0.40743076961744734,  
1.1030856800887578,  
0.08388380440455438,  
0.25224805905642333,



0.10644300798076774,  
1.0474125729404944,  
-1.1459016177859003,  
-1.6916287310468103,  
-0.9886067106540645,  
0.24182274960650893,  
-0.25703819491337826,  
-1.1942818044595898,  
-0.7763678643520989,  
-0.916718557142268,  
0.20086626876005667,  
-0.3711023890817823,  
-0.006962349053602254,  
2.687031223814704,  
0.3970791704566904,  
-0.6890591654410289,  
1.0504536719091986,  
-1.2458238157294268,  
-1.197330311624414,  
-0.12155955689525438,  
-0.2969718406476498,  
0.15406921803787998,  
0.9984735505197111,  
-0.2734456365103056,  
0.0100494123830882,  
0.16172873483083283,  
-0.6780409734277772,  
0.4539997995464368,  
0.7558576390626953,  
0.9556605206819043,  
-0.10572075101403118,  
1.5564628686733721,  
0.05397552837650759,  
0.7415987024402694,  
-0.1648500682327342,  
1.052699139325594,  
0.6776572023171561,  
0.15219630541397192,  
0.8843933196559655,  
1.3948099389813178,  
-0.16710315713046545,  
1.2199200746863228,  
-0.3825678575328573,  
-0.26766985045935626,  
2.5777182352113908,  
0.23156136798610805,  
-0.3377548185037014,  
1.0689111835439342,  
-0.17216022970038714,  
-0.29381807805976945,  
-0.5689533077540762,  
0.30596827309967156,  
0.5260993417881752,  
-0.6768480303494689,  
-0.1092430795457648,  
1.5442082488768039,  
-0.10826504240549732,  
-0.9555598065181787,  
0.5334835330029429,  
0.5569227134357198,  
1.2665483894271157,  
-1.9677332823608626,  
1.5559931182978979,  
0.7709453943956464,  
1.5746506000831744],  
[ 1.7625089228179507e-05,  
1.298540182320117,  
1.3141870420194457,  
1.3305471045820527,  
2.0686735179487985,  
2.23810597518972,  
2.267373737425337,  
2.295441377067579,  
2.3325388050051976,  
2.352484360014207,

2.370891483796666,  
3.3117124844820194,  
3.363605896627787,  
3.858981460194034,  
3.8589814603490344,  
3.859537867870235,  
3.8595381713444072,  
4.26458571773699,  
4.264585717738593,  
6.599549149586233,  
6.655963438031886,  
6.939612414177192,  
6.939612414268938,  
7.004302986969205,  
7.010544991093791,  
7.97314828104894,  
7.999280802101656,  
8.022628296732579,  
8.027896471579398,  
10.077254342713585,  
-1.0733166032270363,  
0.4264387306682,  
-0.29490479134596703,  
-0.45181113351566254,  
-0.9496712390342118,  
-0.24412788786515252,  
-0.17005038539710493,  
2.131747001055919,  
-0.8801477965160032,  
0.1985900676052623,  
-0.17829180427317373,  
0.1513896817808816,  
-0.2996418627583153,  
0.09152392337611555,  
1.0155053498240294,  
0.6713280773462803,  
-0.5915672184524843,  
-0.21780814909773427,  
-0.23676595566314207,  
-0.1539223229682568,  
0.9733737893230769,  
-0.8325690111887051,  
-0.6684349693104433,  
0.944923850675747,  
-0.8270803600282979,  
0.4869668407293288,  
0.07342964610078141,  
-0.8928903181234079,  
-0.04262248204617692,  
-0.7602498290394286,  
-0.48858825463899247,  
1.7340528561515622,  
0.7340502315717261,  
0.5163401187759543,  
-0.5015858040228415,  
0.2890335055344555,  
-0.46033506221820203,  
-0.8185907107929625,  
0.4557079379705311,  
1.6601520871164626,  
0.07125306723268252,  
-1.4035119795986863,  
-0.6741575848895364,  
1.84360490583597,  
1.6836338044245691,  
-0.33329370458317326,  
0.19854317161902654,  
2.03917897859608,  
-0.3342251938073038,  
-1.6015864477635742,  
0.35422488479060155,  
0.1487121545506934,  
-0.2821114888507261,  
0.21869934797564045,  
0.7523961573071125,

1.3021785537923125,  
0.26184859002187644,  
1.2441238228144538,  
0.039670539596101485,  
-0.15687777352236798,  
1.1386642271664005,  
-0.13559116971858365,  
0.39167499360215746,  
2.4453261619465274,  
-1.0890320328395309,  
-0.4289422005081893,  
1.425249318116838,  
-0.0016733698174337221,  
0.023121567661497415,  
-0.28325087531692295,  
0.940069260590291,  
1.163437407349777,  
-0.4256527399896147,  
-1.4972731615803316,  
-0.12624975701746496,  
-0.10144651691714318,  
1.3307378561466523,  
0.041778278155808674,  
-1.2746374184036902,  
-1.2216848741140482,  
1.4048769664929757,  
0.8957112974734468,  
1.0058068981677006,  
-3.0965653057688316,  
-0.3344448337959029,  
-1.0948102803209163,  
-0.038478236121346335,  
0.12618687504486675,  
-0.0850775611793361,  
1.33550885346982,  
-0.04334772196309596,  
0.2406908654957122,  
0.7327249608913058,  
0.9966290850109706,  
2.2852565843192423,  
-0.030570948934034583,  
-0.5566407461361556,  
0.813246653395058,  
0.5946355273642772,  
0.07519254658407079,  
0.27120989268694123,  
-0.15415722381241237,  
-1.1239288818585278,  
1.893751281002709,  
0.7530205722182245,  
1.4454588921082565,  
0.15037300343080462,  
0.1793867334099716,  
0.3587259643057371,  
-0.006799349268608,  
1.0907160355013774,  
-0.30186717991666434,  
0.8507589785411056,  
0.009155709268365956,  
-0.8165113788656561,  
0.011816515180360782,  
1.116430418883973,  
1.5343789763879045,  
-0.1682835166498154,  
-1.5032827361947747],  
[ 0.10956969985098665,  
0.4360115975982133,  
0.5932904704915389,  
0.6050451872391112,  
1.3688142364348175,  
1.3737597367805747,  
1.5226773273508583,  
1.5589271816733294,  
3.150320547140947,  
3.1613053536766147,

4.7635234433865605,  
4.823148382609575,  
4.823188243925802,  
7.171157860626202,  
7.171157878485542,  
7.171158529865571,  
7.175073431930883,  
7.183070822592498,  
8.102400589897519,  
8.10392263292654,  
8.103940780725882,  
9.021308924987686,  
9.02133947231205,  
9.082831297490506,  
9.094868565409332,  
9.236804949782064,  
9.237029573386183,  
9.26430291432718,  
10.00744744746223,  
10.032040374677464,  
-0.5042382729215367,  
1.0180015436638659,  
0.10423420212375085,  
-0.3355687578372037,  
-0.3902319222280216,  
-0.09867602213718178,  
0.3860296418386605,  
0.8522828003851446,  
-0.7730596965193267,  
0.08803782521712378,  
1.175277695996097,  
-0.3769225558693855,  
-0.4553519820435133,  
0.4758962487375975,  
-1.0517577693418567,  
0.3712029741888282,  
0.27334544561774066,  
0.03397030216872572,  
0.3891396532807883,  
0.12152393226873999,  
1.5192516885791116,  
-0.5124931636551364,  
-0.5667003913709334,  
-0.08425393582345661,  
-0.8152956002657638,  
-0.008087141654348068,  
-0.20833380477584987,  
-0.19186344764752156,  
0.309463849209865,  
-0.16555810903618162,  
-0.28534485935787846,  
0.025710068868521854,  
-0.9172960495760906,  
0.027100436879331523,  
-0.9806057417125867,  
0.46877133554227174,  
0.22597640762440013,  
-1.8700902599315918,  
-0.6222133609404971,  
0.023922176634194332,  
-0.6777524378245746,  
-0.3883818313368169,  
-0.19921738892417568,  
-1.3418496115619054,  
-0.05365669225714106,  
0.38835985529462186,  
0.46741217514915123,  
-0.1388983196762152,  
1.0002905156718758,  
1.6633296566254185,  
-1.0097136763815113,  
1.203957772036831,  
0.34033273848251194,  
1.1456357751380877,  
-0.4637199651146574,

-0.13624703361320328,  
0.6785440200843139,  
0.21691345067474185,  
-0.4166036808107477,  
1.6003722740710606,  
-0.294881370724797,  
0.04198878790454511,  
-0.689532047804753,  
-1.3911901894570817,  
-1.1667039833298627,  
0.824824800006074,  
0.8047687705752488,  
0.5727196814509768,  
0.2385364014798047,  
-0.512164832149354,  
0.17925141295137917,  
-0.19704824673887428,  
-1.6372757558452697,  
0.5441675736491897,  
-0.13936070677778437,  
1.3935144064781402,  
0.10763856884501717,  
0.6679788244416961,  
-0.33118654939932857,  
-0.35796695002153883,  
0.2632208027041665,  
1.5831503864671255,  
-0.25140146740224,  
1.135774876905931,  
0.5897962040478675,  
-0.7664904031063712,  
1.092649076983624,  
-0.9862462517151122,  
0.010216869101717933,  
0.5705833807099128,  
0.09839127014019662,  
-1.034770130526523,  
0.20582133073730807,  
-0.44428721001967564,  
0.5272444819968604,  
-0.2627660867388947,  
-0.9857421779520247,  
-1.3646538516413942,  
0.14779052759756187,  
1.1207932022043874,  
0.30427416833245535,  
-1.055109005337564,  
0.30548258474769546,  
0.8153937738463674,  
0.5082537250510629,  
-0.2973639305797175,  
0.0034742209991892575,  
1.5168338311712208,  
0.0971904670135119,  
0.5305672799342332,  
-0.08170159551874663,  
0.4909203029282298,  
-1.1771354207712392,  
0.038725619801271274,  
-0.6655680746562402,  
1.312626970471223,  
-1.0115568894576918,  
0.16290676730453105,  
0.3074286838975462,  
0.013117345918778788],  
[ 0.4866654913190249,  
0.4866654913190249,  
1.4314116389487666,  
1.4314116389487666,  
1.548608655381947,  
1.5552664901547235,  
1.662920497545568,  
1.676155881591226,  
1.6952532774325564,  
1.6952532774325564,

2.46741851740979,  
2.50102877426778,  
3.636145431120801,  
3.6361454311208004,  
3.6361454311208004,  
3.6361454311208004,  
3.6361454311208004,  
4.0161273218482085,  
4.0161273218482085,  
4.5411636896776235,  
4.5411636896776235,  
4.922545565757144,  
5.624338470516907,  
5.642847901355697,  
5.904037934138086,  
5.915382265322609,  
6.860930229950661,  
6.860930229950661,  
9.422517992567101,  
9.467623480195014,  
9.467623480195014,  
0.40091998571272736,  
-0.3581846438287994,  
-0.32033246941904975,  
0.24409866553117068,  
0.176560178011825,  
0.4452285262890565,  
-0.37150326481454765,  
-1.0185408309777293,  
1.6197684873006286,  
2.0095194673452026,  
-0.20342804182482532,  
-0.4471079471088122,  
0.37127155242298737,  
0.4199607045713712,  
0.11145558426636207,  
-0.289968410859463,  
0.9752004498173846,  
-0.11972987215087512,  
-0.8215210043660294,  
-0.4144105549344152,  
0.04966095047933562,  
0.6091224412599766,  
-0.2481186610805342,  
-0.9036735819055022,  
0.22922493224752044,  
-0.04567884568114995,  
-0.40529506738584414,  
-0.44609185937563545,  
1.1000542207972743,  
0.8995834380092431,  
-0.4391184290327733,  
-1.623814742575614,  
0.11121717167805684,  
-0.15344289124808663,  
0.7072346226342329,  
0.013911394934765222,  
1.1008239636292285,  
1.1342299046285917,  
-0.1605718532112884,  
-0.8521154510350495,  
-0.9726520318623231,  
-0.11078467990736285,  
1.2893067940177063,  
-0.8656847782514395,  
-0.4554157535410911,  
0.46752563535079134,  
1.0115326820592876,  
-0.017465678177200683,  
0.7555243091795097,  
0.2225241128439446,  
-0.6129237770264853,  
0.36249038141661666,  
-0.1470816778834455,  
-0.23781939745964606,  
0.7410640700988803,

```
-0.10219672891678527,  
-0.9043863030697507,  
-0.054446492384892985,  
-0.23618927113386157,  
-0.3971482428910102,  
0.42980979959963467,  
-0.4511512430809565,  
-0.3322123782853245,  
0.15031459204805087,  
-1.4287283715133035,  
-0.026859055017604255,  
0.20826999854501216,  
-0.016397767746330064,  
-0.026711091547853946,  
0.15899307013846248,  
0.18349959987180348,  
-0.019181103141429404,  
-1.3777401647916119,  
0.05578672583947999,  
-0.17191397249005735,  
0.08492618339903452,  
0.2781511329827625,  
1.6853098582374997,  
-0.7964285169174421,  
0.13628687772581302,  
-0.26524580358677924,  
1.3615146942088054,  
-0.18163849035743365,  
-1.5476669195398023,  
0.2740670870741208,  
0.19740142577560438,  
0.18567840551061798,  
0.43288784764736754,  
-0.8069341399605817,  
1.5139336080928714,  
-0.7594440385529729,  
-0.20443587392639553,  
0.0916888700165231,  
-0.03922249489745327,  
0.4135801157921025,  
-0.06731598775715468,  
0.5038720973518589,  
-0.7705715736697758,  
-1.4775324565516457,  
0.061950004909204714,  
-0.9555167624183505,  
3.1277455162888304,  
-1.137887484425651,  
-0.09852947784569874,  
0.042597844143281625,  
0.06134264537966588,  
0.3384848933516047,  
0.012002169875906457,  
1.5732417764972468,  
-0.3550969359952667,  
0.37821230776206083,  
1.4914211446267915,  
-1.2027836619303884,  
0.22421848814312553,  
-0.2072711571643093,  
0.05122655754886873,  
-1.5578500765322636,  
1.5918641150141506,  
1.2635397829742223,  
-1.2452354025631063]]],  
    'run_time_sec': 43720.81102514267}}]],  
'redundant': [ { 'config': { 'ansatz': { 'gateset': 1,  
    'layer': 30,  
    'ugate': { 'coefficients': { 'bn': [ 0,  
    0,  
    0,  
    0,  
    0,  
    0,  
    0]
```

```
                                'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                'r': 0},
                                'time': {'max': 10.0, 'min': 0.0},
                                'type': 'xy-iss'}},
'init_param': { 'value': [ 0.2383708143795501,
                             0.8137820253985804,
                             1.0561141201801563,
                             1.2070683478267785,
                             1.9518166906091101,
                             2.08301823027678,
                             2.6774459967535513,
                             2.7270096866449576,
                             3.7369434259122447,
                             3.7421546540398443,
                             4.458327272130387,
                             4.463102384700506,
                             4.463102384700506,
                             4.482690585412051,
                             4.482694652744643,
                             4.498978826283554,
                             6.3580266266370415,
                             7.886395999997723,
                             7.886532810158634,
                             8.060529572035655,
                             8.06234783983503,
                             8.127555772505229,
                             8.130166630032164,
                             8.42408407139234,
                             8.433074307328475,
                             9.412401860498063,
                             9.420584174895616,
                             9.429609653004679,
                             9.434851407347677,
                             11.283524698808058,
                             0.19157417616433814,
                             0.42257952171340063,
                             0.3129095694283805,
                             0.28360255750055535,
                             -0.7229159635345903,
                             2.545731433831817,
                             1.1687892956196542,
                             0.5222949375721274,
                             0.9482151911772319,
                             0.28742832079435787,
                             1.1627391357840349,
                             -0.27939056132165146,
                             -0.07574334812551493,
                             -0.529119211391362,
                             -0.08653083237786212,
                             0.042544229108731915,
                             -0.09154582517805988,
                             0.2776265525620834,
                             0.373637405241428,
                             -0.666296500917012,
                             -0.729825790392568,
                             0.36164641825124294,
                             1.2066181407380305,
                             0.18327070025757417,
                             2.2757552060408917,
                             -0.004789158452516104,
                             0.49019439516235463,
                             2.190622553796523,
                             0.6131206832540379,
                             1.0987721265230228,
                             1.9413219378309259,
                             0.07975169469268534,
                             0.17531082109327745,
                             0.01770145552231998,
                             0.22429808435825893,
                             1.1460098869067579,
```



-0.25766861736092417,  
0.4386465248337572,  
0.7521614434169624,  
0.07039918338308593,  
-0.23913727928604284,  
0.062497116873310714,  
0.27575365987954265,  
-0.8268952220573135,  
0.8599765782432734,  
0.6958325703328606,  
-0.16792542378671177,  
-0.13186811496768225,  
0.17745018848846658,  
-0.13764108606901534,  
-0.34798347931108986,  
0.3901205214779397,  
-0.12832331396189006,  
0.7623260417931323,  
-0.08745728181826747,  
0.22448567111633413,  
0.5103689813486589,  
0.020179740460913417,  
-0.4639048953982949,  
1.8052783293547816,  
-0.06895296635033099,  
-0.46137869531525183,  
-0.7694587159951923,  
-0.1507074275764489,  
-3.159084078074864,  
1.5556721360426484,  
0.9802025173412374,  
-1.5980562353917622,  
0.9974678614222413,  
0.11965749551778265,  
-0.5964068365118492,  
1.00912773091807,  
1.2674306548806673,  
1.7418320010188646,  
-1.2223756485879664,  
-0.006270145144671745,  
0.7863824204489233,  
-0.08410721186616651,  
0.13420385894759826,  
0.6686584151585806,  
-0.7946689395347296,  
-1.448768973512125,  
-0.4158373205099576,  
-0.1003664997933048,  
0.5370971852976741,  
-0.013369261455621718,  
-1.2134070474127567,  
2.71822204346588,  
-0.8266087910498845,  
-0.04274152999618493,  
0.627725493238542,  
-0.10714625448592663,  
1.4055199595750496,  
-0.08877591733311402,  
-0.6400618055168635,  
0.27990653766167567,  
0.27230874688701184,  
1.8329367216853043,  
0.12128377229042309,  
0.03719209379786179,  
0.7558193864298689,  
-0.027085062677120984,  
0.7947118159580207,  
-0.18810209431195668,  
0.008294184744538372,  
-0.9110921816475059,  
1.3065108206329406,  
0.004810940817056788,  
1.4030602129547465,  
0.03878633149748846,  
0.29850504257680605,

```

-0.9524583070906825,
0.10037229527914636,
0.4277056649647598,
-2.2528322583674503,
0.030724614514628212,
0.8416350822543037,
1.5579013461800135,
0.5696673724928452,
-1.5352194543526818]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#4'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                '6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                                         '0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + '
                                                         '0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + '
                                                         '0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + '
                                                         '0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + '
                                                         '0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + '
                                                         '0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.418732841657523],
                              [12, 6, 0, 0, -5.8155731075176975],
                              [20, 10, 0, 0, -4.600391600363878],
                              [28, 14, 0, 0, -3.6713467271615334]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                     'identity_factors': [0, 0, 0, 0],
                     'noise_level': [4, 2, 0, 0],
                     'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

```

```

0.001,
0.001,

'noise_prob': [
0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {

'noise_prob': [
0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'noise_prob': [
0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
'identity_factors': [3, 3, 0, 0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {

'noise_prob': [
0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4}],
'run_time_sec': 10.84847092628479}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.3442332088020621,
0.7247295953616149,

```

0.7247295953616149,  
0.7610537291022658,  
1.7162580174489597,  
2.0119282772467635,  
2.0119282772467635,  
3.369934702704019,  
3.369934702704019,  
5.00211845115155,  
5.212181786011135,  
5.346566249705437,  
6.103091648910964,  
6.103091648910964,  
7.050711873868975,  
7.050711873868975,  
7.492144583370162,  
7.492144583370162,  
7.606105711064038,  
7.606105711064038,  
8.717193051662631,  
8.753101318062777,  
8.877107151002964,  
8.889590522678484,  
8.982812044989718,  
8.982812044989718,  
9.499874357008034,  
9.499874357008034,  
9.659025604148875,  
9.671110590806489,  
0.02814413440270558,  
0.250593445582179,  
0.17496868989230024,  
-0.19749991731592192,  
-0.5878125517240043,  
1.1370895496823794,  
0.3339578948727643,  
0.30833012680275795,  
0.21147160367429677,  
0.5518340573364652,  
0.9816766119937317,  
-1.3427949214182668,  
2.2864376119784486,  
0.673664283367827,  
0.4767745045632036,  
-0.47480445681581174,  
0.05912449937800317,  
0.9513757199218045,  
1.079093875588678,  
-0.4313388366547843,  
0.43347513808131466,  
-0.3381632209207048,  
-0.42699598389932686,  
-1.1528003206699722,  
0.2505681368756031,  
1.1900947118566725,  
-0.38260053073473543,  
-0.6405385159573362,  
0.08926968472452403,  
-0.04834256297702397,  
1.603027736914297,  
-0.44672812120859223,  
-0.5759172165575565,  
1.25237714334681,  
0.04254918814060746,  
-0.002429292667880943,  
0.47732275422632153,  
-0.10204026491637587,  
0.02357869435971368,  
0.06910865492863566,  
-0.5942663805386644,  
1.1629666490831163,  
0.28625726751699415,  
0.4183193427753825,  
0.33026699893767814,  
1.8860632823719743,  
-0.37929215782635534,



```

        'noise_prob': [0.001, 0.001, 0, 0],
        'status': True,
        'type': 'depolarizing'},
    'nqubits': 7,
    'observable': { 'coefficients': { 'bn': [ 1.0,
        1.0,
        1.0,
        1.0,
        1.0,
        1.0],
        'cn': [ 0.5,
        0.5,
        0.5,
        0.5,
        0.5,
        0.5],
        'r': 1},
        'def': 'ising'},
    'output': { 'draw': { 'fig_dpi': 100,
        'status': False,
        'type': 'png'},
        'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#5'},
    'redundant': { 'identity_factors': [ [0, 0, 0, 0],
        [1, 1, 0, 0],
        [2, 2, 0, 0],
        [3, 3, 0, 0]],
    'run': 'redundant',
    'state': 'dmatrix',
    'vqe': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
        'constraint': True,
        'status': False}},
    'zne': { 'data_points': None,
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
    'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
        '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
        '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
        '6 + 1 Z 5 + 1 Z 6',
        'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
        '0.5 Z 0 Z 1 + '
        '0.5 X 1 X 2 + '
        '0.5 Z 1 Z 2 + '
        '0.5 X 2 X 3 + '
        '0.5 Z 2 Z 3 + '
        '0.5 X 3 X 4 + '
        '0.5 Z 3 Z 4 + '
        '0.5 X 4 X 5 + '
        '0.5 Z 4 Z 5 + '
        '0.5 X 5 X 6 + '
        '0.5 Z 5 Z 6']],
    'output': { 'data_points': [ [4, 2, 0, 0, -7.407206817517893],
        [12, 6, 0, 0, -5.829141582765497],
        [20, 10, 0, 0, -4.618573032874505],
        [28, 14, 0, 0, -3.681441154365551]],
    'noise_details': [ { 'gates_num': [4, 1, 1, 0],
        'identity_factors': [0, 0, 0, 0],
        'noise_level': [4, 2, 0, 0],
        'noise_profile': {
'noise_on_init_param': { 'status': False,
        'value': 0},
        'noise_prob': [
0.001,
0.001,
0,
0],
        'status': True,
        'type':
'depolarizing'},
        'odd_wires': 4},
        { 'gates_num': [12, 3, 1, 0],
        'identity_factors': [1, 1, 0, 0],

```

```

'noise_level': [12, 6, 0, 0],
'noise_profile': {

'noise_prob': [

0,
0],

'status': True,
'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {

'noise_prob': [

0,
0],

'status': True,
'type':

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
'identity_factors': [3, 3, 0, 0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {

'noise_prob': [

0,
0],

'status': True,
'type':

'odd_wires': 4}},
'run_time_sec': 11.273851871490479}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}}},
'init_param': { 'value': [ 0.17961742860022237,
0.4029745783400613,
0.4271020388774394,
0.6998927493507625,
1.1444327445959492,
1.4463150894355827,
1.7859669797147917,
1.7859669797147917,
1.8910076260348616,
2.1568466639380097,
2.184715675260106,
2.3241261579565067,
5.221288254664872,

```

5.360678146313719,  
5.572749542622228,  
6.315664711217606,  
6.332942041057151,  
7.225695385348529,  
7.238714694082236,  
7.767863290353532,  
7.947954629935657,  
8.045079231148478,  
8.080705184182557,  
8.235317994608641,  
8.52967785406855,  
8.920755162601605,  
8.920755162601605,  
8.920755162601605,  
9.75907480462672,  
11.068402571583377,  
-0.07026370230905016,  
1.2758275954101812,  
0.1960569796315372,  
-0.7454998985427054,  
0.5260870873255556,  
1.3632265149428353,  
0.06759709485075166,  
0.7201883678889174,  
0.7780364770341424,  
0.7034018811814728,  
-0.3281225120527201,  
-0.21523884970562404,  
0.3525948786581971,  
0.10058439953616755,  
0.8489242437750127,  
0.4102210250930649,  
-1.1239274808373552,  
-0.07527028057729333,  
-0.662823747816413,  
-0.09016589559770041,  
0.0005078927131911535,  
-0.9974030724775158,  
1.2973260682530905,  
0.6207513445119947,  
-0.06959715000945968,  
0.01479447508324883,  
0.5707366547040263,  
0.8024230791007029,  
0.11580671533830131,  
0.5319238260215059,  
2.029703693625361,  
0.8476591202353092,  
-0.5985490132202251,  
-1.0850372047073247,  
-0.13885829158476937,  
0.6160884575951602,  
-0.6119315652443118,  
0.25456754270344084,  
1.6135141314150674,  
1.6101080474118592,  
-1.0046888465114787,  
-1.2174288348798858,  
-0.8801790341822278,  
-0.01998793431745051,  
-1.007194981866689,  
-1.6365882266166358,  
3.524880820008825,  
1.5399950054830251,  
-1.401820445976074,  
-0.04945776017633801,  
0.9565666812114323,  
-0.20490442564626934,  
-0.5632271134618189,  
1.0033608730635488,  
0.12368927199762578,  
-0.06153617179775209,  
1.0557374829951787,  
1.532632985657107,



```
-0.3069192599686721,  
1.8620498010178619,  
0.18083984306067874,  
-0.9702971127887235,  
-0.4866438529829019,  
0.2527358034573417,  
0.46390718912935613,  
0.05253485630073179,  
-0.15957905175444287,  
0.5064463362180326,  
0.6588516997606392,  
0.036226022952260704,  
-1.5941274572195923,  
0.3692191472654626,  
0.31840120283705997,  
0.8741993879399423,  
0.4802653460337955,  
0.3012459045041651,  
0.5102022084743536,  
0.3727970282915065,  
0.6665750190815365,  
-0.7773615380935764,  
0.12852119124454983,  
0.6774482070442244,  
-0.34235651892527574,  
-1.1577831131801597,  
-0.2879120353476077,  
1.157549789799121,  
-0.1818163295634488,  
-0.034519908964088415,  
-0.6744130553492667,  
1.1322140576298956,  
0.5044463860518625,  
1.5469749343656427,  
-0.19451127779487945,  
0.16868157432748737,  
0.3887158384137858,  
1.179393002549757,  
0.4377598134949622,  
0.42273561999328285,  
0.17555703442650725,  
0.7637154786900613,  
0.3204620558964089,  
-1.0127445325141415,  
-0.3366137672636463,  
-0.6128563234467006,  
-0.19959799618607235,  
-0.22993024268879514,  
0.6548635589470768,  
0.5449412421525476,  
0.11171602982233311,  
0.5174688869584806,  
-0.0926785574168733,  
-0.012796553414024043,  
0.872831179387319,  
-0.3738274777631416,  
0.708424995234135,  
1.1207261796968788,  
0.39043722964884914,  
1.5466373285390471,  
-0.0566526099067629,  
-1.544789451209757]],  
'noise_profile': { 'noise_on_init_param': { 'status': False,  
                                             'value': 0},  
                   'noise_prob': [0.001, 0.001, 0, 0],  
                   'status': True,  
                   'type': 'depolarizing'}},  
'nqubits': 7,  
'observable': { 'coefficients': { 'bn': [ 1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0,  
                                           1.0]
```

```

        'cn': [ 0.5,
                0.5,
                0.5,
                0.5,
                0.5,
                0.5],
        'r': 1},
    'def': 'ising'},
    'output': { 'draw': { 'fig_dpi': 100,
                          'status': False,
                          'type': 'png'},
                'file_name_prefix':

'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#9'},
    'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                          [1, 1, 0, 0],
                                          [2, 2, 0, 0],
                                          [3, 3, 0, 0]],

    'run': 'redundant',
    'state': 'dmatrix',
    'vqe': { 'iteration': 1,
              'optimization': { 'algorithm': 'SLSQP',
                                'constraint': True,
                                'status': False}},

    'zne': { 'data_points': None,
              'degree': 0,
              'method': 'richardson',
              'sampling': 'default'}},
    'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                     '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                     '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                     '6 + 1 Z 5 + 1 Z 6',
                'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                                            '0.5 Z 0 Z 1 + '
                                                            '0.5 X 1 X 2 + '
                                                            '0.5 Z 1 Z 2 + '
                                                            '0.5 X 2 X 3 + '
                                                            '0.5 Z 2 Z 3 + '
                                                            '0.5 X 3 X 4 + '
                                                            '0.5 Z 3 Z 4 + '
                                                            '0.5 X 4 X 5 + '
                                                            '0.5 Z 4 Z 5 + '
                                                            '0.5 X 5 X 6 + '
                                                            '0.5 Z 5 Z 6']],

    'output': { 'data_points': [ [4, 2, 0, 0, -7.395384341095474],
                                  [12, 6, 0, 0, -5.790856073500346],
                                  [20, 10, 0, 0, -4.565524427603155],
                                  [28, 14, 0, 0, -3.622528542539368]],

    'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                          'identity_factors': [0, 0, 0, 0],
                          'noise_level': [4, 2, 0, 0],
                          'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},

                                'noise_prob': [

0.001,
0.001,

                                0,
                                0],

                                'status': True,
                                'type':

'depolarizing'},

                                'odd_wires': 4},
                                { 'gates_num': [12, 3, 1, 0],
                                  'identity_factors': [1, 1, 0, 0],
                                  'noise_level': [12, 6, 0, 0],
                                  'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},

                                'noise_prob': [

0.001,
0.001,

                                0,
                                0],

                                'status': True,
                                'type':

```

'depolarizing'},

'noise\_on\_init\_param': { 'status': False,  
                          'value': 0},

0.001,  
0.001,

'depolarizing'},

'noise\_on\_init\_param': { 'status': False,  
                          'value': 0},

0.001,  
0.001,

'depolarizing'},

'odd\_wires': 4},  
{ 'gates\_num': [20, 5, 1, 0],  
  'identity\_factors': [2, 2, 0, 0],  
  'noise\_level': [20, 10, 0, 0],  
  'noise\_profile': {

'noise\_prob': [

0,  
0],

'status': True,  
'type':

'odd\_wires': 4},  
{ 'gates\_num': [28, 7, 1, 0],  
  'identity\_factors': [3, 3, 0, 0],  
  'noise\_level': [28, 14, 0, 0],  
  'noise\_profile': {

'noise\_prob': [

0,  
0],

'status': True,  
'type':

'odd\_wires': 4}},  
  'run\_time\_sec': 10.623285293579102}},  
{ 'config': { 'ansatz': { 'gateset': 1,  
                          'layer': 30,  
                          'ugate': { 'coefficients': { 'bn': [ 0,  
  0,  
  0,  
  0,  
  0,  
  0,  
  0],  
                          'cn': [ 0.5,  
                                  0.5,  
                                  0.5,  
                                  0.5,  
                                  0.5,  
                                  0.5],  
                          'r': 0},  
                          'time': {'max': 10.0, 'min': 0.0},  
                          'type': 'xy-iss'}},  
  'init\_param': { 'value': [ 0.5482907189468895,  
                              0.6413620809492503,  
                              0.6422482149552934,  
                              1.5892409709442974,  
                              1.850708229814058,  
                              1.850708229814058,  
                              1.8745552660050262,  
                              2.400679867939261,  
                              2.402212278134192,  
                              2.485190345183722,  
                              2.485190345183722,  
                              2.4851903451837223,  
                              2.488397493491329,  
                              2.4883974934913287,  
                              5.077476636438464,  
                              5.077476636438464,  
                              5.732990197214016,  
                              5.806868622878696,  
                              5.817834245705687,  
                              6.166757373752113,  
                              7.3114292874931905,  
                              7.311858449036949,  
                              8.346734585466223,  
                              8.350435170229554,

8.354614694314481,  
8.35659817980371,  
8.356905245901928,  
9.313534396314816,  
9.313534396314816,  
10.443787047737276,  
-0.5971318801423705,  
-0.6830583120471296,  
0.053446928626708114,  
-1.488251087277441,  
0.740998345617078,  
-0.020561007687691084,  
-0.47029189134787985,  
-0.9187802118512801,  
-0.07390570205801456,  
0.6091612085770479,  
0.5696050095749661,  
-2.634874245900948,  
0.14733366015521565,  
1.0781100436188797,  
0.3459269460772517,  
1.2820636645787713,  
-1.605623121104658,  
0.856791024529966,  
0.16374864437029604,  
-0.7377840957855112,  
0.7603752030179747,  
0.4958590077418653,  
1.0293890027768824,  
0.4862585296205842,  
-1.0838654128292502,  
1.2632637762941026,  
-1.1043454462318527,  
-0.7867654190654241,  
0.8818217647037212,  
1.0406267750063978,  
0.05770567519039498,  
-0.5922070722918433,  
-0.3271403288282926,  
0.5980786503295974,  
-0.02050375112330311,  
-0.9007241609880184,  
0.5239405469453117,  
0.7601496703420288,  
-0.6449049942439851,  
1.7340858429103823,  
0.10050113333288421,  
0.3143347863780438,  
0.28408386490618526,  
-0.1222389867527315,  
-0.09502282329152913,  
-1.3004368662949968,  
0.16856179320059875,  
0.6790103402211991,  
0.3355977478652572,  
0.0935957266804422,  
0.42936820813464754,  
0.5148227650107633,  
0.10764356588532305,  
-0.054251737808208085,  
0.06525040933822983,  
-0.21143245853075732,  
-1.5801988491404158,  
0.023513208971767067,  
1.0921277689034055,  
-0.11501776583679489,  
-0.14182911234947893,  
1.8716225858725093,  
-1.0747761250482988,  
-0.01873186129021693,  
0.9952348515577564,  
1.5589645169221944,  
2.4625123021717044,  
1.5320934484141422,  
0.6264578101560674,

```

0.015802850908690148,
0.6559295719723718,
0.5030706883609005,
0.010357532831659657,
-0.6971755064049523,
-1.334963536555068,
0.05714132580252865,
0.9478292633237722,
1.541635767019547,
-1.2357775558070643,
1.5753066317572375,
1.2206753513411082,
-0.013882574638756213,
2.102115305768464,
0.6867648509985108,
-1.0810617894892982,
0.608205793929093,
-1.0701207529796843,
-0.008804617073740417,
1.0802724219136723,
1.4472704941581649,
-0.525983160453369,
0.10347757085774918,
0.07451664808136123,
0.8113743025574697,
-0.19830571509994802,
0.20760359505818776,
-0.5709476706639499,
0.1791350390980861,
-0.32061652775092425,
-1.6382844876022806,
2.271046687924862,
0.09972766177435569,
1.671157305178672,
1.0596955078067567,
-0.7395801076185267,
-0.8217251410877643,
1.2660358026872456,
-0.149859182069558,
1.7386861885389688,
-0.003505497297480453,
0.677126408740769,
-1.0541684899696007,
0.9437251450981726,
1.7354017388586316,
-0.8022872949930118,
0.01881044769021433,
-0.013699411839369284,
1.5965466699123847,
0.4486397166383021,
1.5669137279484207]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [ 0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5],
                                'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},

```

```

'file_name_prefix':
'AUTOMATE_xy_noise_free_time_evo_ric4_unifrom_scaling_sample#1'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                      [1, 1, 0, 0],
                                      [2, 2, 0, 0],
                                      [3, 3, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                '6 + 1 Z 5 + 1 Z 6',
'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                             '0.5 Z 0 Z 1 + '
                                             '0.5 X 1 X 2 + '
                                             '0.5 Z 1 Z 2 + '
                                             '0.5 X 2 X 3 + '
                                             '0.5 Z 2 Z 3 + '
                                             '0.5 X 3 X 4 + '
                                             '0.5 Z 3 Z 4 + '
                                             '0.5 X 4 X 5 + '
                                             '0.5 Z 4 Z 5 + '
                                             '0.5 X 5 X 6 + '
                                             '0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.463351332654992],
                              [12, 6, 0, 0, -5.841676652164559],
                              [20, 10, 0, 0, -4.604434423168805],
                              [28, 14, 0, 0, -3.651723685315627]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                     'identity_factors': [0, 0, 0, 0],
                     'noise_level': [4, 2, 0, 0],
                     'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
  'identity_factors': [3, 3, 0, 0],
  'noise_level': [28, 14, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4}
]
}
}

```

```

0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
'identity_factors': [3, 3, 0, 0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {

'noise_prob': [

0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 9.285445213317871}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}}},
'init_param': { 'value': [ 0.5698358581496117,
1.0111463732621893,
1.116254023022104,
1.116254023022104,
1.4543153683590362,
1.4543153683590362,
1.551144943675129,
1.551144943675129,
2.3321866923810566,
2.4857852178760083,
3.837593499897418,
3.837593499897418,
3.837593499897418,
3.837593499897418,
4.847467397840062,
5.03660309473088,
5.176578602594472,
5.176578602594472,
5.214332760543968,
6.547255537065404,
6.547255537065404,
7.083633091144979,
7.083633091144979,
7.133204014188821,
7.133204014188821,
7.133204014188821,
7.937225733864811,
8.370661235857398,
8.62656679928389,
8.759707620277526,
9.424598849529344,
0.24247733923543782,
0.79275118507479,
-0.012314768690710378,
1.2247395896468714,
-0.6087890007814074,
```

0.9804698093938512,  
0.19554007335952167,  
-0.18291383394130525,  
-0.08254523307317092,  
0.18380200005144362,  
-0.06242013495608768,  
-0.18902966193120999,  
0.4846770511497838,  
1.2162916157423216,  
0.4476502570273604,  
-0.5204828708955642,  
1.1525916637240337,  
0.9814837501696517,  
1.2019836737296188,  
0.10039944576408244,  
-1.165620769823409,  
0.5709783345435084,  
0.04690539627488982,  
0.3150855883896384,  
0.6835833386917337,  
0.7350671828581666,  
0.15105693185753874,  
0.7851129846448224,  
-0.290237804763004,  
0.02628688844012564,  
-0.3427838784588314,  
-0.12202424723691215,  
0.30368921729231485,  
-0.08398845633414893,  
-0.34421225485285395,  
-1.0992299599969957,  
-0.6679166311787512,  
-0.4925602784337871,  
-0.7607905356843834,  
-0.061822787578292515,  
-0.33643902903801526,  
1.7237644621079549,  
1.1087838048318122,  
1.4391293107545464,  
-0.2688865923867924,  
0.07238699078201241,  
-0.7262166431073663,  
-0.8607492696026928,  
0.1828620517189283,  
-1.5556021786529124,  
-0.5230641559705965,  
-0.023465829708141782,  
0.5773817105800866,  
-0.6189512057198875,  
-0.1704298219551506,  
0.6935490081871019,  
0.43024761601627914,  
-1.3818053283072975,  
0.32069867830077864,  
0.11223505487625844,  
-0.6642209341325642,  
-0.7163563578386999,  
0.9533459704680486,  
-2.5373567196844773,  
-0.3530595330204968,  
-0.36744271288254204,  
-0.4105700661159024,  
-0.529185988706723,  
-0.5074466275713505,  
0.5969687397167245,  
0.1454479675984071,  
0.9510340399481164,  
-0.16051754924491393,  
0.168676911677473,  
1.6243103666539225,  
-0.3533677275828062,  
0.23248347317288842,  
1.550100715213732,  
0.3540002793004863,  
0.11004939052123668,



```

0.0026309322638186474,
1.0023099891482978,
1.3075603782358884,
0.06614039249633322,
0.12696883216368457,
0.4650745950568721,
0.09288306127511851,
-0.05535633254466518,
1.0893487961438044,
0.1856572010619516,
-0.3369565165204948,
1.1993442715596423,
-0.1637322799431796,
-0.05574034797393315,
-0.6499132821077687,
-1.1854402746414112,
-0.20554021240749126,
-0.697991352679575,
0.7715290435685477,
0.27728540290360154,
-0.7490020286422794,
0.6727458447445039,
-1.3928966895283914,
-1.1123692530480307,
1.2429888713160355,
0.5002310144425463,
1.0425617895549082,
-0.41250228671824735,
-0.20782873770333182,
0.952256354944612,
-0.2180059005687231,
0.8024032545701543,
-1.0975152466418368,
0.6192383355749876,
-0.44420258004771784,
-1.3605235580058401,
1.4196204597477091,
-1.1230853758949062,
0.09475958663430169,
0.9412942473630452]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]],
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,

```

```
'status': False}},
    'zne': { 'data_points': None,
             'degree': 0,
             'method': 'richardson',
             'sampling': 'default'}},
    'others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                     '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                     '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                     '6 + 1 Z 5 + 1 Z 6',
                'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                                            '0.5 Z 0 Z 1 + '
                                                            '0.5 X 1 X 2 + '
                                                            '0.5 Z 1 Z 2 + '
                                                            '0.5 X 2 X 3 + '
                                                            '0.5 Z 2 Z 3 + '
                                                            '0.5 X 3 X 4 + '
                                                            '0.5 Z 3 Z 4 + '
                                                            '0.5 X 4 X 5 + '
                                                            '0.5 Z 4 Z 5 + '
                                                            '0.5 X 5 X 6 + '
                                                            '0.5 Z 5 Z 6']},
    'output': { 'data_points': [ [4, 2, 0, 0, -7.159167099826595],
                                  [12, 6, 0, 0, -5.573237410199789],
                                  [20, 10, 0, 0, -4.355904736591592],
                                  [28, 14, 0, 0, -3.4138455900908444]],
               'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                    'identity_factors': [0, 0, 0, 0],
                                    'noise_level': [4, 2, 0, 0],
                                    'noise_profile': {
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
  'identity_factors': [3, 3, 0, 0],
  'noise_level': [28, 14, 0, 0],
  'noise_profile': {
'noise_prob': [
0.001,
0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4}]}},
    'noise_on_init_param': { 'status': False,
                              'value': 0},
    'noise_on_init_param': { 'status': False,
                              'value': 0},
    'noise_on_init_param': { 'status': False,
                              'value': 0},
    'noise_on_init_param': { 'status': False,
                              'value': 0}
```

```

'value': 0},

0.001,
0.001,

'noise_prob': [
0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4}},
'run_time_sec': 11.1983642578125}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}}},
'init_param': { 'value': [ 4.1837705414928806e-17,
1.1742327239243593,
1.1742327239243593,
1.174232723924359,
1.3021435979041922,
1.3883521076730898,
1.4901272631800928,
1.490127263180093,
1.490127263180093,
2.542545188872923,
2.56739133991554,
2.677178516908646,
5.624946341909109,
5.624946341909109,
5.63924283183031,
5.672838193807689,
5.672838193807689,
5.672838193807689,
5.672838193807689,
5.672838193807689,
5.805507018952099,
5.858678454346443,
7.374841183417447,
7.374841183417447,
9.078346087689514,
9.17910617229311,
9.185363997877552,
9.550522060955204,
9.715006087156702,
0.5380723684568228,
0.20346632529178696,
-0.28402043001150323,
-0.013694659434132353,
-0.8491217472851175,
-0.13891219530245408,
-0.7902948900320785,
0.02035105936303376,
0.35891510624171696,
0.07011262472067725,
0.2571910630887441,
0.0972780792224965,
-0.4253506785797692,
-0.08201618636277365,
-0.5629942371157008,
0.4984357070329931,

```

0.22460606922422946,  
0.6436861273901548,  
0.5581387866543217,  
0.6438048424266741,  
0.6625810608832491,  
-0.2877740698749285,  
0.03400434270310955,  
0.6598198228171638,  
0.15695492486622947,  
-0.23277712193728803,  
0.3379436543817524,  
0.6679629986711755,  
0.4913802101172593,  
-0.6543304626041586,  
1.2398324170787045,  
0.10868488610295632,  
0.4726806257545104,  
-1.0278416218016544,  
-0.5660236088762642,  
-0.06627186605932975,  
0.3527547117645279,  
0.3944014355355292,  
0.33709190475341266,  
0.16707772676088822,  
0.29195080738380563,  
1.0354529601392413,  
0.12500585138196232,  
-0.037178956773431956,  
0.7823218278561086,  
-0.04464215343745706,  
-0.36923576305262273,  
-0.9863817864437636,  
0.039519076991602065,  
-0.35646400258617383,  
0.04542480304419608,  
-0.46125271135496354,  
0.40472620693719735,  
0.7802480661953589,  
-0.6757172179201896,  
0.6396142241310521,  
0.2327897749192615,  
0.8954622299286413,  
0.7158405805761733,  
0.1382139633537826,  
1.0616928944303126,  
-0.6122315420380016,  
-0.6738539946512315,  
1.0433459792659807,  
0.494526070112864,  
0.20621322780405107,  
-0.05318175489586881,  
-0.11213659998229918,  
0.32941262943060273,  
0.13931786347259914,  
-0.07640781308377202,  
0.31450116184408605,  
0.3658109215963646,  
0.04460349089074807,  
-0.12913310998017427,  
0.31890485610090735,  
-0.005491508360761248,  
1.2692063073436923,  
-0.3006174703747285,  
-0.41404661321397057,  
-0.5199199797590206,  
0.44225909618051784,  
-0.4233007342169607,  
0.7456354776212751,  
-0.32484988424610756,  
0.9268151291603125,  
0.8385591284905366,  
0.027219364270413358,  
-0.5520387125082392,  
1.3757901840365965,  
0.02933419406725825,

[illegible]

```

'0.5 X 1 X 2 + '
'0.5 Z 1 Z 2 + '
'0.5 X 2 X 3 + '
'0.5 Z 2 Z 3 + '
'0.5 X 3 X 4 + '
'0.5 Z 3 Z 4 + '
'0.5 X 4 X 5 + '
'0.5 Z 4 Z 5 + '
'0.5 X 5 X 6 + '
'0.5 Z 5 Z 6']],
'output': { 'data_points': [ [4, 2, 0, 0, -7.130214875567141],
                              [12, 6, 0, 0, -5.622281179564727],
                              [20, 10, 0, 0, -4.4547314200293675],
                              [28, 14, 0, 0, -3.544056752302471]],
  'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                      'identity_factors': [0, 0, 0, 0],
                      'noise_level': [4, 2, 0, 0],
                      'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,

0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,

0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,

0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
  'identity_factors': [3, 3, 0, 0],
  'noise_level': [28, 14, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

'noise_prob': [
0.001,
0.001,

0,
0],
'status': True,
'type':

'depolarizing'},

'odd_wires': 4}]],
'run_time_sec': 9.331718683242798}},

```

```
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'xy-iss'}}},
  'init_param': { 'value': [ 0.003408343124459994,
                              0.0034083431244599804,
                              0.006710027629051694,
                              0.2484817728699434,
                              1.1672656342280407,
                              1.167470260322433,
                              3.1453440534904744,
                              3.166261678218574,
                              3.2843704266652405,
                              4.089250903115526,
                              4.091989893807717,
                              4.091989893807717,
                              5.181052167254873,
                              5.181052167254873,
                              5.184972473956635,
                              5.585122024093685,
                              5.5990893229720795,
                              5.630355974178803,
                              5.704160317443757,
                              8.658831571647385,
                              8.66505230970618,
                              8.712765508205756,
                              8.712765508205756,
                              8.712765508205756,
                              9.168875276976076,
                              9.176734348833309,
                              9.262471352200725,
                              9.262471352200725,
                              10.578606537988184,
                              10.578606537988184,
                              1.5905119084430799,
                              0.8691136234632737,
                              0.04907693052707525,
                              -0.23336553986203207,
                              0.4284777328779486,
                              2.2866815267075147,
                              0.1760352312050406,
                              0.27820168999860917,
                              2.067264415281462,
                              0.5755331494929522,
                              -0.06858856463703264,
                              -0.7222667597755238,
                              0.7750924366303688,
                              -0.278304785792398,
                              0.5352624789798245,
                              -1.1702690163303244,
                              -0.012717570027659048,
                              -0.07125250327360101,
                              1.7927644689789062,
                              1.3752915621891346,
                              -1.1981440291126808,
                              -0.30737164793891514,
                              0.2657743539912098,
                              0.04156274567190095,
                              1.1363043468044227,
                              0.059217925806269944,
                              0.7608352104096147,
```

-0.1513784586666425,  
0.025696061144845524,  
0.861481321747562,  
-0.48544656000194114,  
-0.006033515622113467,  
0.473431667961849,  
1.5469119181224316,  
0.1871819193791605,  
1.555475823471471,  
0.9001349633565042,  
-1.5961139272878428,  
-0.6749613217725859,  
-1.5596468027729833,  
0.5296186936496604,  
-0.8549575199843406,  
1.7649719371938613,  
1.5569889217595585,  
-0.9244334407213903,  
-1.5804326845781602,  
0.3840271097002098,  
-0.8070678340768227,  
-0.48791686278645724,  
0.13110829311357092,  
-2.023238766590243,  
-0.8997043584182223,  
0.8435119798114825,  
0.12108034013815198,  
-0.7013572315179941,  
0.05813246571029178,  
-1.3645229029121433,  
-1.704441396215925,  
0.6160899239086374,  
-1.6580292769388947,  
-1.550797918270104,  
-0.033040246679508146,  
-0.7595754539148374,  
0.6024045095197653,  
0.446745843265138,  
0.9717727329863253,  
-1.3190014690683383,  
-3.180952616822137,  
-0.47685451708111876,  
0.03958388950097112,  
-0.04894683660460036,  
-0.013869967587830365,  
0.9715551393376142,  
-0.2688733257646762,  
-1.7112803723577967,  
-0.06346862095088202,  
1.2756440828431679,  
0.4087049517265435,  
-0.4433737535464867,  
0.07044159255576982,  
0.877714241226598,  
-0.33059433004855665,  
-0.41683973817974146,  
-0.09123983383660174,  
1.153451542408442,  
1.5381060924707182,  
1.4432055127327397,  
0.7948381511053778,  
0.12126271666707081,  
0.3736422837955817,  
-0.06595460407520624,  
-0.1569219765005705,  
1.4053035958769775,  
-0.3443177603686477,  
0.14604377230684606,  
0.733462484703497,  
1.2365404639754205,  
-0.020105376528163625,  
-0.09631958929266826,  
-0.16876809298151013,  
0.42184799028013376,  
0.8803036484986011,



```

-0.4148292271104988,
0.011464734896518355,
1.0895788780475535,
-0.006017115067308532,
0.6476481463328121,
-0.4792828310008005,
1.7145504838049759,
0.9300252591703124,
1.4147034805691376,
-0.04601267898776636,
-0.34579443398211707,
0.006107561937391137,
2.7608588509789516,
-2.470402787070412,
-0.2193552778493498,
-0.43636419827955597,
0.5036040054264609,
-0.006776779992121664]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#7'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                '6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                                         '0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + '
                                                         '0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + '
                                                         '0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + '
                                                         '0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + '
                                                         '0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + '
                                                         '0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.568863804770513],

```

```

[12, 6, 0, 0, -6.084665473601484],
[20, 10, 0, 0, -4.914126798758423],
[28, 14, 0, 0, -3.985131466280292]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                    'identity_factors': [0, 0, 0, 0],
                    'noise_level': [4, 2, 0, 0],
                    'noise_profile': {

'noise_on_init_param': { 'status': False,
                        'value': 0},

                                'noise_prob': [

0.001,
0.001,

                                0,
                                0],

                                'status': True,
                                'type':

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {

'noise_on_init_param': { 'status': False,
                        'value': 0},

                                'noise_prob': [

0.001,
0.001,

                                0,
                                0],

                                'status': True,
                                'type':

'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
  'identity_factors': [2, 2, 0, 0],
  'noise_level': [20, 10, 0, 0],
  'noise_profile': {

'noise_on_init_param': { 'status': False,
                        'value': 0},

                                'noise_prob': [

0.001,
0.001,

                                0,
                                0],

                                'status': True,
                                'type':

'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
  'identity_factors': [3, 3, 0, 0],
  'noise_level': [28, 14, 0, 0],
  'noise_profile': {

'noise_on_init_param': { 'status': False,
                        'value': 0},

                                'noise_prob': [

0.001,
0.001,

                                0,
                                0],

                                'status': True,
                                'type':

'odd_wires': 4}],
'run_time_sec': 11.694263696670532}},
{ 'config': { 'ansatz': { 'gateset': 1,
                        'layer': 30,
                        'ugate': { 'coefficients': { 'bn': [ 0,
                                                            0,
                                                            0,
                                                            0,
                                                            0,
                                                            0,
                                                            0],
                                                    'cn': [ 0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5,
                                                            0.5]
                                                    }
                        }
                    }
}

```

```
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.01970245038838479,
0.18403088824160574,
0.23516669011749736,
0.3619340287619915,
0.7559235356843684,
0.8037553588156275,
0.8037553588156274,
0.8037553588156274,
1.523650120002224,
1.5399034674182392,
3.5267025169505333,
3.526702516950533,
4.657784878324055,
4.735234101549794,
4.768060921347247,
6.910522417024203,
6.910522417024203,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
8.950027818739875,
8.950027818739875,
8.950027818739875,
8.950027818739875,
8.950027818739875,
9.275481401407285,
0.034552241786943605,
0.7960682992937013,
-0.16960774395822967,
-0.13488653659207303,
-0.07127010448742209,
0.7213919487775996,
0.07517487951530155,
0.7669403129297154,
-0.0980146039609658,
0.2841753594230342,
0.41897129078802076,
0.7644737129881134,
0.21659836679204617,
0.40978346593820614,
0.23386906952753808,
0.6351364889148511,
0.33021983360135304,
0.3518425622667454,
-0.16759580526603354,
1.1955178055405769,
-0.1119172073880175,
-1.6647459335605923,
-0.09499524124538847,
1.171044098528735,
-0.022137095989983098,
0.46479840085551427,
0.5434533112600137,
0.7953483283824695,
-0.23791626316884204,
-0.34327459028867535,
0.9770824990177593,
0.3972109926583832,
0.031305244787475206,
0.06660894739153407,
-0.4270300066285869,
-1.4580475210852422,
0.18899331747125298,
-0.5789031865333153,
```

0.2203088633995836,  
-0.028805094274594364,  
-0.21236041446549625,  
0.00835869807102751,  
1.8444421334304235,  
-0.36021419267454113,  
-1.0777998782841605,  
0.7201309879688491,  
-0.07151832135087417,  
0.013523038580686776,  
-0.5101061898109359,  
1.528477364550823,  
-0.24055091899624312,  
1.595727742687772,  
1.181011187425284,  
-0.07205139039345279,  
-0.3645912646252544,  
0.922259297261975,  
0.47504473393792157,  
-1.4582846498754758,  
-1.1041238978674286,  
-0.08619812725702276,  
1.5348185477516838,  
-0.034799821636765677,  
0.34854563969795865,  
-0.3057886345189525,  
0.3435344949085216,  
2.387989506593159,  
0.5928805156422549,  
-0.02250711897690342,  
0.734685803060112,  
1.1230348216575474,  
0.9339212770561773,  
0.5429657194529808,  
-0.9530889967003539,  
1.2607191116533525,  
-0.18262479735843284,  
0.2292294020716647,  
0.484625167272873,  
2.2621526738562925,  
0.3832060422832924,  
0.2504382199240898,  
-1.1186566372739195,  
1.0354182359738777,  
-0.9045076995614423,  
1.0282595509077306,  
1.805679851173207,  
0.9332861023326164,  
1.4396403686507162,  
1.6178312922032976,  
-0.22196274260736226,  
0.19030625281227892,  
-0.32840557234129963,  
1.004592356770436,  
1.8720477930131976,  
-0.06388076228748135,  
0.12235432131563899,  
-0.5998878734536057,  
-0.5461403115162753,  
-0.17116133229966776,  
0.6826247841010238,  
0.6607748570434985,  
0.7854114346995006,  
0.5612002866021459,  
-0.2559995100181322,  
-0.8863827207156498,  
0.2553569774973194,  
0.6372473265785513,  
-0.14017909069433732,  
0.016226196464851673,  
-0.10437448541592237,  
2.5268983957827906,  
2.3709647446626767,  
-0.8108547070158446,  
0.5698393243760288,

```

-1.2042979310590165,
-0.5004321415825274,
-1.0362881146071494,
-0.18531750144204898,
1.5646886079478448,
0.08968487420602586,
-1.6120268318409705]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#10'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                '6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                                         '0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + '
                                                         '0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + '
                                                         '0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + '
                                                         '0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + '
                                                         '0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + '
                                                         '0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.512595875373562],
                              [12, 6, 0, 0, -6.004303631668366],
                              [20, 10, 0, 0, -4.83491199768215],
                              [28, 14, 0, 0, -3.919939099798885]],
          'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                              'identity_factors': [0, 0, 0, 0],
                              'noise_level': [4, 2, 0, 0],
                              'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
                          'noise_prob': [
0.001,

```

```

0.001,
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
'identity_factors': [1, 1, 0, 0],
'noise_level': [12, 6, 0, 0],
'noise_profile': {
'noise_prob': [
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [20, 5, 1, 0],
'identity_factors': [2, 2, 0, 0],
'noise_level': [20, 10, 0, 0],
'noise_profile': {
'noise_prob': [
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4},
{ 'gates_num': [28, 7, 1, 0],
'identity_factors': [3, 3, 0, 0],
'noise_level': [28, 14, 0, 0],
'noise_profile': {
'noise_prob': [
0,
0],
'status': True,
'type':
'depolarizing'},
'odd_wires': 4}},
'run_time_sec': 10.707031011581421}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.02240293444906766,
0.9863710197203618,
1.3708545038264748,
1.3757718928414557,

```

1.7844795346244002,  
2.029643659915566,  
2.029643659915566,  
4.135298362317422,  
4.181946654536538,  
4.392782597821499,  
4.473609589126697,  
4.474471668054438,  
4.475838923576404,  
4.4785869343507265,  
4.4785869343507265,  
5.467009291914798,  
5.470281162008999,  
5.840541346188122,  
5.842392372241278,  
6.505508038171383,  
6.505508038171383,  
7.536348099553183,  
7.536348099553183,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
1.1150074339792337,  
-0.03535947987647509,  
1.1918755403807781,  
-0.20191103850925227,  
-0.268362117189328,  
-0.3595192771004685,  
1.2614204066704717,  
-2.9429228213034166,  
-1.054810371869961,  
0.9594255841252335,  
-0.09538831740389547,  
0.3965663197177072,  
-0.22182226409641906,  
-0.2653718580482209,  
0.1686090968331403,  
1.6516484362324146,  
-0.3049608013883917,  
0.49165272629600476,  
1.9061569916625292,  
1.241422732345657,  
-0.11527538328521378,  
-0.22895223610637053,  
-0.06124477487110871,  
0.6193220715745159,  
1.372932614853267,  
-1.1538384701543527,  
-0.1139440760455718,  
0.16973094341798492,  
-0.5943234340378932,  
0.21399932498003596,  
-0.18156105319883253,  
-1.0504702368491705,  
0.7232808408606985,  
-0.018870518436612777,  
-0.29343981279013404,  
0.30960592292227684,  
0.13511542022922338,  
0.5096669954667911,  
-1.097576281455009,  
0.12047585913747774,  
-0.5585503308065869,  
1.2279608447421912,  
1.3012401380411538,  
0.3769592231863052,  
-0.5692023175942067,  
-0.4567508363134565,  
-0.679549924864495,  
-0.24647993267323956,  
0.6292567546169889,

```
0.9587256267378846,  
1.7268825428143277,  
0.1413792259593793,  
0.6520451922983643,  
0.6152471684019365,  
-1.1240317980448378,  
-0.9856730455453077,  
-1.2455074642265085,  
0.2235091354354849,  
-0.8870861048674711,  
0.5299724059178798,  
-0.21820971616414211,  
-0.09687180933262383,  
-0.9247884680119297,  
-0.4566833626656702,  
-0.4285291193052864,  
-0.6406026728496247,  
0.9023578506051637,  
0.03748900229192909,  
0.7551248935414285,  
-0.18980887545414976,  
-0.1497604267964229,  
-0.4253730408988226,  
-0.4157675203773789,  
1.677209169409502,  
0.2126888490300174,  
-0.13481167544410624,  
-1.6951458494505263,  
-0.006476362637627559,  
-0.5490470525961781,  
0.3195499617454318,  
1.077429849794694,  
0.6725724542747005,  
-0.10235701747439804,  
-0.014129818782246995,  
2.382406086835482,  
0.008866515589568993,  
1.0282503794544984,  
-0.6899701634722577,  
0.3510134577654823,  
0.6918405669356381,  
-0.08667968085870373,  
-0.0005005962237103964,  
1.3805542469189591,  
1.011514915181436,  
-0.4623191099783579,  
1.397645255720587,  
-0.7813361449321683,  
-0.9940660424170442,  
-0.6570734018108508,  
1.0171740600492052,  
0.14480072689925969,  
1.157289980717297,  
1.019472554492438,  
1.0029573776528096,  
-0.20406480565208354,  
-0.011076077177880707,  
-0.30566521016454584,  
-0.4775965459909992,  
-0.7158801142606765,  
1.5610067764386268,  
1.5187465408730505,  
0.21158961058436962,  
-0.38098352608767794,  
-0.046999172842648596,  
0.5964180792256618,  
-0.6260168044949087,  
-0.7215592053840503,  
-0.5706802740378752,  
0.11995346168986934,  
0.17053214926260635]],  
'noise_profile': { 'noise_on_init_param': { 'status': False,  
                                              'value': 0},  
                  'noise_prob': [0.001, 0.001, 0, 0],  
                  'status': True,
```



```

        'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                'cn': [ 0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5,
                                         0.5],
                                'r': 1},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':

'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#6'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},

'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},

'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                '6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                                         '0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + '
                                                         '0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + '
                                                         '0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + '
                                                         '0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + '
                                                         '0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + '
                                                         '0.5 Z 5 Z 6']},

'output': { 'data_points': [ [4, 2, 0, 0, -7.259703059772281],
                             [12, 6, 0, 0, -5.766278116709839],
                             [20, 10, 0, 0, -4.583193384345111],
                             [28, 14, 0, 0, -3.640157125717274]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 0, 0],
                                'noise_profile': {

'noise_on_init_param': { 'status': False,
                          'value': 0},

                                'noise_prob': [

0.001,
0.001,

                                0,
                                0],

                                'status': True,
                                'type':

'depolarizing'},

                                'odd_wires': 4},
                              { 'gates_num': [12, 3, 1, 0],
                                'identity_factors': [1, 1, 0, 0],
                                'noise_level': [12, 6, 0, 0],
                                'noise_profile': {

```

```

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,

'noise_prob': [
    0,
    0],
    'status': True,
    'type':

'depolarizing'},

    'odd_wires': 4},
    { 'gates_num': [20, 5, 1, 0],
    'identity_factors': [2, 2, 0, 0],
    'noise_level': [20, 10, 0, 0],
    'noise_profile': {

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,

'noise_prob': [
    0,
    0],
    'status': True,
    'type':

'depolarizing'},

    'odd_wires': 4},
    { 'gates_num': [28, 7, 1, 0],
    'identity_factors': [3, 3, 0, 0],
    'noise_level': [28, 14, 0, 0],
    'noise_profile': {

'noise_on_init_param': { 'status': False,
    'value': 0},

0.001,
0.001,

'noise_prob': [
    0,
    0],
    'status': True,
    'type':

'depolarizing'},

    'odd_wires': 4}},
    'run_time_sec': 11.005364656448364}},
{ 'config': { 'ansatz': { 'gateset': 1,
    'layer': 30,
    'ugate': { 'coefficients': { 'bn': [ 0,
    0,
    0,
    0,
    0,
    0,
    0],
    'cn': [ 0.5,
    0.5,
    0.5,
    0.5,
    0.5,
    0.5],
    'r': 0}},
    'time': {'max': 10.0, 'min': 0.0},
    'type': 'xy-iss'}}},
'init_param': { 'value': [ -3.641081222961908e-17,
    0.6149788059529836,
    0.7190202634465676,
    1.227117923902744,
    1.282995668258181,
    1.320146784613617,
    1.320146784613617,
    3.1464089486715623,
    3.1464089486715623,
    5.021180125711677,
    5.021180125711677,
    5.021180125711677,
    6.703692809170789,
    6.703692809170789,
    7.791601108223033,

```

7.8369202041803225,  
7.951907692650894,  
7.98389042115583,  
8.258376681022987,  
8.258376681022987,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.265620267330194,  
8.265620267330194,  
9.412842541483705,  
9.412842541483705,  
10.502716174481437,  
10.502716174481437,  
0.1665558361704551,  
0.0766182276072886,  
-0.06331706305100791,  
0.03225035272845343,  
-0.2265177184784691,  
0.6859734408919996,  
0.358399999202588,  
-0.31490649734707366,  
0.03084506070978915,  
0.8141179515629021,  
-0.05751068028622007,  
0.9013204998454583,  
-0.325467390457223,  
-0.16027539072229496,  
0.19756436832536928,  
0.17875052394899651,  
0.07441990946369173,  
-1.7121562848350094,  
0.5411900571694856,  
0.025994665514066265,  
-1.0547594680221428,  
-0.3558195097906033,  
0.2575282902752545,  
-0.32652811387218433,  
-0.17477771883072452,  
0.05603758809983181,  
-0.31531793685177084,  
0.24953935818155465,  
-0.21945102528047247,  
0.016201452486715968,  
-0.47139285875704856,  
0.8354485366702803,  
0.28783787212142514,  
-1.483190369052958,  
-0.05324490057492157,  
0.00808064868141892,  
-1.3894868155533049,  
0.07648399162880297,  
0.28128388531065984,  
-0.8032486745370345,  
0.9961277979922681,  
0.7271807873997648,  
-0.2598267503182047,  
0.058937213125893145,  
1.4176939090014022,  
1.5623836495300838,  
-1.2281014386266311,  
1.627596878633186,  
0.150437982354294,  
0.017798034487339433,  
-0.2091243023446671,  
0.08776907917710067,  
0.637527078885032,  
1.2603122563899933,  
1.0910453886717337,  
0.001707278941889729,  
-0.5366140699752073,  
-0.04457743756443993,  
0.708269991966563,  
1.6757260639955311,

```

0.6610325406900899,
-0.508228690084442,
-0.5178693625521746,
-0.2955589105377924,
-0.47790822054112786,
0.31077598178920485,
0.020632196003020267,
1.5538854336639996,
1.2816443511581943,
-0.6926864187150775,
0.73698114320343,
0.3645818015611773,
-0.2097443780477125,
0.1421287040679699,
0.052774836076248374,
-0.7306191772967899,
1.107856618529218,
0.3743379513498811,
1.2959169452837032,
0.8858564921663113,
0.03370518740548656,
-1.0860983069970114,
1.2199055901240408,
-1.0630806559423625,
1.3748402618369016,
0.9943926078324806,
0.7116645059379805,
-0.21098608064682703,
0.04581715611274856,
-0.17117312830066983,
1.2229557830916487,
-1.6273428514067598,
1.8508927721454946,
0.851693435560975,
1.0946646161197402,
0.43088380554694883,
-0.6171985422875839,
1.6866137951313547,
-0.2289359575496427,
-0.09152362655526167,
1.6917359096449291,
0.22722692961233917,
0.49434218233553445,
1.2228162165990006,
-0.4070166799423108,
0.00966082758630671,
-0.3344922737632815,
-1.0755692755599169,
1.1846485271761396,
-0.06070659712292082,
0.6384418838463358,
-0.034216786122488324,
-0.6519049362670448,
-0.0019231105719348242,
0.503764046349436,
0.5779702041064313,
-0.8610978040126155,
0.5832069567020347,
0.07954533618121334,
0.016329041774977193]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,

```

```

0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#3'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'redundant',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': None,
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z '
                                '1 + 1 X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + '
                                '1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X '
                                '6 + 1 Z 5 + 1 Z 6',
            'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + '
                                                         '0.5 Z 0 Z 1 + '
                                                         '0.5 X 1 X 2 + '
                                                         '0.5 Z 1 Z 2 + '
                                                         '0.5 X 2 X 3 + '
                                                         '0.5 Z 2 Z 3 + '
                                                         '0.5 X 3 X 4 + '
                                                         '0.5 Z 3 Z 4 + '
                                                         '0.5 X 4 X 5 + '
                                                         '0.5 Z 4 Z 5 + '
                                                         '0.5 X 5 X 6 + '
                                                         '0.5 Z 5 Z 6']},
'output': { 'data_points': [ [4, 2, 0, 0, -7.47570078392518],
                             [12, 6, 0, 0, -5.921149282782478],
                             [20, 10, 0, 0, -4.7240834286119355],
                             [28, 14, 0, 0, -3.7949056030968538]],
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                     'identity_factors': [0, 0, 0, 0],
                     'noise_level': [4, 2, 0, 0],
                     'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

0.001,
0.001,

'noise_prob': [
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},
{ 'gates_num': [12, 3, 1, 0],
  'identity_factors': [1, 1, 0, 0],
  'noise_level': [12, 6, 0, 0],
  'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},

0.001,
0.001,

'noise_prob': [
0,
0],

'status': True,
'type':

'depolarizing'},

'odd_wires': 4},

```

```

        { 'gates_num': [20, 5, 1, 0],
          'identity_factors': [2, 2, 0, 0],
          'noise_level': [20, 10, 0, 0],
          'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
0.001,
0.001,
                                'noise_prob': [
                                0,
                                0],
                                'status': True,
                                'type':
'depolarizing'},
                                'odd_wires': 4},
        { 'gates_num': [28, 7, 1, 0],
          'identity_factors': [3, 3, 0, 0],
          'noise_level': [28, 14, 0, 0],
          'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
0.001,
0.001,
                                'noise_prob': [
                                0,
                                0],
                                'status': True,
                                'type':
'depolarizing'},
                                'odd_wires': 4}},
        'run_time_sec': 10.085844993591309}}],
'vqe': [ { 'config': { 'ansatz': { 'gateset': 1,
                                  'layer': 30,
                                  'ugate': { 'coefficients': { 'bn': [ 0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0],
                                                                      'cn': [ 0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5],
                                                                      'r': 0},
                                                                      'time': {'max': 10.0, 'min': 0.0},
                                                                      'type': 'xy-iss'}},
                                  'init_param': {'value': 'random'},
                                  'noise_profile': { 'noise_on_init_param': { 'status': False,
                                                                              'value': 0},
                                                    'noise_prob': [0.001, 0.001, 0, 0],
                                                    'status': True,
                                                    'type': 'depolarizing'},
                                  'nqubits': 7,
                                  'observable': { 'coefficients': { 'bn': [ 1.0,
                                                                              1.0,
                                                                              1.0,
                                                                              1.0,
                                                                              1.0,
                                                                              1.0,
                                                                              1.0],
                                                                              'cn': [ 0.5,
                                                                              0.5,
                                                                              0.5,
                                                                              0.5,
                                                                              0.5,
                                                                              0.5],
                                                                              'r': 1},
                                                                              'def': 'ising'},
                                  'output': { 'draw': { 'fig_dpi': 100,
                                                         'status': True,
                                                         'type': 'png'},
                                                         'file_name_prefix': 'xy_noisefree_time_evo'},
        { 'gates_num': [20, 5, 1, 0],
          'identity_factors': [2, 2, 0, 0],
          'noise_level': [20, 10, 0, 0],
          'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
0.001,
0.001,
                                'noise_prob': [
                                0,
                                0],
                                'status': True,
                                'type':
'depolarizing'},
                                'odd_wires': 4},
        { 'gates_num': [28, 7, 1, 0],
          'identity_factors': [3, 3, 0, 0],
          'noise_level': [28, 14, 0, 0],
          'noise_profile': {
'noise_on_init_param': { 'status': False,
                          'value': 0},
0.001,
0.001,
                                'noise_prob': [
                                0,
                                0],
                                'status': True,
                                'type':
'depolarizing'},
                                'odd_wires': 4}},
        'run_time_sec': 10.085844993591309}}],
'vqe': [ { 'config': { 'ansatz': { 'gateset': 1,
                                  'layer': 30,
                                  'ugate': { 'coefficients': { 'bn': [ 0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0,
                                                                      0],
                                                                      'cn': [ 0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5,
                                                                      0.5],
                                                                      'r': 0},
                                                                      'time': {'max': 10.0, 'min': 0.0},
                                                                      'type': 'xy-iss'}},
                                  'init_param': {'value': 'random'},
                                  'noise_profile': { 'noise_on_init_param': { 'status': False,
                                                                              'value': 0},
                                                    'noise_prob': [0.001, 0.001, 0, 0],
                                                    'status': True,
                                                    'type': 'depolarizing'},
                                  'nqubits': 7,
                                  'observable': { 'coefficients': { 'bn': [ 1.0,
                                                                              1.0,
                                                                              1.0,
                                                                              1.0,
                                                                              1.0,
                                                                              1.0,
                                                                              1.0],
                                                                              'cn': [ 0.5,
                                                                              0.5,
                                                                              0.5,
                                                                              0.5,
                                                                              0.5,
                                                                              0.5],
                                                                              'r': 1},
                                                                              'def': 'ising'},
                                  'output': { 'draw': { 'fig_dpi': 100,
                                                         'status': True,
                                                         'type': 'png'},
                                                         'file_name_prefix': 'xy_noisefree_time_evo'},

```

```

'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
'run': 'vqe',
'state': 'dmatrix',
'vqe': { 'iteration': 10,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': True}},
'zne': { 'data_points': None,
         'degree': 1,
         'method': 'richardson',
         'sampling': 'default'}},
{others': { 'observable_string': '1 X 0 X 1 + 1 Z 0 + 1 X 1 X 2 + 1 Z 1 + 1 '
                                'X 2 X 3 + 1 Z 2 + 1 X 3 X 4 + 1 Z 3 + 1 X '
                                '4 X 5 + 1 Z 4 + 1 X 5 X 6 + 1 Z 5 + 1 Z 6',
         'time_evolution_gate_hamiltonian_string': [ '0.5 X 0 X 1 + 0.5 Z '
                                                    '0 Z 1 + 0.5 X 1 X 2 '
                                                    '+ 0.5 Z 1 Z 2 + 0.5 '
                                                    'X 2 X 3 + 0.5 Z 2 Z '
                                                    '3 + 0.5 X 3 X 4 + '
                                                    '0.5 Z 3 Z 4 + 0.5 X '
                                                    '4 X 5 + 0.5 Z 4 Z 5 '
                                                    '+ 0.5 X 5 X 6 + 0.5 '
                                                    'Z 5 Z 6']},

'output': { 'exact_sol': -8.56677223350563,
            'initial_cost_history': [ 3.450586259258812,
                                     2.2577647098356715,
                                     3.220573399525229,
                                     2.813569497850412,
                                     2.356577849154886,
                                     2.484693017894963,
                                     2.751192081705436,
                                     3.0939254363357245,
                                     3.3455601721392987,
                                     2.9399815036188865],
            'noise_details': { 'gates_num': [4, 1, 1, 0],
                              'identity_factors': [0, 0, 0, 0],
                              'noise_level': [4, 2, 0, 0],
                              'noise_profile': { 'noise_on_init_param': {

'noise_prob': [ 0.001,
                0.001,
                0,
                0],

'status': True,
'type': 'depolarizing'},

'odd_wires': 4},
'optimized_minimum_cost': [ -7.463351332655033,
                            -7.130214875567174,
                            -7.475700783925261,
                            -7.41873284165754,
                            -7.407206817517966,
                            -7.259703059772282,
                            -7.568863804770619,
                            -7.15916709982671,
                            -7.395384341095537,
                            -7.512595875373624],
'optimized_parameters': [ [ 0.5482907189468895,
                           0.6413620809492503,
                           0.6422482149552934,
                           1.5892409709442974,
                           1.850708229814058,
                           1.850708229814058,
                           1.8745552660050262,
                           2.400679867939261,
                           2.402212278134192,
                           2.485190345183722,
                           2.485190345183722,
                           2.4851903451837223,
                           2.488397493491329,
                           2.4883974934913287,
                           5.077476636438464,
                           5.077476636438464,
                           5.732990197214016,
                           5.806868622878696,

```

5.817834245705687,  
6.166757373752113,  
7.3114292874931905,  
7.311858449036949,  
8.346734585466223,  
8.350435170229554,  
8.354614694314481,  
8.35659817980371,  
8.356905245901928,  
9.313534396314816,  
9.313534396314816,  
10.443787047737276,  
-0.5971318801423705,  
-0.6830583120471296,  
0.053446928626708114,  
-1.488251087277441,  
0.740998345617078,  
-0.020561007687691084,  
-0.47029189134787985,  
-0.9187802118512801,  
-0.07390570205801456,  
0.6091612085770479,  
0.5696050095749661,  
-2.634874245900948,  
0.14733366015521565,  
1.0781100436188797,  
0.3459269460772517,  
1.2820636645787713,  
-1.605623121104658,  
0.856791024529966,  
0.16374864437029604,  
-0.7377840957855112,  
0.7603752030179747,  
0.4958590077418653,  
1.0293890027768824,  
0.4862585296205842,  
-1.0838654128292502,  
1.2632637762941026,  
-1.1043454462318527,  
-0.7867654190654241,  
0.8818217647037212,  
1.0406267750063978,  
0.05770567519039498,  
-0.5922070722918433,  
-0.3271403288282926,  
0.5980786503295974,  
-0.02050375112330311,  
-0.9007241609880184,  
0.5239405469453117,  
0.7601496703420288,  
-0.6449049942439851,  
1.7340858429103823,  
0.10050113333288421,  
0.3143347863780438,  
0.28408386490618526,  
-0.1222389867527315,  
-0.09502282329152913,  
-1.3004368662949968,  
0.16856179320059875,  
0.6790103402211991,  
0.3355977478652572,  
0.0935957266804422,  
0.42936820813464754,  
0.5148227650107633,  
0.10764356588532305,  
-0.054251737808208085,  
0.06525040933822983,  
-0.21143245853075732,  
-1.5801988491404158,  
0.023513208971767067,  
1.0921277689034055,  
-0.11501776583679489,  
-0.14182911234947893,  
1.8716225858725093,  
-1.0747761250482988,



-0.01873186129021693,  
0.9952348515577564,  
1.5589645169221944,  
2.4625123021717044,  
1.5320934484141422,  
0.6264578101560674,  
0.015802850908690148,  
0.6559295719723718,  
0.5030706883609005,  
0.010357532831659657,  
-0.6971755064049523,  
-1.334963536555068,  
0.05714132580252865,  
0.9478292633237722,  
1.541635767019547,  
-1.2357775558070643,  
1.5753066317572375,  
1.2206753513411082,  
-0.013882574638756213,  
2.102115305768464,  
0.6867648509985108,  
-1.0810617894892982,  
0.608205793929093,  
-1.0701207529796843,  
-0.008804617073740417,  
1.0802724219136723,  
1.4472704941581649,  
-0.525983160453369,  
0.10347757085774918,  
0.07451664808136123,  
0.8113743025574697,  
-0.19830571509994802,  
0.20760359505818776,  
-0.5709476706639499,  
0.1791350390980861,  
-0.32061652775092425,  
-1.6382844876022806,  
2.271046687924862,  
0.09972766177435569,  
1.671157305178672,  
1.0596955078067567,  
-0.7395801076185267,  
-0.8217251410877643,  
1.2660358026872456,  
-0.149859182069558,  
1.7386861885389688,  
-0.003505497297480453,  
0.677126408740769,  
-1.0541684899696007,  
0.9437251450981726,  
1.7354017388586316,  
-0.8022872949930118,  
0.01881044769021433,  
-0.013699411839369284,  
1.5965466699123847,  
0.4486397166383021,  
1.5669137279484207],  
[ 4.1837705414928806e-17,  
1.1742327239243593,  
1.1742327239243593,  
1.174232723924359,  
1.3021435979041922,  
1.3883521076730898,  
1.4901272631800928,  
1.490127263180093,  
1.490127263180093,  
2.542545188872923,  
2.56739133991554,  
2.677178516908646,  
5.624946341909109,  
5.624946341909109,  
5.63924283183031,  
5.672838193807689,  
5.672838193807689,  
5.672838193807689,

5.672838193807689,  
5.672838193807689,  
5.672838193807689,  
5.805507018952099,  
5.858678454346443,  
7.374841183417447,  
7.374841183417447,  
9.078346087689514,  
9.17910617229311,  
9.185363997877552,  
9.550522060955204,  
9.715006087156702,  
0.5380723684568228,  
0.20346632529178696,  
-0.28402043001150323,  
-0.013694659434132353,  
-0.8491217472851175,  
-0.13891219530245408,  
-0.7902948900320785,  
0.02035105936303376,  
0.35891510624171696,  
0.07011262472067725,  
0.2571910630887441,  
0.09727807922224965,  
-0.4253506785797692,  
-0.08201618636277365,  
-0.5629942371157008,  
0.4984357070329931,  
0.22460606922422946,  
0.6436861273901548,  
0.5581387866543217,  
0.6438048424266741,  
0.6625810608832491,  
-0.2877740698749285,  
0.03400434270310955,  
0.6598198228171638,  
0.15695492486622947,  
-0.23277712193728803,  
0.3379436543817524,  
0.6679629986711755,  
0.4913802101172593,  
-0.6543304626041586,  
1.2398324170787045,  
0.10868488610295632,  
0.4726806257545104,  
-1.0278416218016544,  
-0.5660236088762642,  
-0.06627186605932975,  
0.3527547117645279,  
0.3944014355355292,  
0.33709190475341266,  
0.16707772676088822,  
0.29195080738380563,  
1.0354529601392413,  
0.12500585138196232,  
-0.037178956773431956,  
0.7823218278561086,  
-0.04464215343745706,  
-0.36923576305262273,  
-0.9863817864437636,  
0.039519076991602065,  
-0.35646400258617383,  
0.04542480304419608,  
-0.46125271135496354,  
0.40472620693719735,  
0.7802480661953589,  
-0.6757172179201896,  
0.6396142241310521,  
0.2327897749192615,  
0.8954622299286413,  
0.7158405805761733,  
0.1382139633537826,  
1.0616928944303126,  
-0.6122315420380016,  
-0.6738539946512315,

1.0433459792659807,  
0.494526070112864,  
0.20621322780405107,  
-0.05318175489586881,  
-0.11213659998229918,  
0.32941262943060273,  
0.13931786347259914,  
-0.07640781308377202,  
0.31450116184408605,  
0.3658109215963646,  
0.04460349089074807,  
-0.12913310998017427,  
0.31890485610090735,  
-0.005491508360761248,  
1.2692063073436923,  
-0.3006174703747285,  
-0.41404661321397057,  
-0.5199199797590206,  
0.44225909618051784,  
-0.4233007342169607,  
0.7456354776212751,  
-0.32484988424610756,  
0.9268151291603125,  
0.8385591284905366,  
0.027219364270413358,  
-0.5520387125082392,  
1.3757901840365965,  
0.02933419406725825,  
-0.2915193842748469,  
0.33917094344303517,  
0.10828106345120646,  
-0.5650186064180197,  
-0.6041651963720519,  
-0.19230834783869816,  
1.9848826966849449,  
0.0632219631903188,  
0.04804551511145073,  
0.47752350144148015,  
1.3406847618100746,  
-1.3722262204383469,  
-1.0513455672656666,  
0.7121308231347245,  
0.13278942055995957,  
1.9758312031522887,  
2.19648222646383,  
0.8936788375205645,  
0.05510909660880629,  
-0.18765678539637448,  
0.45031205104496697,  
-0.6542716355161553,  
0.5783583754336702,  
-0.18844184232604352,  
-1.5667303012058793,  
0.36110899429768645,  
-0.275182998952267,  
0.30367576290775045,  
-0.1532687178202341],  
[-3.641081222961908e-17,  
0.6149788059529836,  
0.7190202634465676,  
1.227117923902744,  
1.282995668258181,  
1.320146784613617,  
1.320146784613617,  
3.1464089486715623,  
3.1464089486715623,  
5.021180125711677,  
5.021180125711677,  
5.021180125711677,  
6.703692809170789,  
6.703692809170789,  
7.791601108223033,  
7.8369202041803225,  
7.951907692650894,  
7.98389042115583,

8.258376681022987,  
8.258376681022987,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.264818959972613,  
8.265620267330194,  
8.265620267330194,  
9.412842541483705,  
9.412842541483705,  
10.502716174481437,  
10.502716174481437,  
0.1665558361704551,  
0.0766182276072886,  
-0.06331706305100791,  
0.03225035272845343,  
-0.2265177184784691,  
0.6859734408919996,  
0.358399999202588,  
-0.31490649734707366,  
0.03084506070978915,  
0.8141179515629021,  
-0.05751068028622007,  
0.9013204998454583,  
-0.325467390457223,  
-0.16027539072229496,  
0.19756436832536928,  
0.17875052394899651,  
0.07441990946369173,  
-1.7121562848350094,  
0.5411900571694856,  
0.025994665514066265,  
-1.0547594680221428,  
-0.3558195097906033,  
0.2575282902752545,  
-0.32652811387218433,  
-0.17477771883072452,  
0.05603758809983181,  
-0.31531793685177084,  
0.24953935818155465,  
-0.21945102528047247,  
0.016201452486715968,  
-0.47139285875704856,  
0.8354485366702803,  
0.28783787212142514,  
-1.483190369052958,  
-0.05324490057492157,  
0.00808064868141892,  
-1.3894868155533049,  
0.07648399162880297,  
0.28128388531065984,  
-0.8032486745370345,  
0.9961277979922681,  
0.7271807873997648,  
-0.2598267503182047,  
0.058937213125893145,  
1.4176939090014022,  
1.5623836495300838,  
-1.2281014386266311,  
1.627596878633186,  
0.150437982354294,  
0.017798034487339433,  
-0.2091243023446671,  
0.08776907917710067,  
0.637527078885032,  
1.2603122563899933,  
1.0910453886717337,  
0.001707278941889729,  
-0.5366140699752073,  
-0.04457743756443993,  
0.708269991966563,  
1.6757260639955311,  
0.6610325406900899,  
-0.508228690084442,  
-0.5178693625521746,

-0.2955589105377924,  
-0.47790822054112786,  
0.31077598178920485,  
0.020632196003020267,  
1.5538854336639996,  
1.2816443511581943,  
-0.6926864187150775,  
0.73698114320343,  
0.3645818015611773,  
-0.2097443780477125,  
0.1421287040679699,  
0.052774836076248374,  
-0.7306191772967899,  
1.107856618529218,  
0.3743379513498811,  
1.2959169452837032,  
0.8858564921663113,  
0.03370518740548656,  
-1.0860983069970114,  
1.2199055901240408,  
-1.0630806559423625,  
1.3748402618369016,  
0.9943926078324806,  
0.7116645059379805,  
-0.21098608064682703,  
0.04581715611274856,  
-0.17117312830066983,  
1.2229557830916487,  
-1.6273428514067598,  
1.8508927721454946,  
0.851693435560975,  
1.0946646161197402,  
0.43088380554694883,  
-0.6171985422875839,  
1.6866137951313547,  
-0.2289359575496427,  
-0.09152362655526167,  
1.6917359096449291,  
0.22722692961233917,  
0.49434218233553445,  
1.2228162165990006,  
-0.4070166799423108,  
0.00966082758630671,  
-0.3344922737632815,  
-1.0755692755599169,  
1.1846485271761396,  
-0.06070659712292082,  
0.6384418838463358,  
-0.034216786122488324,  
-0.6519049362670448,  
-0.0019231105719348242,  
0.503764046349436,  
0.5779702041064313,  
-0.8610978040126155,  
0.5832069567020347,  
0.07954533618121334,  
0.016329041774977193],  
[ 0.2383708143795501,  
0.8137820253985804,  
1.0561141201801563,  
1.2070683478267785,  
1.9518166906091101,  
2.08301823027678,  
2.6774459967535513,  
2.7270096866449576,  
3.7369434259122447,  
3.7421546540398443,  
4.458327272130387,  
4.463102384700506,  
4.463102384700506,  
4.482690585412051,  
4.482694652744643,  
4.498978826283554,  
6.3580266266370415,  
7.886395999997723,

7.886532810158634,  
8.060529572035655,  
8.06234783983503,  
8.127555772505229,  
8.130166630032164,  
8.42408407139234,  
8.433074307328475,  
9.412401860498063,  
9.420584174895616,  
9.429609653004679,  
9.434851407347677,  
11.283524698808058,  
0.19157417616433814,  
0.42257952171340063,  
0.3129095694283805,  
0.28360255750055535,  
-0.7229159635345903,  
2.545731433831817,  
1.1687892956196542,  
0.5222949375721274,  
0.9482151911772319,  
0.28742832079435787,  
1.1627391357840349,  
-0.27939056132165146,  
-0.07574334812551493,  
-0.529119211391362,  
-0.08653083237786212,  
0.042544229108731915,  
-0.09154582517805988,  
0.2776265525620834,  
0.373637405241428,  
-0.666296500917012,  
-0.729825790392568,  
0.36164641825124294,  
1.2066181407380305,  
0.18327070025757417,  
2.2757552060408917,  
-0.004789158452516104,  
0.49019439516235463,  
2.190622553796523,  
0.6131206832540379,  
1.0987721265230228,  
1.9413219378309259,  
0.07975169469268534,  
0.17531082109327745,  
0.01770145552231998,  
0.22429808435825893,  
1.1460098869067579,  
-0.25766861736092417,  
0.4386465248337572,  
0.7521614434169624,  
0.07039918338308593,  
-0.23913727928604284,  
0.062497116873310714,  
0.27575365987954265,  
-0.8268952220573135,  
0.8599765782432734,  
0.6958325703328606,  
-0.16792542378671177,  
-0.13186811496768225,  
0.17745018848846658,  
-0.13764108606901534,  
-0.34798347931108986,  
0.3901205214779397,  
-0.12832331396189006,  
0.7623260417931323,  
-0.08745728181826747,  
0.22448567111633413,  
0.5103689813486589,  
0.020179740460913417,  
-0.4639048953982949,  
1.8052783293547816,  
-0.06895296635033099,  
-0.46137869531525183,  
-0.7694587159951923,

-0.1507074275764489,  
-3.159084078074864,  
1.5556721360426484,  
0.9802025173412374,  
-1.5980562353917622,  
0.9974678614222413,  
0.11965749551778265,  
-0.5964068365118492,  
1.00912773091807,  
1.2674306548806673,  
1.7418320010188646,  
-1.2223756485879664,  
-0.006270145144671745,  
0.7863824204489233,  
-0.08410721186616651,  
0.13420385894759826,  
0.6686584151585806,  
-0.7946689395347296,  
-1.448768973512125,  
-0.4158373205099576,  
-0.1003664997933048,  
0.5370971852976741,  
-0.013369261455621718,  
-1.2134070474127567,  
2.71822204346588,  
-0.8266087910498845,  
-0.04274152999618493,  
0.627725493238542,  
-0.10714625448592663,  
1.4055199595750496,  
-0.08877591733311402,  
-0.6400618055168635,  
0.27990653766167567,  
0.27230874688701184,  
1.8329367216853043,  
0.12128377229042309,  
0.03719209379786179,  
0.7558193864298689,  
-0.027085062677120984,  
0.7947118159580207,  
-0.18810209431195668,  
0.008294184744538372,  
-0.9110921816475059,  
1.3065108206329406,  
0.004810940817056788,  
1.4030602129547465,  
0.03878633149748846,  
0.29850504257680605,  
-0.9524583070906825,  
0.10037229527914636,  
0.4277056649647598,  
-2.2528322583674503,  
0.030724614514628212,  
0.8416350822543037,  
1.5579013461800135,  
0.5696673724928452,  
-1.5352194543526818],  
[ 0.3442332088020621,  
0.7247295953616149,  
0.7247295953616149,  
0.7610537291022658,  
1.7162580174489597,  
2.0119282772467635,  
2.0119282772467635,  
3.369934702704019,  
3.369934702704019,  
5.00211845115155,  
5.212181786011135,  
5.346566249705437,  
6.103091648910964,  
6.103091648910964,  
7.050711873868975,  
7.050711873868975,  
7.492144583370162,  
7.492144583370162,

7.606105711064038,  
7.606105711064038,  
8.717193051662631,  
8.753101318062777,  
8.877107151002964,  
8.889590522678484,  
8.982812044989718,  
8.982812044989718,  
9.499874357008034,  
9.499874357008034,  
9.659025604148875,  
9.671110590806489,  
0.02814413440270558,  
0.250593445582179,  
0.17496868989230024,  
-0.19749991731592192,  
-0.5878125517240043,  
1.1370895496823794,  
0.3339578948727643,  
0.30833012680275795,  
0.21147160367429677,  
0.5518340573364652,  
0.9816766119937317,  
-1.3427949214182668,  
2.2864376119784486,  
0.673664283367827,  
0.4767745045632036,  
-0.47480445681581174,  
0.05912449937800317,  
0.9513757199218045,  
1.079093875588678,  
-0.4313388366547843,  
0.43347513808131466,  
-0.3381632209207048,  
-0.42699598389932686,  
-1.1528003206699722,  
0.2505681368756031,  
1.1900947118566725,  
-0.38260053073473543,  
-0.6405385159573362,  
0.08926968472452403,  
-0.04834256297702397,  
1.603027736914297,  
-0.44672812120859223,  
-0.5759172165575565,  
1.25237714334681,  
0.04254918814060746,  
-0.002429292667880943,  
0.47732275422632153,  
-0.10204026491637587,  
0.02357869435971368,  
0.06910865492863566,  
-0.5942663805386644,  
1.1629666490831163,  
0.28625726751699415,  
0.4183193427753825,  
0.33026699893767814,  
1.8860632823719743,  
-0.37929215782635534,  
0.8251027249542411,  
-0.13937217921728381,  
-0.35829122981546885,  
-0.11830319301401378,  
-1.1307480811476716,  
-0.33746884247229475,  
1.7161163093033744,  
-0.03517175574182253,  
-0.4044561448132672,  
-0.7301790593832838,  
-0.10496992427986328,  
-0.0377875273258637,  
0.11576685707785253,  
-0.9348023198901909,  
2.132577954045408,  
-0.47199808297503054,



0.09642080758509694,  
-1.5590866370005203,  
0.10045413530924742,  
-0.3215930726850239,  
-0.7020784722315541,  
1.2376661808413174,  
0.5709879203761018,  
-0.820670510834149,  
0.1634866307612446,  
0.06270250983710676,  
-0.03570422816362065,  
-0.5699745682010601,  
-0.26488761312159137,  
1.795803611544861,  
-0.4017001375917998,  
-1.757541020399501,  
-0.05132347348943386,  
0.8521664539464072,  
0.4812990598336637,  
-0.7041980923594973,  
0.6941905718406797,  
1.5589556954504384,  
1.9089912382579748,  
0.4849438728523755,  
0.03939482159422182,  
-0.2564597588944596,  
-0.16675906759041134,  
2.5610800117093855,  
0.9927310518963223,  
1.3170410278463267,  
0.6281459286410694,  
-0.07878692694615999,  
0.5865838795710373,  
0.4894408136056478,  
-0.043552207832595204,  
0.8988064624972067,  
-0.35279792613941824,  
1.5088457985023234,  
-0.32174328535909336,  
0.41978129355629945,  
0.014567846908235548,  
-0.17446008524494477,  
0.35494980160059775,  
1.44166715836895,  
0.027787407199764528,  
-0.2573832607835415,  
0.9605798444843694,  
-0.08907047543629609,  
-0.012116788408097524,  
1.2676248549462201,  
-0.2512276837340942,  
0.7869834357157488,  
-2.3607393050467915,  
0.1914341630047483,  
-1.0542342437530707,  
0.8454261921281611,  
0.02027118187750096],  
[ 0.02240293444906766,  
0.9863710197203618,  
1.3708545038264748,  
1.3757718928414557,  
1.7844795346244002,  
2.029643659915566,  
2.029643659915566,  
4.135298362317422,  
4.181946654536538,  
4.392782597821499,  
4.473609589126697,  
4.474471668054438,  
4.475838923576404,  
4.4785869343507265,  
4.4785869343507265,  
5.467009291914798,  
5.470281162008999,  
5.840541346188122,

5.842392372241278,  
6.505508038171383,  
6.505508038171383,  
7.536348099553183,  
7.536348099553183,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
9.63019412694799,  
1.1150074339792337,  
-0.03535947987647509,  
1.1918755403807781,  
-0.20191103850925227,  
-0.268362117189328,  
-0.3595192771004685,  
1.2614204066704717,  
-2.9429228213034166,  
-1.054810371869961,  
0.9594255841252335,  
-0.09538831740389547,  
0.3965663197177072,  
-0.22182226409641906,  
-0.2653718580482209,  
0.1686090968331403,  
1.6516484362324146,  
-0.3049608013883917,  
0.49165272629600476,  
1.9061569916625292,  
1.241422732345657,  
-0.11527538328521378,  
-0.22895223610637053,  
-0.06124477487110871,  
0.6193220715745159,  
1.372932614853267,  
-1.1538384701543527,  
-0.1139440760455718,  
0.16973094341798492,  
-0.5943234340378932,  
0.21399932498003596,  
-0.18156105319883253,  
-1.0504702368491705,  
0.7232808408606985,  
-0.018870518436612777,  
-0.29343981279013404,  
0.30960592292227684,  
0.13511542022922338,  
0.5096669954667911,  
-1.097576281455009,  
0.12047585913747774,  
-0.5585503308065869,  
1.2279608447421912,  
1.3012401380411538,  
0.3769592231863052,  
-0.5692023175942067,  
-0.4567508363134565,  
-0.679549924864495,  
-0.24647993267323956,  
0.6292567546169889,  
0.9587256267378846,  
1.7268825428143277,  
0.1413792259593793,  
0.6520451922983643,  
0.6152471684019365,  
-1.1240317980448378,  
-0.9856730455453077,  
-1.2455074642265085,  
0.2235091354354849,  
-0.8870861048674711,  
0.5299724059178798,  
-0.21820971616414211,  
-0.09687180933262383,  
-0.9247884680119297,

-0.4566833626656702,  
-0.4285291193052864,  
-0.6406026728496247,  
0.9023578506051637,  
0.03748900229192909,  
0.7551248935414285,  
-0.18980887545414976,  
-0.1497604267964229,  
-0.4253730408988226,  
-0.4157675203773789,  
1.677209169409502,  
0.2126888490300174,  
-0.13481167544410624,  
-1.6951458494505263,  
-0.006476362637627559,  
-0.5490470525961781,  
0.3195499617454318,  
1.077429849794694,  
0.6725724542747005,  
-0.10235701747439804,  
-0.014129818782246995,  
2.382406086835482,  
0.008866515589568993,  
1.0282503794544984,  
-0.6899701634722577,  
0.3510134577654823,  
0.6918405669356381,  
-0.08667968085870373,  
-0.0005005962237103964,  
1.3805542469189591,  
1.011514915181436,  
-0.4623191099783579,  
1.397645255720587,  
-0.7813361449321683,  
-0.9940660424170442,  
-0.6570734018108508,  
1.0171740600492052,  
0.14480072689925969,  
1.157289980717297,  
1.019472554492438,  
1.0029573776528096,  
-0.20406480565208354,  
-0.011076077177880707,  
-0.30566521016454584,  
-0.4775965459909992,  
-0.7158801142606765,  
1.5610067764386268,  
1.5187465408730505,  
0.21158961058436962,  
-0.38098352608767794,  
-0.046999172842648596,  
0.5964180792256618,  
-0.6260168044949087,  
-0.7215592053840503,  
-0.5706802740378752,  
0.11995346168986934,  
0.17053214926260635],  
[ 0.003408343124459994,  
0.0034083431244599804,  
0.006710027629051694,  
0.2484817728699434,  
1.1672656342280407,  
1.167470260322433,  
3.1453440534904744,  
3.166261678218574,  
3.2843704266652405,  
4.089250903115526,  
4.091989893807717,  
4.091989893807717,  
5.181052167254873,  
5.181052167254873,  
5.184972473956635,  
5.585122024093685,  
5.5990893229720795,  
5.630355974178803,

5.704160317443757,  
8.658831571647385,  
8.66505230970618,  
8.712765508205756,  
8.712765508205756,  
8.712765508205756,  
9.168875276976076,  
9.176734348833309,  
9.262471352200725,  
9.262471352200725,  
10.578606537988184,  
10.578606537988184,  
1.5905119084430799,  
0.8691136234632737,  
0.04907693052707525,  
-0.23336553986203207,  
0.4284777328779486,  
2.2866815267075147,  
0.1760352312050406,  
0.27820168999860917,  
2.067264415281462,  
0.5755331494929522,  
-0.06858856463703264,  
-0.7222667597755238,  
0.7750924366303688,  
-0.278304785792398,  
0.5352624789798245,  
-1.1702690163303244,  
-0.012717570027659048,  
-0.07125250327360101,  
1.7927644689789062,  
1.3752915621891346,  
-1.1981440291126808,  
-0.30737164793891514,  
0.2657743539912098,  
0.04156274567190095,  
1.1363043468044227,  
0.059217925806269944,  
0.7608352104096147,  
-0.1513784586666425,  
0.025696061144845524,  
0.861481321747562,  
-0.48544656000194114,  
-0.006033515622113467,  
0.473431667961849,  
1.5469119181224316,  
0.1871819193791605,  
1.555475823471471,  
0.9001349633565042,  
-1.5961139272878428,  
-0.6749613217725859,  
-1.5596468027729833,  
0.5296186936496604,  
-0.8549575199843406,  
1.7649719371938613,  
1.5569889217595585,  
-0.9244334407213903,  
-1.5804326845781602,  
0.3840271097002098,  
-0.8070678340768227,  
-0.48791686278645724,  
0.13110829311357092,  
-2.023238766590243,  
-0.8997043584182223,  
0.8435119798114825,  
0.12108034013815198,  
-0.7013572315179941,  
0.05813246571029178,  
-1.3645229029121433,  
-1.704441396215925,  
0.6160899239086374,  
-1.6580292769388947,  
-1.550797918270104,  
-0.033040246679508146,  
-0.7595754539148374,

0.6024045095197653,  
0.446745843265138,  
0.9717727329863253,  
-1.3190014690683383,  
-3.180952616822137,  
-0.47685451708111876,  
0.03958388950097112,  
-0.04894683660460036,  
-0.013869967587830365,  
0.9715551393376142,  
-0.2688733257646762,  
-1.7112803723577967,  
-0.06346862095088202,  
1.2756440828431679,  
0.4087049517265435,  
-0.4433737535464867,  
0.07044159255576982,  
0.877714241226598,  
-0.33059433004855665,  
-0.41683973817974146,  
-0.09123983383660174,  
1.153451542408442,  
1.5381060924707182,  
1.4432055127327397,  
0.7948381511053778,  
0.12126271666707081,  
0.3736422837955817,  
-0.06595460407520624,  
-0.1569219765005705,  
1.4053035958769775,  
-0.3443177603686477,  
0.14604377230684606,  
0.733462484703497,  
1.2365404639754205,  
-0.020105376528163625,  
-0.09631958929266826,  
-0.16876809298151013,  
0.42184799028013376,  
0.8803036484986011,  
-0.4148292271104988,  
0.011464734896518355,  
1.0895788780475535,  
-0.006017115067308532,  
0.6476481463328121,  
-0.4792828310008005,  
1.7145504838049759,  
0.9300252591703124,  
1.4147034805691376,  
-0.04601267898776636,  
-0.34579443398211707,  
0.006107561937391137,  
2.7608588509789516,  
-2.470402787070412,  
-0.2193552778493498,  
-0.43636419827955597,  
0.5036040054264609,  
-0.006776779992121664],  
[ 0.5698358581496117,  
1.0111463732621893,  
1.116254023022104,  
1.116254023022104,  
1.4543153683590362,  
1.4543153683590362,  
1.551144943675129,  
1.551144943675129,  
2.3321866923810566,  
2.4857852178760083,  
3.837593499897418,  
3.837593499897418,  
3.837593499897418,  
4.847467397840062,  
5.03660309473088,  
5.176578602594472,  
5.176578602594472,  
5.214332760543968,

6.547255537065404,  
6.547255537065404,  
7.083633091144979,  
7.083633091144979,  
7.133204014188821,  
7.133204014188821,  
7.133204014188821,  
7.937225733864811,  
8.370661235857398,  
8.62656679928389,  
8.759707620277526,  
9.424598849529344,  
0.24247733923543782,  
0.79275118507479,  
-0.012314768690710378,  
1.2247395896468714,  
-0.6087890007814074,  
0.9804698093938512,  
0.19554007335952167,  
-0.18291383394130525,  
-0.08254523307317092,  
0.18380200005144362,  
-0.06242013495608768,  
-0.18902966193120999,  
0.4846770511497838,  
1.2162916157423216,  
0.4476502570273604,  
-0.5204828708955642,  
1.1525916637240337,  
0.9814837501696517,  
1.2019836737296188,  
0.10039944576408244,  
-1.165620769823409,  
0.5709783345435084,  
0.04690539627488982,  
0.3150855883896384,  
0.6835833386917337,  
0.7350671828581666,  
0.15105693185753874,  
0.7851129846448224,  
-0.290237804763004,  
0.02628688844012564,  
-0.3427838784588314,  
-0.12202424723691215,  
0.30368921729231485,  
-0.08398845633414893,  
-0.34421225485285395,  
-1.0992299599969957,  
-0.6679166311787512,  
-0.4925602784337871,  
-0.7607905356843834,  
-0.061822787578292515,  
-0.33643902903801526,  
1.7237644621079549,  
1.1087838048318122,  
1.4391293107545464,  
-0.2688865923867924,  
0.07238699078201241,  
-0.7262166431073663,  
-0.8607492696026928,  
0.1828620517189283,  
-1.5556021786529124,  
-0.5230641559705965,  
-0.023465829708141782,  
0.5773817105800866,  
-0.6189512057198875,  
-0.1704298219551506,  
0.6935490081871019,  
0.43024761601627914,  
-1.3818053283072975,  
0.32069867830077864,  
0.11223505487625844,  
-0.6642209341325642,  
-0.7163563578386999,  
0.9533459704680486,

-2.5373567196844773,  
-0.3530595330204968,  
-0.36744271288254204,  
-0.4105700661159024,  
-0.529185988706723,  
-0.5074466275713505,  
0.5969687397167245,  
0.1454479675984071,  
0.9510340399481164,  
-0.16051754924491393,  
0.168676911677473,  
1.6243103666539225,  
-0.3533677275828062,  
0.23248347317288842,  
1.550100715213732,  
0.3540002793004863,  
0.11004939052123668,  
0.0026309322638186474,  
1.0023099891482978,  
1.3075603782358884,  
0.06614039249633322,  
0.12696883216368457,  
0.4650745950568721,  
0.09288306127511851,  
-0.05535633254466518,  
1.0893487961438044,  
0.1856572010619516,  
-0.3369565165204948,  
1.1993442715596423,  
-0.1637322799431796,  
-0.05574034797393315,  
-0.6499132821077687,  
-1.1854402746414112,  
-0.20554021240749126,  
-0.697991352679575,  
0.7715290435685477,  
0.27728540290360154,  
-0.7490020286422794,  
0.6727458447445039,  
-1.3928966895283914,  
-1.1123692530480307,  
1.2429888713160355,  
0.5002310144425463,  
1.0425617895549082,  
-0.41250228671824735,  
-0.20782873770333182,  
0.952256354944612,  
-0.2180059005687231,  
0.8024032545701543,  
-1.0975152466418368,  
0.6192383355749876,  
-0.44420258004771784,  
-1.3605235580058401,  
1.4196204597477091,  
-1.1230853758949062,  
0.09475958663430169,  
0.9412942473630452],  
[ 0.17961742860022237,  
0.4029745783400613,  
0.4271020388774394,  
0.6998927493507625,  
1.1444327445959492,  
1.4463150894355827,  
1.7859669797147917,  
1.7859669797147917,  
1.8910076260348616,  
2.1568466639380097,  
2.184715675260106,  
2.3241261579565067,  
5.221288254664872,  
5.360678146313719,  
5.572749542622228,  
6.315664711217606,  
6.332942041057151,  
7.225695385348529,

7.238714694082236,  
7.767863290353532,  
7.947954629935657,  
8.045079231148478,  
8.080705184182557,  
8.235317994608641,  
8.52967785406855,  
8.920755162601605,  
8.920755162601605,  
8.920755162601605,  
9.75907480462672,  
11.068402571583377,  
-0.07026370230905016,  
1.2758275954101812,  
0.1960569796315372,  
-0.7454998985427054,  
0.5260870873255556,  
1.3632265149428353,  
0.06759709485075166,  
0.7201883678889174,  
0.7780364770341424,  
0.7034018811814728,  
-0.3281225120527201,  
-0.21523884970562404,  
0.3525948786581971,  
0.10058439953616755,  
0.8489242437750127,  
0.4102210250930649,  
-1.1239274808373552,  
-0.07527028057729333,  
-0.662823747816413,  
-0.09016589559770041,  
0.0005078927131911535,  
-0.9974030724775158,  
1.2973260682530905,  
0.6207513445119947,  
-0.06959715000945968,  
0.01479447508324883,  
0.5707366547040263,  
0.8024230791007029,  
0.11580671533830131,  
0.5319238260215059,  
2.029703693625361,  
0.8476591202353092,  
-0.5985490132202251,  
-1.0850372047073247,  
-0.13885829158476937,  
0.6160884575951602,  
-0.6119315652443118,  
0.25456754270344084,  
1.6135141314150674,  
1.6101080474118592,  
-1.0046888465114787,  
-1.2174288348798858,  
-0.8801790341822278,  
-0.01998793431745051,  
-1.007194981866689,  
-1.6365882266166358,  
3.524880820008825,  
1.5399950054830251,  
-1.401820445976074,  
-0.04945776017633801,  
0.9565666812114323,  
-0.20490442564626934,  
-0.5632271134618189,  
1.0033608730635488,  
0.12368927199762578,  
-0.06153617179775209,  
1.0557374829951787,  
1.532632985657107,  
-0.3069192599686721,  
1.8620498010178619,  
0.18083984306067874,  
-0.9702971127887235,  
-0.4866438529829019,



0.2527358034573417,  
0.46390718912935613,  
0.05253485630073179,  
-0.15957905175444287,  
0.5064463362180326,  
0.6588516997606392,  
0.036226022952260704,  
-1.5941274572195923,  
0.3692191472654626,  
0.31840120283705997,  
0.8741993879399423,  
0.4802653460337955,  
0.3012459045041651,  
0.5102022084743536,  
0.3727970282915065,  
0.6665750190815365,  
-0.7773615380935764,  
0.12852119124454983,  
0.6774482070442244,  
-0.34235651892527574,  
-1.1577831131801597,  
-0.2879120353476077,  
1.157549789799121,  
-0.1818163295634488,  
-0.034519908964088415,  
-0.6744130553492667,  
1.1322140576298956,  
0.5044463860518625,  
1.5469749343656427,  
-0.19451127779487945,  
0.16868157432748737,  
0.3887158384137858,  
1.179393002549757,  
0.4377598134949622,  
0.42273561999328285,  
0.17555703442650725,  
0.7637154786900613,  
0.3204620558964089,  
-1.0127445325141415,  
-0.3366137672636463,  
-0.6128563234467006,  
-0.19959799618607235,  
-0.22993024268879514,  
0.6548635589470768,  
0.5449412421525476,  
0.11171602982233311,  
0.5174688869584806,  
-0.0926785574168733,  
-0.012796553414024043,  
0.872831179387319,  
-0.3738274777631416,  
0.708424995234135,  
1.1207261796968788,  
0.39043722964884914,  
1.5466373285390471,  
-0.0566526099067629,  
-1.544789451209757],  
[ 0.01970245038838479,  
0.18403088824160574,  
0.23516669011749736,  
0.3619340287619915,  
0.7559235356843684,  
0.8037553588156275,  
0.8037553588156274,  
0.8037553588156274,  
1.523650120002224,  
1.5399034674182392,  
3.5267025169505333,  
3.526702516950533,  
4.657784878324055,  
4.735234101549794,  
4.768060921347247,  
6.910522417024203,  
6.910522417024203,  
7.937298848041795,

7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
7.937298848041795,  
8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
8.950027818739875,  
9.275481401407285,  
0.034552241786943605,  
0.7960682992937013,  
-0.16960774395822967,  
-0.13488653659207303,  
-0.07127010448742209,  
0.7213919487775996,  
0.07517487951530155,  
0.7669403129297154,  
-0.0980146039609658,  
0.2841753594230342,  
0.41897129078802076,  
0.7644737129881134,  
0.21659836679204617,  
0.40978346593820614,  
0.23386906952753808,  
0.6351364889148511,  
0.33021983360135304,  
0.3518425622667454,  
-0.16759580526603354,  
1.1955178055405769,  
-0.1119172073880175,  
-1.6647459335605923,  
-0.09499524124538847,  
1.171044098528735,  
-0.022137095989983098,  
0.46479840085551427,  
0.5434533112600137,  
0.7953483283824695,  
-0.23791626316884204,  
-0.34327459028867535,  
0.9770824990177593,  
0.3972109926583832,  
0.031305244787475206,  
0.06660894739153407,  
-0.4270300066285869,  
-1.4580475210852422,  
0.18899331747125298,  
-0.5789031865333153,  
0.2203088633995836,  
-0.028805094274594364,  
-0.21236041446549625,  
0.00835869807102751,  
1.8444421334304235,  
-0.36021419267454113,  
-1.0777998782841605,  
0.7201309879688491,  
-0.07151832135087417,  
0.013523038580686776,  
-0.5101061898109359,  
1.528477364550823,  
-0.24055091899624312,  
1.595727742687772,  
1.181011187425284,  
-0.07205139039345279,  
-0.3645912646252544,  
0.922259297261975,  
0.47504473393792157,  
-1.4582846498754758,  
-1.1041238978674286,  
-0.08619812725702276,  
1.5348185477516838,  
-0.034799821636765677,  
0.34854563969795865,

[illegible]

```
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.17961742860022237,
0.4029745783400613,
0.4271020388774394,
0.6998927493507625,
1.1444327445959492,
1.4463150894355827,
1.7859669797147917,
1.7859669797147917,
1.8910076260348616,
2.1568466639380097,
2.184715675260106,
2.3241261579565067,
5.221288254664872,
5.360678146313719,
5.572749542622228,
6.315664711217606,
6.332942041057151,
7.225695385348529,
7.238714694082236,
7.767863290353532,
7.947954629935657,
8.045079231148478,
8.080705184182557,
8.235317994608641,
8.52967785406855,
8.920755162601605,
8.920755162601605,
8.920755162601605,
9.75907480462672,
11.068402571583377,
-0.07026370230905016,
1.2758275954101812,
0.1960569796315372,
-0.7454998985427054,
0.5260870873255556,
1.3632265149428353,
0.06759709485075166,
0.7201883678889174,
0.7780364770341424,
0.7034018811814728,
-0.3281225120527201,
-0.21523884970562404,
0.3525948786581971,
0.10058439953616755,
0.8489242437750127,
0.4102210250930649,
-1.1239274808373552,
-0.07527028057729333,
-0.662823747816413,
-0.09016589559770041,
0.0005078927131911535,
-0.9974030724775158,
1.2973260682530905,
0.6207513445119947,
-0.06959715000945968,
0.01479447508324883,
0.5707366547040263,
0.8024230791007029,
0.11580671533830131,
0.5319238260215059,
2.029703693625361,
0.8476591202353092,
-0.5985490132202251,
-1.0850372047073247,
-0.13885829158476937,
0.6160884575951602,
-0.6119315652443118,
0.25456754270344084,
1.6135141314150674,
1.6101080474118592,
-1.0046888465114787,
-1.2174288348798858,
-0.8801790341822278,
-0.01998793431745051,
```

-1.007194981866689,  
-1.6365882266166358,  
3.524880820008825,  
1.5399950054830251,  
-1.401820445976074,  
-0.04945776017633801,  
0.9565666812114323,  
-0.20490442564626934,  
-0.5632271134618189,  
1.0033608730635488,  
0.12368927199762578,  
-0.06153617179775209,  
1.0557374829951787,  
1.532632985657107,  
-0.3069192599686721,  
1.8620498010178619,  
0.18083984306067874,  
-0.9702971127887235,  
-0.4866438529829019,  
0.2527358034573417,  
0.46390718912935613,  
0.05253485630073179,  
-0.15957905175444287,  
0.5064463362180326,  
0.6588516997606392,  
0.036226022952260704,  
-1.5941274572195923,  
0.3692191472654626,  
0.31840120283705997,  
0.8741993879399423,  
0.4802653460337955,  
0.3012459045041651,  
0.5102022084743536,  
0.3727970282915065,  
0.6665750190815365,  
-0.7773615380935764,  
0.12852119124454983,  
0.6774482070442244,  
-0.34235651892527574,  
-1.1577831131801597,  
-0.2879120353476077,  
1.157549789799121,  
-0.1818163295634488,  
-0.034519908964088415,  
-0.6744130553492667,  
1.1322140576298956,  
0.5044463860518625,  
1.5469749343656427,  
-0.19451127779487945,  
0.16868157432748737,  
0.3887158384137858,  
1.179393002549757,  
0.4377598134949622,  
0.42273561999328285,  
0.17555703442650725,  
0.7637154786900613,  
0.3204620558964089,  
-1.0127445325141415,  
-0.3366137672636463,  
-0.6128563234467006,  
-0.19959799618607235,  
-0.22993024268879514,  
0.6548635589470768,  
0.5449412421525476,  
0.11171602982233311,  
0.5174688869584806,  
-0.0926785574168733,  
-0.012796553414024043,  
0.872831179387319,  
-0.3738274777631416,  
0.708424995234135,  
1.1207261796968788,  
0.39043722964884914,  
1.5466373285390471,  
-0.0566526099067629,

```

-1.544789451209757]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
               'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]],
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 0, 0, -7.395384341095474],
                                         [12, 6, 0, 0, -5.790856073500346],
                                         [20, 10, 0, 0, -4.565524427603155],
                                         [28, 14, 0, 0, -3.622528542539368]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.172325134277344e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -8.370116227049929,
                           'others': { 'beta_coeffieicients': [ 2.1875,
                                                                -2.1875,
                                                                1.3125,
                                                                -0.3125],
                                       'cost_richardson_zne': 11.390625,
                                       'sorted_expectation_vals': [
-7.395384341095474,
-5.790856073500346,
-4.565524427603155,
-3.622528542539368],

'sorted_noise': [6, 18, 30, 42]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -7.395384341095474],
                  [ 12,
                    6,
                    0,
                    0,
                    -5.790856073500346],
                  [ 20,
                    10,
                    0,
                    0,
                    -4.565524427603155],
                  [ 28,

```

```

14,
0,
0,
-3.622528542539368]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}}},
'init_param': { 'value': [ 0.02240293444906766,
0.9863710197203618,
1.3708545038264748,
1.3757718928414557,
1.7844795346244002,
2.029643659915566,
2.029643659915566,
4.135298362317422,
4.181946654536538,
4.392782597821499,
4.473609589126697,
4.474471668054438,
4.475838923576404,
4.4785869343507265,
4.4785869343507265,
5.467009291914798,
5.470281162008999,
5.840541346188122,
5.842392372241278,
6.505508038171383,
6.505508038171383,
7.536348099553183,
7.536348099553183,
9.63019412694799,
9.63019412694799,
9.63019412694799,
9.63019412694799,
9.63019412694799,
9.63019412694799,
9.63019412694799,
1.1150074339792337,
-0.03535947987647509,
1.1918755403807781,
-0.20191103850925227,
-0.268362117189328,
-0.3595192771004685,
1.2614204066704717,
-2.9429228213034166,
-1.054810371869961,
0.9594255841252335,
-0.09538831740389547,
0.3965663197177072,
-0.22182226409641906,
-0.2653718580482209,
0.1686090968331403,
1.6516484362324146,
-0.3049608013883917,
0.49165272629600476,
1.9061569916625292,
1.241422732345657,
-0.11527538328521378,
-0.22895223610637053,

```

-0.06124477487110871,  
0.6193220715745159,  
1.372932614853267,  
-1.1538384701543527,  
-0.1139440760455718,  
0.16973094341798492,  
-0.5943234340378932,  
0.21399932498003596,  
-0.18156105319883253,  
-1.0504702368491705,  
0.7232808408606985,  
-0.018870518436612777,  
-0.29343981279013404,  
0.30960592292227684,  
0.13511542022922338,  
0.5096669954667911,  
-1.097576281455009,  
0.12047585913747774,  
-0.5585503308065869,  
1.2279608447421912,  
1.3012401380411538,  
0.3769592231863052,  
-0.5692023175942067,  
-0.4567508363134565,  
-0.679549924864495,  
-0.24647993267323956,  
0.6292567546169889,  
0.9587256267378846,  
1.7268825428143277,  
0.1413792259593793,  
0.6520451922983643,  
0.6152471684019365,  
-1.1240317980448378,  
-0.9856730455453077,  
-1.2455074642265085,  
0.2235091354354849,  
-0.8870861048674711,  
0.5299724059178798,  
-0.21820971616414211,  
-0.09687180933262383,  
-0.9247884680119297,  
-0.4566833626656702,  
-0.4285291193052864,  
-0.6406026728496247,  
0.9023578506051637,  
0.03748900229192909,  
0.7551248935414285,  
-0.18980887545414976,  
-0.1497604267964229,  
-0.4253730408988226,  
-0.4157675203773789,  
1.677209169409502,  
0.2126888490300174,  
-0.13481167544410624,  
-1.6951458494505263,  
-0.006476362637627559,  
-0.5490470525961781,  
0.3195499617454318,  
1.077429849794694,  
0.6725724542747005,  
-0.10235701747439804,  
-0.014129818782246995,  
2.382406086835482,  
0.008866515589568993,  
1.0282503794544984,  
-0.6899701634722577,  
0.3510134577654823,  
0.6918405669356381,  
-0.08667968085870373,  
-0.0005005962237103964,  
1.3805542469189591,  
1.011514915181436,  
-0.4623191099783579,  
1.397645255720587,  
-0.7813361449321683,



[illegible]

```
-7.259703059772281,  
-5.766278116709839,  
-4.583193384345111,  
-3.640157125717274],
```

```
        'sorted_expectation_vals': [  
  
        'sorted_noise': [6, 18, 30, 42]],  
    'sampled data': [ [ 4,  
                        2,  
                        0,  
                        0,  
                        -7.259703059772281],  
                      [ 12,  
                        6,  
                        0,  
                        0,  
                        -5.766278116709839],  
                      [ 20,  
                        10,  
                        0,  
                        0,  
                        -4.583193384345111],  
                      [ 28,  
                        14,  
                        0,  
                        0,  
                        -3.640157125717274]],  
    'sampling': 'default'}]],  
{ 'config': { 'ansatz': { 'gateset': 1,  
                          'layer': 30,  
                          'ugate': { 'coefficients': { 'bn': [ 0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0,  
                                                                0],  
                                                                'cn': [ 0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5,  
                                                                0.5],  
                                                                'r': 0},  
                          'time': {'max': 10.0, 'min': 0.0},  
                          'type': 'xy-iss'}},  
  'init_param': { 'value': [ 0.3442332088020621,  
                              0.7247295953616149,  
                              0.7247295953616149,  
                              0.7610537291022658,  
                              1.7162580174489597,  
                              2.0119282772467635,  
                              2.0119282772467635,  
                              3.369934702704019,  
                              3.369934702704019,  
                              5.00211845115155,  
                              5.212181786011135,  
                              5.346566249705437,  
                              6.103091648910964,  
                              6.103091648910964,  
                              7.050711873868975,  
                              7.050711873868975,  
                              7.492144583370162,  
                              7.492144583370162,  
                              7.606105711064038,  
                              7.606105711064038,  
                              8.717193051662631,  
                              8.753101318062777,  
                              8.877107151002964,  
                              8.889590522678484,  
                              8.982812044989718,  
                              8.982812044989718,  
                              9.499874357008034,  
                              9.499874357008034,  
                              9.659025604148875,  
                              9.671110590806489,
```

0.02814413440270558,  
0.250593445582179,  
0.17496868989230024,  
-0.19749991731592192,  
-0.5878125517240043,  
1.1370895496823794,  
0.3339578948727643,  
0.30833012680275795,  
0.21147160367429677,  
0.5518340573364652,  
0.9816766119937317,  
-1.3427949214182668,  
2.2864376119784486,  
0.673664283367827,  
0.4767745045632036,  
-0.47480445681581174,  
0.05912449937800317,  
0.9513757199218045,  
1.079093875588678,  
-0.4313388366547843,  
0.43347513808131466,  
-0.3381632209207048,  
-0.42699598389932686,  
-1.1528003206699722,  
0.2505681368756031,  
1.1900947118566725,  
-0.38260053073473543,  
-0.6405385159573362,  
0.08926968472452403,  
-0.04834256297702397,  
1.603027736914297,  
-0.44672812120859223,  
-0.5759172165575565,  
1.25237714334681,  
0.04254918814060746,  
-0.002429292667880943,  
0.47732275422632153,  
-0.10204026491637587,  
0.02357869435971368,  
0.06910865492863566,  
-0.5942663805386644,  
1.1629666490831163,  
0.28625726751699415,  
0.4183193427753825,  
0.33026699893767814,  
1.8860632823719743,  
-0.37929215782635534,  
0.8251027249542411,  
-0.13937217921728381,  
-0.35829122981546885,  
-0.11830319301401378,  
-1.1307480811476716,  
-0.33746884247229475,  
1.7161163093033744,  
-0.03517175574182253,  
-0.4044561448132672,  
-0.7301790593832838,  
-0.10496992427986328,  
-0.0377875273258637,  
0.11576685707785253,  
-0.9348023198901909,  
2.132577954045408,  
-0.47199808297503054,  
0.09642080758509694,  
-1.5590866370005203,  
0.10045413530924742,  
-0.3215930726850239,  
-0.7020784722315541,  
1.2376661808413174,  
0.5709879203761018,  
-0.820670510834149,  
0.1634866307612446,  
0.06270250983710676,  
-0.03570422816362065,  
-0.5699745682010601,

```

-0.26488761312159137,
1.795803611544861,
-0.4017001375917998,
-1.757541020399501,
-0.05132347348943386,
0.8521664539464072,
0.4812990598336637,
-0.7041980923594973,
0.6941905718406797,
1.5589556954504384,
1.9089912382579748,
0.4849438728523755,
0.03939482159422182,
-0.2564597588944596,
-0.16675906759041134,
2.5610800117093855,
0.9927310518963223,
1.3170410278463267,
0.6281459286410694,
-0.07878692694615999,
0.5865838795710373,
0.4894408136056478,
-0.043552207832595204,
0.8988064624972067,
-0.35279792613941824,
1.5088457985023234,
-0.32174328535909336,
0.41978129355629945,
0.014567846908235548,
-0.17446008524494477,
0.35494980160059775,
1.44166715836895,
0.027787407199764528,
-0.2573832607835415,
0.9605798444843694,
-0.08907047543629609,
-0.012116788408097524,
1.2676248549462201,
-0.2512276837340942,
0.7869834357157488,
-2.3607393050467915,
0.1914341630047483,
-1.0542342437530707,
0.8454261921281611,
0.02027118187750096]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#5'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},

```

```

'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
        'optimization': { 'algorithm': 'SLSQP',
                          'constraint': True,
                          'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.407206817517893],
                          [12, 6, 0, 0, -5.829141582765497],
                          [20, 10, 0, 0, -4.618573032874505],
                          [28, 14, 0, 0, -3.681441154365551]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.2438507080078125e-05,
            'zne_values': { 'degree': 0,
                          'extrapolated_value': -8.363444445929417,
                          'others': { 'beta_coeffieicients': [ 2.1875,
                                                                -2.1875,
                                                                1.3125,
                                                                -0.3125],
                                      'cost_richardson_zne': 11.390625,
                                      'sorted_expectation_vals': [
-7.407206817517893,
-5.829141582765497,
-4.618573032874505,
-3.681441154365551],

'sorted_noise': [6, 18, 30, 42]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -7.407206817517893],
                  [ 12,
                    6,
                    0,
                    0,
                    -5.829141582765497],
                  [ 20,
                    10,
                    0,
                    0,
                    -4.618573032874505],
                  [ 28,
                    14,
                    0,
                    0,
                    -3.681441154365551]],
        'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                        'layer': 30,
                        'ugate': { 'coefficients': { 'bn': [ 0,
                                                             0,
                                                             0,
                                                             0,
                                                             0,
                                                             0,
                                                             0],
                                                         'cn': [ 0.5,
                                                             0.5,
                                                             0.5,
                                                             0.5,
                                                             0.5],
                                                         'r': 0},
                        'time': {'max': 10.0, 'min': 0.0},
                        'type': 'xy-iss'}},
  'init_param': { 'value': [ 0.5482907189468895,
                             0.6413620809492503,
                             0.6422482149552934,
                             1.5892409709442974,
                             1.850708229814058,
                             1.850708229814058,
                             1.8745552660050262,
                             2.400679867939261,

```

2.402212278134192,  
2.485190345183722,  
2.485190345183722,  
2.4851903451837223,  
2.488397493491329,  
2.4883974934913287,  
5.077476636438464,  
5.077476636438464,  
5.732990197214016,  
5.806868622878696,  
5.817834245705687,  
6.166757373752113,  
7.3114292874931905,  
7.311858449036949,  
8.346734585466223,  
8.350435170229554,  
8.354614694314481,  
8.35659817980371,  
8.356905245901928,  
9.313534396314816,  
9.313534396314816,  
10.443787047737276,  
-0.5971318801423705,  
-0.6830583120471296,  
0.053446928626708114,  
-1.488251087277441,  
0.7409998345617078,  
-0.020561007687691084,  
-0.47029189134787985,  
-0.9187802118512801,  
-0.07390570205801456,  
0.6091612085770479,  
0.5696050095749661,  
-2.634874245900948,  
0.14733366015521565,  
1.0781100436188797,  
0.3459269460772517,  
1.2820636645787713,  
-1.605623121104658,  
0.856791024529966,  
0.16374864437029604,  
-0.7377840957855112,  
0.7603752030179747,  
0.4958590077418653,  
1.0293890027768824,  
0.4862585296205842,  
-1.0838654128292502,  
1.2632637762941026,  
-1.1043454462318527,  
-0.7867654190654241,  
0.8818217647037212,  
1.0406267750063978,  
0.05770567519039498,  
-0.5922070722918433,  
-0.3271403288282926,  
0.5980786503295974,  
-0.02050375112330311,  
-0.9007241609880184,  
0.5239405469453117,  
0.7601496703420288,  
-0.6449049942439851,  
1.7340858429103823,  
0.10050113333288421,  
0.3143347863780438,  
0.28408386490618526,  
-0.1222389867527315,  
-0.09502282329152913,  
-1.3004368662949968,  
0.16856179320059875,  
0.6790103402211991,  
0.3355977478652572,  
0.0935957266804422,  
0.42936820813464754,  
0.5148227650107633,  
0.10764356588532305,

```

-0.054251737808208085,
0.06525040933822983,
-0.21143245853075732,
-1.5801988491404158,
0.023513208971767067,
1.0921277689034055,
-0.11501776583679489,
-0.14182911234947893,
1.8716225858725093,
-1.0747761250482988,
-0.01873186129021693,
0.9952348515577564,
1.5589645169221944,
2.4625123021717044,
1.5320934484141422,
0.6264578101560674,
0.015802850908690148,
0.6559295719723718,
0.5030706883609005,
0.010357532831659657,
-0.6971755064049523,
-1.334963536555068,
0.05714132580252865,
0.9478292633237722,
1.541635767019547,
-1.2357775558070643,
1.5753066317572375,
1.2206753513411082,
-0.013882574638756213,
2.102115305768464,
0.6867648509985108,
-1.0810617894892982,
0.608205793929093,
-1.0701207529796843,
-0.008804617073740417,
1.0802724219136723,
1.4472704941581649,
-0.525983160453369,
0.10347757085774918,
0.07451664808136123,
0.8113743025574697,
-0.19830571509994802,
0.20760359505818776,
-0.5709476706639499,
0.1791350390980861,
-0.32061652775092425,
-1.6382844876022806,
2.271046687924862,
0.09972766177435569,
1.671157305178672,
1.0596955078067567,
-0.7395801076185267,
-0.8217251410877643,
1.2660358026872456,
-0.149859182069558,
1.7386861885389688,
-0.003505497297480453,
0.677126408740769,
-1.0541684899696007,
0.9437251450981726,
1.7354017388586316,
-0.8022872949930118,
0.01881044769021433,
-0.013699411839369284,
1.5965466699123847,
0.4486397166383021,
1.5669137279484207}],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,

```

```

1.0,
1.0,
1.0,
1.0,
1.0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 1},
'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
'status': False,
'type': 'png'},
'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#1'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
[1, 1, 0, 0],
[2, 2, 0, 0],
[3, 3, 0, 0]],
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
'optimization': { 'algorithm': 'SLSQP',
'constraint': True,
'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.463351332654992],
[12, 6, 0, 0, -5.841676652164559],
[20, 10, 0, 0, -4.604434423168805],
[28, 14, 0, 0, -3.651723685315627]],
'degree': 0,
'method': 'richardson',
'sampling': 'default'}}},
'output': { 'exact_sol': -8.566772233505624,
'run_time_sec': 4.410743713378906e-05,
'zne_values': { 'degree': 0,
'extrapolated_value': -8.449569892320747,
'others': { 'beta_coeffieicients': [ 2.1875,
-2.1875,
1.3125,
-0.3125],
'cost_richardson_zne': 11.390625,
'sorted_expectation_vals': [
-7.463351332654992,
-5.841676652164559,
-4.604434423168805,
-3.651723685315627],
'sorted_noise': [6, 18, 30, 42]}},
'sampled data': [ [ 4,
2,
0,
0,
-7.463351332654992],
[ 12,
6,
0,
0,
-5.841676652164559],
[ 20,
10,
0,
0,
-4.604434423168805],
[ 28,
14,
0,
0,
-3.651723685315627]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,

```



```
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.2383708143795501,
0.8137820253985804,
1.0561141201801563,
1.2070683478267785,
1.9518166906091101,
2.08301823027678,
2.6774459967535513,
2.7270096866449576,
3.7369434259122447,
3.7421546540398443,
4.458327272130387,
4.463102384700506,
4.463102384700506,
4.482690585412051,
4.482694652744643,
4.498978826283554,
6.3580266266370415,
7.88639599997723,
7.886532810158634,
8.060529572035655,
8.06234783983503,
8.127555772505229,
8.130166630032164,
8.42408407139234,
8.433074307328475,
9.412401860498063,
9.420584174895616,
9.429609653004679,
9.434851407347677,
11.283524698808058,
0.19157417616433814,
0.42257952171340063,
0.3129095694283805,
0.28360255750055535,
-0.7229159635345903,
2.545731433831817,
1.1687892956196542,
0.5222949375721274,
0.9482151911772319,
0.28742832079435787,
1.1627391357840349,
-0.27939056132165146,
-0.07574334812551493,
-0.529119211391362,
-0.08653083237786212,
0.042544229108731915,
-0.09154582517805988,
0.2776265525620834,
0.373637405241428,
-0.666296500917012,
-0.729825790392568,
0.36164641825124294,
1.2066181407380305,
0.18327070025757417,
2.2757552060408917,
-0.004789158452516104,
0.49019439516235463,
2.190622553796523,
0.6131206832540379,
1.0987721265230228,
1.9413219378309259,
```

0.07975169469268534,  
0.17531082109327745,  
0.01770145552231998,  
0.22429808435825893,  
1.1460098869067579,  
-0.25766861736092417,  
0.4386465248337572,  
0.7521614434169624,  
0.07039918338308593,  
-0.23913727928604284,  
0.062497116873310714,  
0.27575365987954265,  
-0.8268952220573135,  
0.8599765782432734,  
0.6958325703328606,  
-0.16792542378671177,  
-0.13186811496768225,  
0.17745018848846658,  
-0.13764108606901534,  
-0.34798347931108986,  
0.3901205214779397,  
-0.12832331396189006,  
0.7623260417931323,  
-0.08745728181826747,  
0.22448567111633413,  
0.5103689813486589,  
0.020179740460913417,  
-0.4639048953982949,  
1.8052783293547816,  
-0.06895296635033099,  
-0.46137869531525183,  
-0.7694587159951923,  
-0.1507074275764489,  
-3.159084078074864,  
1.5556721360426484,  
0.9802025173412374,  
-1.5980562353917622,  
0.9974678614222413,  
0.11965749551778265,  
-0.5964068365118492,  
1.00912773091807,  
1.2674306548806673,  
1.7418320010188646,  
-1.2223756485879664,  
-0.006270145144671745,  
0.7863824204489233,  
-0.08410721186616651,  
0.13420385894759826,  
0.6686584151585806,  
-0.7946689395347296,  
-1.448768973512125,  
-0.4158373205099576,  
-0.1003664997933048,  
0.5370971852976741,  
-0.013369261455621718,  
-1.2134070474127567,  
2.71822204346588,  
-0.8266087910498845,  
-0.04274152999618493,  
0.627725493238542,  
-0.10714625448592663,  
1.4055199595750496,  
-0.08877591733311402,  
-0.6400618055168635,  
0.27990653766167567,  
0.27230874688701184,  
1.8329367216853043,  
0.12128377229042309,  
0.03719209379786179,  
0.7558193864298689,  
-0.027085062677120984,  
0.7947118159580207,  
-0.18810209431195668,  
0.008294184744538372,  
-0.9110921816475059,

```

1.3065108206329406,
0.004810940817056788,
1.4030602129547465,
0.03878633149748846,
0.29850504257680605,
-0.9524583070906825,
0.10037229527914636,
0.4277056649647598,
-2.2528322583674503,
0.030724614514628212,
0.8416350822543037,
1.5579013461800135,
0.5696673724928452,
-1.5352194543526818]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'ngubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#4'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.418732841657523],
                          [12, 6, 0, 0, -5.8155731075176975],
                          [20, 10, 0, 0, -4.600391600363878],
                          [28, 14, 0, 0, -3.6713467271615334]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.315376281738281e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -8.397630041670476,
                           'others': { 'beta_coeffieicients': [ 2.1875,
                                                                -2.1875,
                                                                1.3125,
                                                                -0.3125],
                                         'cost_richardson_zne': 11.390625,
                                         'sorted_expectation_vals': [
-7.418732841657523,
-5.8155731075176975,
-4.600391600363878,
-3.6713467271615334],

'sorted_noise': [6, 18, 30, 42]}},
'sampled data': [ [ 4,
                    2,
                    0,

```

```

0,
-7.418732841657523],
[ 12,
6,
0,
0,
-5.8155731075176975],
[ 20,
10,
0,
0,
-4.600391600363878],
[ 28,
14,
0,
0,
-3.6713467271615334]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}}},
'init_param': { 'value': [ -3.641081222961908e-17,
0.6149788059529836,
0.7190202634465676,
1.227117923902744,
1.282995668258181,
1.320146784613617,
1.320146784613617,
3.1464089486715623,
3.1464089486715623,
5.021180125711677,
5.021180125711677,
5.021180125711677,
6.703692809170789,
6.703692809170789,
7.791601108223033,
7.8369202041803225,
7.951907692650894,
7.98389042115583,
8.258376681022987,
8.258376681022987,
8.264818959972613,
8.264818959972613,
8.264818959972613,
8.264818959972613,
8.265620267330194,
8.265620267330194,
9.412842541483705,
9.412842541483705,
10.502716174481437,
10.502716174481437,
0.1665558361704551,
0.0766182276072886,
-0.06331706305100791,
0.03225035272845343,
-0.2265177184784691,
0.6859734408919996,
0.358399999202588,
-0.31490649734707366,
0.03084506070978915,

```

0.8141179515629021,  
-0.05751068028622007,  
0.9013204998454583,  
-0.325467390457223,  
-0.16027539072229496,  
0.19756436832536928,  
0.17875052394899651,  
0.07441990946369173,  
-1.7121562848350094,  
0.5411900571694856,  
0.025994665514066265,  
-1.0547594680221428,  
-0.3558195097906033,  
0.2575282902752545,  
-0.32652811387218433,  
-0.17477771883072452,  
0.05603758809983181,  
-0.31531793685177084,  
0.24953935818155465,  
-0.21945102528047247,  
0.016201452486715968,  
-0.47139285875704856,  
0.8354485366702803,  
0.28783787212142514,  
-1.483190369052958,  
-0.05324490057492157,  
0.00808064868141892,  
-1.3894868155533049,  
0.07648399162880297,  
0.28128388531065984,  
-0.8032486745370345,  
0.9961277979922681,  
0.7271807873997648,  
-0.2598267503182047,  
0.058937213125893145,  
1.4176939090014022,  
1.5623836495300838,  
-1.2281014386266311,  
1.627596878633186,  
0.150437982354294,  
0.017798034487339433,  
-0.2091243023446671,  
0.08776907917710067,  
0.637527078885032,  
1.2603122563899933,  
1.0910453886717337,  
0.001707278941889729,  
-0.5366140699752073,  
-0.04457743756443993,  
0.708269991966563,  
1.6757260639955311,  
0.6610325406900899,  
-0.508228690084442,  
-0.5178693625521746,  
-0.2955589105377924,  
-0.47790822054112786,  
0.31077598178920485,  
0.020632196003020267,  
1.5538854336639996,  
1.2816443511581943,  
-0.6926864187150775,  
0.73698114320343,  
0.3645818015611773,  
-0.2097443780477125,  
0.1421287040679699,  
0.052774836076248374,  
-0.7306191772967899,  
1.107856618529218,  
0.3743379513498811,  
1.2959169452837032,  
0.8858564921663113,  
0.03370518740548656,  
-1.0860983069970114,  
1.2199055901240408,  
-1.0630806559423625,

[illegible]

```

        [28, 14, 0, 0, -3.7949056030968538]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.886222839355469e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.415032907835059,
                            'others': { 'beta_coeffieicients': [ 2.1875,
                                                                -2.1875,
                                                                1.3125,
                                                                -0.3125],
                            'cost_richardson_zne': 11.390625,
                            'sorted_expectation_vals': [
-7.47570078392518,
-5.921149282782478,
-4.7240834286119355,
-3.7949056030968538],

                                'sorted_noise': [6, 18, 30, 42]}},
            'sampled data': [ [4, 2, 0, 0, -7.47570078392518],
                              [ 12,
                                6,
                                0,
                                0,
                                -5.921149282782478],
                              [ 20,
                                10,
                                0,
                                0,
                                -4.7240834286119355],
                              [ 28,
                                14,
                                0,
                                0,
                                -3.7949056030968538]],
            'sampling': 'default'}}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                                'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                                'r': 0},
                          'time': {'max': 10.0, 'min': 0.0},
                          'type': 'xy-iss'}}},
  'init_param': { 'value': [ 0.5698358581496117,
                              1.0111463732621893,
                              1.116254023022104,
                              1.116254023022104,
                              1.4543153683590362,
                              1.4543153683590362,
                              1.551144943675129,
                              1.551144943675129,
                              2.3321866923810566,
                              2.4857852178760083,
                              3.837593499897418,
                              3.837593499897418,
                              3.837593499897418,
                              4.847467397840062,
                              5.03660309473088,
                              5.176578602594472,
                              5.176578602594472,
                              5.214332760543968,
                              6.547255537065404,
                              6.547255537065404,
                              7.083633091144979,

```

7.083633091144979,  
7.133204014188821,  
7.133204014188821,  
7.133204014188821,  
7.937225733864811,  
8.370661235857398,  
8.62656679928389,  
8.759707620277526,  
9.424598849529344,  
0.24247733923543782,  
0.79275118507479,  
-0.012314768690710378,  
1.2247395896468714,  
-0.6087890007814074,  
0.9804698093938512,  
0.19554007335952167,  
-0.18291383394130525,  
-0.08254523307317092,  
0.18380200005144362,  
-0.06242013495608768,  
-0.18902966193120999,  
0.4846770511497838,  
1.2162916157423216,  
0.4476502570273604,  
-0.5204828708955642,  
1.1525916637240337,  
0.9814837501696517,  
1.2019836737296188,  
0.10039944576408244,  
-1.165620769823409,  
0.5709783345435084,  
0.04690539627488982,  
0.3150855883896384,  
0.6835833386917337,  
0.7350671828581666,  
0.15105693185753874,  
0.7851129846448224,  
-0.290237804763004,  
0.02628688844012564,  
-0.3427838784588314,  
-0.12202424723691215,  
0.30368921729231485,  
-0.08398845633414893,  
-0.34421225485285395,  
-1.0992299599969957,  
-0.6679166311787512,  
-0.4925602784337871,  
-0.7607905356843834,  
-0.061822787578292515,  
-0.33643902903801526,  
1.7237644621079549,  
1.1087838048318122,  
1.4391293107545464,  
-0.2688865923867924,  
0.07238699078201241,  
-0.7262166431073663,  
-0.8607492696026928,  
0.1828620517189283,  
-1.5556021786529124,  
-0.5230641559705965,  
-0.023465829708141782,  
0.5773817105800866,  
-0.6189512057198875,  
-0.1704298219551506,  
0.6935490081871019,  
0.43024761601627914,  
-1.3818053283072975,  
0.32069867830077864,  
0.11223505487625844,  
-0.6642209341325642,  
-0.7163563578386999,  
0.9533459704680486,  
-2.5373567196844773,  
-0.3530595330204968,  
-0.36744271288254204,



```

-0.4105700661159024,
-0.529185988706723,
-0.5074466275713505,
0.5969687397167245,
0.1454479675984071,
0.9510340399481164,
-0.16051754924491393,
0.168676911677473,
1.6243103666539225,
-0.3533677275828062,
0.23248347317288842,
1.550100715213732,
0.3540002793004863,
0.11004939052123668,
0.0026309322638186474,
1.0023099891482978,
1.3075603782358884,
0.06614039249633322,
0.12696883216368457,
0.4650745950568721,
0.09288306127511851,
-0.05535633254466518,
1.0893487961438044,
0.1856572010619516,
-0.3369565165204948,
1.1993442715596423,
-0.1637322799431796,
-0.05574034797393315,
-0.6499132821077687,
-1.1854402746414112,
-0.20554021240749126,
-0.697991352679575,
0.7715290435685477,
0.27728540290360154,
-0.7490020286422794,
0.6727458447445039,
-1.3928966895283914,
-1.1123692530480307,
1.2429888713160355,
0.5002310144425463,
1.0425617895549082,
-0.41250228671824735,
-0.20782873770333182,
0.952256354944612,
-0.2180059005687231,
0.8024032545701543,
-1.0975152466418368,
0.6192383355749876,
-0.44420258004771784,
-1.3605235580058401,
1.4196204597477091,
-1.1230853758949062,
0.09475958663430169,
0.9412942473630452}],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},

```

```

'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#8'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 0, 0],
                                                  [2, 2, 0, 0],
                                                  [3, 3, 0, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                       'constraint': True,
                                       'status': False}},
            'zne': { 'data_points': [ [4, 2, 0, 0, -7.159167099826595],
                                       [12, 6, 0, 0, -5.573237410199789],
                                       [20, 10, 0, 0, -4.355904736591592],
                                       [28, 14, 0, 0, -3.4138455900908444]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.649162292480469e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -8.119519415931714,
                           'others': { 'beta_coefficients': [ 2.1875,
                                                             -2.1875,
                                                             1.3125,
                                                             -0.3125],
                                       'cost_richardson_zne': 11.390625,
                                       'sorted_expectation_vals': [
-7.159167099826595,
-5.573237410199789,
-4.355904736591592,
-3.4138455900908444],
'sorted_noise': [6, 18, 30, 42]}},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -7.159167099826595],
                  [ 12,
                    6,
                    0,
                    0,
                    -5.573237410199789],
                  [ 20,
                    10,
                    0,
                    0,
                    -4.355904736591592],
                  [ 28,
                    14,
                    0,
                    0,
                    -3.4138455900908444]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [ 0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0,
                                                                0],
                                                            'cn': [ 0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5,
                                                                0.5],
                                                            'r': 0},
'coefficients': { 'bn': [ 0,
                          0,
                          0,
                          0,
                          0,
                          0,
                          0],
                  'cn': [ 0.5,
                          0.5,
                          0.5,
                          0.5,
                          0.5,
                          0.5],
                  'r': 0},
'time': {'max': 10.0, 'min': 0.0}},

```

```
'type': 'xy-iss'}},
'init_param': { 'value': [ 4.1837705414928806e-17,
1.1742327239243593,
1.1742327239243593,
1.174232723924359,
1.3021435979041922,
1.3883521076730898,
1.4901272631800928,
1.490127263180093,
1.490127263180093,
2.542545188872923,
2.56739133991554,
2.677178516908646,
5.624946341909109,
5.624946341909109,
5.63924283183031,
5.672838193807689,
5.672838193807689,
5.672838193807689,
5.672838193807689,
5.672838193807689,
5.672838193807689,
5.672838193807689,
5.805507018952099,
5.858678454346443,
7.374841183417447,
7.374841183417447,
9.078346087689514,
9.17910617229311,
9.185363997877552,
9.550522060955204,
9.715006087156702,
0.5380723684568228,
0.20346632529178696,
-0.28402043001150323,
-0.013694659434132353,
-0.8491217472851175,
-0.13891219530245408,
-0.7902948900320785,
0.02035105936303376,
0.35891510624171696,
0.07011262472067725,
0.2571910630887441,
0.09727807922224965,
-0.4253506785797692,
-0.08201618636277365,
-0.5629942371157008,
0.4984357070329931,
0.22460606922422946,
0.6436861273901548,
0.5581387866543217,
0.6438048424266741,
0.6625810608832491,
-0.2877740698749285,
0.03400434270310955,
0.6598198228171638,
0.15695492486622947,
-0.23277712193728803,
0.3379436543817524,
0.6679629986711755,
0.4913802101172593,
-0.6543304626041586,
1.2398324170787045,
0.10868488610295632,
0.4726806257545104,
-1.0278416218016544,
-0.5660236088762642,
-0.06627186605932975,
0.3527547117645279,
0.3944014355355292,
0.33709190475341266,
0.16707772676088822,
0.29195080738380563,
1.0354529601392413,
0.12500585138196232,
-0.037178956773431956,
```

0.7823218278561086,  
-0.04464215343745706,  
-0.36923576305262273,  
-0.9863817864437636,  
0.039519076991602065,  
-0.35646400258617383,  
0.04542480304419608,  
-0.46125271135496354,  
0.40472620693719735,  
0.7802480661953589,  
-0.6757172179201896,  
0.6396142241310521,  
0.2327897749192615,  
0.8954622299286413,  
0.7158405805761733,  
0.1382139633537826,  
1.0616928944303126,  
-0.6122315420380016,  
-0.6738539946512315,  
1.0433459792659807,  
0.494526070112864,  
0.20621322780405107,  
-0.05318175489586881,  
-0.11213659998229918,  
0.32941262943060273,  
0.13931786347259914,  
-0.07640781308377202,  
0.31450116184408605,  
0.3658109215963646,  
0.04460349089074807,  
-0.12913310998017427,  
0.31890485610090735,  
-0.005491508360761248,  
1.2692063073436923,  
-0.3006174703747285,  
-0.41404661321397057,  
-0.5199199797590206,  
0.44225909618051784,  
-0.4233007342169607,  
0.7456354776212751,  
-0.32484988424610756,  
0.9268151291603125,  
0.8385591284905366,  
0.027219364270413358,  
-0.5520387125082392,  
1.3757901840365965,  
0.02933419406725825,  
-0.2915193842748469,  
0.33917094344303517,  
0.10828106345120646,  
-0.5650186064180197,  
-0.6041651963720519,  
-0.19230834783869816,  
1.9848826966849449,  
0.0632219631903188,  
0.04804551511145073,  
0.47752350144148015,  
1.3406847618100746,  
-1.3722262204383469,  
-1.0513455672656666,  
0.7121308231347245,  
0.13278942055995957,  
1.9758312031522887,  
2.19648222646383,  
0.8936788375205645,  
0.05510909660880629,  
-0.18765678539637448,  
0.45031205104496697,  
-0.6542716355161553,  
0.5783583754336702,  
-0.18844184232604352,  
-1.5667303012058793,  
0.36110899429768645,  
-0.275182998952267,  
0.30367576290775045,

```

-0.1532687178202341]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                  'noise_prob': [0.001, 0.001, 0, 0],
                  'status': True,
                  'type': 'depolarizing'}},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#2'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 0, 0],
                                     [2, 2, 0, 0],
                                     [3, 3, 0, 0]],
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 0, 0, -7.130214875567141],
                                         [12, 6, 0, 0, -5.622281179564727],
                                         [20, 10, 0, 0, -4.4547314200293675],
                                         [28, 14, 0, 0, -3.544056752302471]],
                    'degree': 0,
                    'method': 'richardson',
                    'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.00543212890625e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.037922213699304,
                            'others': { 'beta_coeffieicients': [ 2.1875,
                                                                -2.1875,
                                                                1.3125,
                                                                -0.3125],
                            'cost_richardson_zne': 11.390625,
                            'sorted_expectation_vals': [
-7.130214875567141,
-5.622281179564727,
-4.4547314200293675,
-3.544056752302471],

'sorted_noise': [6, 18, 30, 42]},
'sampled data': [ [ 4,
                    2,
                    0,
                    0,
                    -7.130214875567141],
                  [ 12,
                    6,
                    0,
                    0,
                    -5.622281179564727],
                  [ 20,
                    10,
                    0,
                    0,
                    -4.4547314200293675],
                  [ 28,

```

```

14,
0,
0,
-3.544056752302471]],
'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
'layer': 30,
'ugate': { 'coefficients': { 'bn': [ 0,
0,
0,
0,
0,
0,
0],
'cn': [ 0.5,
0.5,
0.5,
0.5,
0.5,
0.5],
'r': 0},
'time': {'max': 10.0, 'min': 0.0},
'type': 'xy-iss'}}},
'init_param': { 'value': [ 0.01970245038838479,
0.18403088824160574,
0.23516669011749736,
0.3619340287619915,
0.7559235356843684,
0.8037553588156275,
0.8037553588156274,
0.8037553588156274,
1.523650120002224,
1.5399034674182392,
3.5267025169505333,
3.526702516950533,
4.657784878324055,
4.735234101549794,
4.768060921347247,
6.910522417024203,
6.910522417024203,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
7.937298848041795,
8.950027818739875,
8.950027818739875,
8.950027818739875,
8.950027818739875,
8.950027818739875,
9.275481401407285,
0.034552241786943605,
0.7960682992937013,
-0.16960774395822967,
-0.13488653659207303,
-0.07127010448742209,
0.7213919487775996,
0.07517487951530155,
0.7669403129297154,
-0.0980146039609658,
0.2841753594230342,
0.41897129078802076,
0.7644737129881134,
0.21659836679204617,
0.40978346593820614,
0.23386906952753808,
0.6351364889148511,
0.33021983360135304,
0.3518425622667454,
-0.16759580526603354,
1.1955178055405769,
-0.1119172073880175,
-1.6647459335605923,

```

-0.09499524124538847,  
1.171044098528735,  
-0.022137095989983098,  
0.46479840085551427,  
0.5434533112600137,  
0.7953483283824695,  
-0.23791626316884204,  
-0.34327459028867535,  
0.9770824990177593,  
0.3972109926583832,  
0.031305244787475206,  
0.06660894739153407,  
-0.4270300066285869,  
-1.4580475210852422,  
0.18899331747125298,  
-0.5789031865333153,  
0.2203088633995836,  
-0.028805094274594364,  
-0.21236041446549625,  
0.00835869807102751,  
1.8444421334304235,  
-0.36021419267454113,  
-1.0777998782841605,  
0.7201309879688491,  
-0.07151832135087417,  
0.013523038580686776,  
-0.5101061898109359,  
1.528477364550823,  
-0.24055091899624312,  
1.595727742687772,  
1.181011187425284,  
-0.07205139039345279,  
-0.3645912646252544,  
0.922259297261975,  
0.47504473393792157,  
-1.4582846498754758,  
-1.1041238978674286,  
-0.08619812725702276,  
1.5348185477516838,  
-0.034799821636765677,  
0.34854563969795865,  
-0.3057886345189525,  
0.3435344949085216,  
2.387989506593159,  
0.5928805156422549,  
-0.02250711897690342,  
0.734685803060112,  
1.1230348216575474,  
0.9339212770561773,  
0.5429657194529808,  
-0.9530889967003539,  
1.2607191116533525,  
-0.18262479735843284,  
0.2292294020716647,  
0.484625167272873,  
2.2621526738562925,  
0.3832060422832924,  
0.2504382199240898,  
-1.1186566372739195,  
1.0354182359738777,  
-0.9045076995614423,  
1.0282595509077306,  
1.805679851173207,  
0.9332861023326164,  
1.4396403686507162,  
1.6178312922032976,  
-0.22196274260736226,  
0.19030625281227892,  
-0.32840557234129963,  
1.004592356770436,  
1.8720477930131976,  
-0.06388076228748135,  
0.12235432131563899,  
-0.5998878734536057,  
-0.5461403115162753,

[illegible]



```
-7.512595875373562,  
-6.004303631668366,  
-4.83491199768215,  
-3.919939099798885],
```

```
        'sorted_expectation_vals': [  
  
        'sorted_noise': [6, 18, 30, 42]],  
    'sampled data': [ [ 4,  
                        2,  
                        0,  
                        0,  
                        -7.512595875373562],  
                      [ 12,  
                        6,  
                        0,  
                        0,  
                        -6.004303631668366],  
                      [ 20,  
                        10,  
                        0,  
                        0,  
                        -4.83491199768215],  
                      [ 28,  
                        14,  
                        0,  
                        0,  
                        -3.919939099798885]],  
    'sampling': 'default'}]],  
{ 'config': { 'ansatz': { 'gateset': 1,  
                          'layer': 30,  
                          'ugate': { 'coefficients': { 'bn': [ 0,  
                                                              0,  
                                                              0,  
                                                              0,  
                                                              0,  
                                                              0,  
                                                              0],  
                                                              'cn': [ 0.5,  
                                                              0.5,  
                                                              0.5,  
                                                              0.5,  
                                                              0.5,  
                                                              0.5],  
                                                              'r': 0},  
                          'time': {'max': 10.0, 'min': 0.0},  
                          'type': 'xy-iss'}},  
  'init_param': { 'value': [ 0.003408343124459994,  
                              0.0034083431244599804,  
                              0.006710027629051694,  
                              0.2484817728699434,  
                              1.1672656342280407,  
                              1.167470260322433,  
                              3.1453440534904744,  
                              3.166261678218574,  
                              3.2843704266652405,  
                              4.089250903115526,  
                              4.091989893807717,  
                              4.091989893807717,  
                              5.181052167254873,  
                              5.181052167254873,  
                              5.184972473956635,  
                              5.585122024093685,  
                              5.5990893229720795,  
                              5.630355974178803,  
                              5.704160317443757,  
                              8.658831571647385,  
                              8.66505230970618,  
                              8.712765508205756,  
                              8.712765508205756,  
                              8.712765508205756,  
                              9.168875276976076,  
                              9.176734348833309,  
                              9.262471352200725,  
                              9.262471352200725,  
                              10.578606537988184,  
                              10.578606537988184,
```

1.5905119084430799,  
0.8691136234632737,  
0.04907693052707525,  
-0.23336553986203207,  
0.4284777328779486,  
2.2866815267075147,  
0.1760352312050406,  
0.27820168999860917,  
2.067264415281462,  
0.5755331494929522,  
-0.06858856463703264,  
-0.7222667597755238,  
0.7750924366303688,  
-0.278304785792398,  
0.5352624789798245,  
-1.1702690163303244,  
-0.012717570027659048,  
-0.07125250327360101,  
1.7927644689789062,  
1.3752915621891346,  
-1.1981440291126808,  
-0.30737164793891514,  
0.2657743539912098,  
0.04156274567190095,  
1.1363043468044227,  
0.059217925806269944,  
0.7608352104096147,  
-0.1513784586666425,  
0.025696061144845524,  
0.861481321747562,  
-0.48544656000194114,  
-0.006033515622113467,  
0.473431667961849,  
1.5469119181224316,  
0.1871819193791605,  
1.555475823471471,  
0.9001349633565042,  
-1.5961139272878428,  
-0.6749613217725859,  
-1.5596468027729833,  
0.5296186936496604,  
-0.8549575199843406,  
1.7649719371938613,  
1.5569889217595585,  
-0.9244334407213903,  
-1.5804326845781602,  
0.3840271097002098,  
-0.8070678340768227,  
-0.48791686278645724,  
0.13110829311357092,  
-2.023238766590243,  
-0.8997043584182223,  
0.8435119798114825,  
0.12108034013815198,  
-0.7013572315179941,  
0.05813246571029178,  
-1.3645229029121433,  
-1.704441396215925,  
0.6160899239086374,  
-1.6580292769388947,  
-1.550797918270104,  
-0.033040246679508146,  
-0.7595754539148374,  
0.6024045095197653,  
0.446745843265138,  
0.9717727329863253,  
-1.3190014690683383,  
-3.180952616822137,  
-0.47685451708111876,  
0.03958388950097112,  
-0.04894683660460036,  
-0.013869967587830365,  
0.9715551393376142,  
-0.2688733257646762,  
-1.7112803723577967,

```

-0.06346862095088202,
1.2756440828431679,
0.4087049517265435,
-0.4433737535464867,
0.07044159255576982,
0.877714241226598,
-0.33059433004855665,
-0.41683973817974146,
-0.09123983383660174,
1.153451542408442,
1.5381060924707182,
1.4432055127327397,
0.7948381511053778,
0.12126271666707081,
0.3736422837955817,
-0.06595460407520624,
-0.1569219765005705,
1.4053035958769775,
-0.3443177603686477,
0.14604377230684606,
0.733462484703497,
1.2365404639754205,
-0.020105376528163625,
-0.09631958929266826,
-0.16876809298151013,
0.42184799028013376,
0.8803036484986011,
-0.4148292271104988,
0.011464734896518355,
1.0895788780475535,
-0.006017115067308532,
0.6476481463328121,
-0.4792828310008005,
1.7145504838049759,
0.9300252591703124,
1.4147034805691376,
-0.04601267898776636,
-0.34579443398211707,
0.006107561937391137,
2.7608588509789516,
-2.470402787070412,
-0.2193552778493498,
-0.43636419827955597,
0.5036040054264609,
-0.006776779992121664]],
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                             'value': 0},
                   'noise_prob': [0.001, 0.001, 0, 0],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [ 1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0,
                                           1.0],
                                   'cn': [ 0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5,
                                           0.5],
                                   'r': 1},
                'def': 'ising'},
'output': { 'draw': { 'fig_dpi': 100,
                      'status': False,
                      'type': 'png'},
            'file_name_prefix':
'AUTOMATE_xy_noisefree_time_evo_ric4_unifrom_scaling_sample#7'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                      [1, 1, 0, 0],
                                      [2, 2, 0, 0],
                                      [3, 3, 0, 0]],

```

```

'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 0, 0, -7.568863804770513],
                          [12, 6, 0, 0, -6.084665473601484],
                          [20, 10, 0, 0, -4.914126798758423],
                          [28, 14, 0, 0, -3.985131466280292]],
        'degree': 0,
        'method': 'richardson',
        'sampling': 'default'}}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.744529724121094e-05,
            'zne_values': { 'degree': 0,
                           'extrapolated_value': -8.451121689590092,
                           'others': { 'beta_coeffieicients': [ 2.1875,
                                                                -2.1875,
                                                                1.3125,
                                                                -0.3125],
                           'cost_richardson_zne': 11.390625,
                           'sorted_expectation_vals': [

```

```

-7.568863804770513,
-6.084665473601484,
-4.914126798758423,
-3.985131466280292],

```

```

'sorted_noise': [6, 18, 30, 42]}},
'sampled data': [ [ 4,
                   2,
                   0,
                   0,
                   -7.568863804770513],
                  [ 12,
                   6,
                   0,
                   0,
                   -6.084665473601484],
                  [ 20,
                   10,
                   0,
                   0,
                   -4.914126798758423],
                  [ 28,
                   14,
                   0,
                   0,
                   -3.985131466280292]],
'sampling': 'default'}}}}}}

```