```
{ 'xy-ric2': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
                                                        'laver': 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': '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'},
                                            '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': 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,
 1.0900003904895101.
 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,
-0.17185617277774212,
-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],
                                                                        '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': [ 3.750846163374531e-05,
                                                         0.22285241391868899,
                                                         0.26252411232084344,
                                                         0.26252411232084344,
                                                         0.26252411232084344,
                                                         1.459545906754556.
                                                         1.4595459067545562,
                                                         1.6094835194149661,
                                                         2.5927782099427628,
                                                         2.5927782099427628,
                                                         2.5927782099427628,
                                                         2.5927782099427623,
                                                         3.3552499939702187,
                                                         3.3552499939702187,
                                                         5.033284106467877,
                                                         5.033284106467877,
                                                         5.056477210452712,
                                                         6.768913439946703,
                                                         6.768913439946703,
                                                         7.2782492670747585,
                                                         7.2782492670747585,
                                                         7.2782492670747585,
                                                         7.2782492670747585,
                                                         7.2782492670747585,
                                                         7.2782492670747585,
                                                         8.934198246659292,
                                                         8.937369801451712,
                                                         9.544406408519471,
                                                         9.544406408519471,
                                                         10.23170722265548,
                                                         -0.4501443853573418,
                                                         0.06519513561037263,
                                                         -0.13386490845883003,
                                                         -0.01542333988020039,
                                                         0.3988203537526196,
                                                         0.9163371790808124,
                                                         0.08159154039220383,
                                                         -0.11665429084087826,
                                                         -0.21130662780886203,
                                                         1.515236372470638,
                                                         0.4436142129357345,
                                                         -0.28780404896369716,
                                                         0.3681425383234808,
                                                         0.648176841676201.
                                                         0.3046875502986337,
                                                         0.05897820457762899,
                                                         0.09316951897603123,
                                                         1.5277657654344678,
                                                         -0.655141628591867,
                                                         0.073084468489131,
                                                         -0.11423944001370272,
                                                         0.3986898081963471,
                                                         1.0974832156349317,
                                                         1.8462557861113,
                                                         0.5998463368708868,
                                                         -0.0014214294560794885,
                                                         0.4026665434776887,
                                                         -0.03860309342262787,
                                                         0.3728818533964108,
```

```
1.7322816292529104,
0.42156018976657544,
0.9872712539907578.
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974.
0.4324416138472369,
0.7909276553155474,
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866.
-0.0743310361925915,
1.1363109745761366,
0.32003332101567866,
0.08535303128967886,
1.1165485958252095,
0.476282782575683,
0.11414859665640108,
0.8927652783900955,
0.027791184984770272,
0.8970588198442948.
-0.04579755391586939,
0.10596016247070955,
0.4721342517962854,
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702,
0.2928189752635581,
-0.4120973709154422,
-0.16251962266938982,
-0.928532755338732,
0.13709877636127538,
0.09386847134985479,
-0.9415336108192559.
-1.3861285848764584,
0.5116476525314603,
-1.5694556777668651,
0.31948518026769196.
-0.0136576069296156,
0.8752899744519326,
-0.448175539102687,
-0.8567162669878051,
0.737642795798484,
-0.5233142967805873,
-0.020239952918795164,
0.9696407297918527,
1.064479355466651,
-0.43102633401249074.
0.3234367312145231,
0.02606795235445944,
0.2525608175326581,
0.09544790103129135,
0.30399471295861424,
0.6638935631613432,
2.095756590649309,
-0.5383535092385583,
-0.1523671776118538,
-0.49733805370513506,
1.0814777965289457,
-0.5541810322110113,
0.4702060218904802,
0.1941018040115748.
0.027389458133440587,
-0.6339976476553459,
0.824073822166477,
-0.8904328829691108
0.5852778403101284,
-0.37705413851354036,
-0.20234246488211116,
0.19390975159216547,
-0.03854894368679599,
-0.5885610444718222,
```

0.2892174263372239,

```
0.36228239756074476.
                                                                         0.06448164730191597,
                                                                         0.8103021451607575,
                                                                         0.04195704491201313,
                                                                         2.1946244272306323.
                                                                         1.1078290402756337,
                                                                         -0.0920096926231485,
                                                                         0.7957980849005134,
                                                                         0.10683086015182242,
                                                                         0.04139972880547422.
                                                                        1.068477454710041,
                                                                        1.5812878062267348,
                                                                        1.0292383703670558,
                                                                        1.5822631942162138]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric2_sample#6'},
                                             'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 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, 7, 0, -6.4606782650454075],
                                                              [12, 6, 21, 8, -3.2738854608106305]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0 } ,
                                                                                      'noise_prob': [ 0.001,
                                                                                                      0.001,
                                                                                                      0.001.
                                                                                                      0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0},
                                                                                      'noise_prob': [ 0.001,
                                                                                                      0.001,
                                                                                                      0.001,
                                                                                                      0.001],
                                                                                      'status': True,
```

-0.7158388932188376, -0.03853087013753846,

```
'type': 'depolarizing'},
                                    'odd_wires': 4}],
              'run_time_sec': 8.591975212097168}},
{ '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': [ 0.00030922277578629,
                                         0.881375055029912,
                                         0.881375055029912,
                                          0.8813750550299119,
                                          0.9803845151714838,
                                          0.9803845151714838,
                                         1.201629973822729,
                                         1.2441077564052723,
                                         1.8660677974280824,
                                         1.8660677974280824,
                                         2.651002314516478,
                                          2.651002314516478,
                                          3.233637461790533,
                                          4.36384995486056,
                                          4.36384995486056,
                                         4.975714528653046,
                                         4.975714528653046,
                                         6.591840750700408,
                                          6.591840750700408,
                                         8.234009055219385,
                                         8.238223602720305,
                                          8.238223602720305,
                                          8.238223602720305,
                                          8.903406631369169,
                                          8.903406631369169,
                                         8.903406631369169,
                                         9.126449234760914,
                                          9.126449234760914,
                                         9.441918167657187,
                                         9.441918167657187,
                                         0.4384156956352651,
                                          -0.017407483354635628,
                                          -0.13579407977759564,
                                          -0.08181457210659056,
                                         -0.5635031413839604,
                                         0.570197125887921,
                                          -0.07389454022208618,
                                         0.18950484918514415,
                                         0.23442314823895152,
                                         0.5187197914643009,
                                         0.03760777637611914,
                                         1.2080522066616035,
                                          -0.006796933498365149,
                                         0.7597395812711474,
                                         0.3165595784185247.
                                         0.09234381717322694,
                                          -0.047116958459538144,
                                          0.02161370846364295,
                                         -0.3330735946096464,
                                          -0.310519881157395,
                                          -0.1321730433969341,
                                          -0.32004747583182785,
                                          0.38880240494533963,
                                         0.5587916266845782,
                                         -0.04068226055752174,
                                         -0.04929253976644778,
                                         0.7350044083650977,
                                         -0.3347542084226466,
                                         0.07994172439872818,
                                          0.177027499128215,
```

```
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313,
-1.8841797053563085,
-0.39250057722196113.
0.0604718224769807,
-0.15658247224402194,
1.097732135880844,
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626,
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875,
-0.29954118659750983.
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
0.32920686175801595,
0.0470036094807545,
0.6942117349751494,
-0.24738597040458754,
-0.3530344251488351,
-0.7207866325012796,
0.6865004571010461,
-0.022934954570734595,
-0.4703523591474931,
0.00010065187353926284,
-0.25737840979321513,
-0.37927040299996573,
0.3323512575736423,
-0.7162822410895011,
-0.8849129065134153.
-0.02984860970928172,
0.9857401879405846,
0.13869536095324345,
-0.4901093246549395,
-0.15185390643388375,
-1.1107951730061545,
1.1255217267520845,
-0.36113008327046914,
0.12498769155032201,
1.105653484876161.
-0.0826241142760939,
-0.6079720837354008,
-0.4798331114275297,
-1.1230771992973987,
0.13634359721928585.
-1.0117198549615587,
0.0420371772323395,
0.4704689604818435,
-0.1136051809968673,
-0.4158299646895606,
0.7682233881623428,
-0.8567828943049521,
-1.0844985071567337,
0.8118563616911731,
-1.0011580890685694,
0.06773503500153778,
-0.9972068257582826,
0.22064841214728595.
1.015101892093672,
```

-0.023903188302909387,

```
-1.5448535965900865,
                                                                         0.40727537812840897,
                                                                         0.6273868528756265.
                                                                         -0.06403282214251436,
                                                                         0.1402221940396834,
                                                                         0.011807494022614938,
                                                                         0.19970219531306482.
                                                                         -0.3159297567283321,
                                                                         0.5243897804672414,
                                                                         0.6302439365729751,
                                                                         0.4184253509022523,
                                                                         0.38422115408735924,
                                                                         0.8610939738936156,
                                                                         0.3457693810952046,
                                                                         0.19105880264763628]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric2_sample#10'},
                                             'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 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, 7, 0, -6.5111758480272135],
                                                               [12, 6, 21, 8, -3.5131084000754242]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001.
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
```

```
'type': 'depolarizing'},
                                    'odd_wires': 4}],
              'run_time_sec': 8.775294542312622}},
{ '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': [ 0.0019047787007362745,
                                         0.7201496918445128,
                                         0.7201496918445128,
                                          0.7201496918445127,
                                          0.7226708680142584,
                                          0.8068041864232433,
                                         1.3847174673528184,
                                         1.6031895944534578,
                                         2.458865333289775,
                                         2.458865333289775,
                                         2.721120236828938,
                                          2.721120236828938,
                                          3.554687304897056,
                                          3.554687304897056,
                                          4.537252190232355,
                                         4.537252190232355,
                                         5.239770593633025,
                                         5.242363659304797,
                                          5.566731623636481,
                                         5.566731623636481,
                                         5.566731623636481,
                                         5.566731623636481,
                                          5.566731623636481,
                                          7.6484324534494865,
                                         7.6484324534494865,
                                         8.96757120343865,
                                         9.352637118466301,
                                          9.381932224950582,
                                         9.966925955531599,
                                         9.966925955531599,
                                         0.29840004251263574,
                                          0.3207087147269936,
                                          -0.22478909909228914,
                                          -1.2242611593120782,
                                         0.061748844824383295,
                                         1.9931455249507801,
                                         0.02449362327304914,
                                         -0.23402928130657288,
                                         0.3399922671860315,
                                         0.2355005268966802,
                                         0.7912945290539132,
                                          -0.9147564287830934,
                                          0.12280724330167514,
                                         0.42016875545313104,
                                         0.6183328009701774.
                                         0.9098148543333162,
                                          0.2439503202728901,
                                         0.4941740976390827,
                                         0.0721485641264495,
                                         0.20051214721509877,
                                          0.14273239312798908,
                                          -0.03846070968482946,
                                          0.11474641891065286,
                                         0.1552743298359438,
                                         -0.050455466832234855,
                                         0.24385918138398863,
                                         0.0646818550964626,
                                         1.0379575003266166,
                                         0.4438839418702803,
                                          0.6652939620943935,
```

```
0.6574583263339632,
0.6386444070388955,
0.30923240052603657.
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079,
0.25272330748816335.
-0.05865013289270936,
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059.
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593.
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661.
0.256318263131488,
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428,
-0.007804627058269528,
-2.9100406031766375,
-0.17918863042787767,
-0.29620353111227854,
-0.2953351498676352,
0.4434234593316091,
0.0018987515325079429,
0.5290648024022053,
0.011057994967698829,
0.03103232328752182,
-0.21693206073792237,
-0.07883582131375938,
-0.2554965378040217,
1.978711034134111,
-0.02822992907519939,
1.110830733101554,
0.04155227001102173,
0.17370289874025888.
-0.08435695708516765,
0.38686640173882947,
1.0727525781247964,
-1.4871438236674412,
0.1437881416009117,
-0.15769165641037303,
0.46096388290194723,
0.3881288491041242,
0.3113157866411551,
-0.21237825892214532.
1.3408904937177344,
0.033287678968192874,
-0.22654084728278404,
0.09162287503278096,
1.1250326534568733.
0.670327239820091,
-1.4911819217025961,
0.8417198858779599,
0.018685303562101165,
-0.5955098452611822,
1.37350461224772,
-0.5503685346151788,
0.07415629279393592,
0.22396953453102358,
-0.02219350017922496,
2.5136787648879593,
1.5560141766956836,
-0.037039417521638966.
-1.5578667717297374,
-0.15174825264689498,
```

```
0.7535559035800633.
                                                                          2.9519825568174283,
                                                                          -0.8640992588734872,
                                                                          -0.486197602889753,
                                                                          -0.029079605859607876,
                                                                          0.1393557947212105,
                                                                          -0.03201203543340934,
                                                                          -0.17255788414719309,
                                                                          -0.6220837667998668,
                                                                          0.10441375911567917.
                                                                          0.7019930428559267,
                                                                          1.822960884928266,
                                                                          0.0010256621400676815]},
                                              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                  'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                  '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_noisy_time_evo_ric2_sample#9'},
                                              'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 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 \times 5 \times 6 + 0.5 \times 5 \times 6 \times 1,
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.536182288327376],
                                                               [12, 6, 21, 8, -3.450081350248876]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
```

-0.0075908588231686416, -0.1347910987366526,

```
'odd_wires': 4}],
              'run_time_sec': 8.882729768753052}},
{ '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': [ 0.003375513600300809,
                                          0.4884127443235871,
                                         0.6719352108785641,
                                         0.9073170135093351,
                                         1.4946633690060278,
                                         1.5076957064847494,
                                          3.872917838142945,
                                          3.872917838142945,
                                         3.872917838142945,
                                         3.872917838142945,
                                          5.047622474508209,
                                         5.054336886650782,
                                          5.067626550795242,
                                          5.0733174878702085,
                                          5.094629387163461,
                                          5.749571576552799,
                                          5.7731554023304374,
                                         7.144946717661993,
                                         7.144946717661993,
                                         7.144946717661993,
                                         7.144946717661993,
                                         7.602314289267704,
                                         7.602314289267704,
                                          8.018775147517832,
                                          8.018775147517832,
                                          8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                          8.018775147517832,
                                         9.661071929582006,
                                         0.2735947252101626,
                                          2.471262065567802,
                                          0.18954222370300397,
                                          0.2633058348660961,
                                          0.07494334922808346,
                                         1.4980157261935538,
                                         0.3538857424122425,
                                         0.26341770410626436,
                                         0.17174804107002956,
                                         -0.22912718472194316,
                                          0.11060714764109056,
                                          -0.30804859927082595,
                                          2.8406850614439736,
                                         1.0823654569610508,
                                         0.9668529413216363,
                                         1.8727663516543385.
                                          -0.0901659930896485,
                                          0.05868560690604535,
                                         0.24212775097742179,
                                         1.0092515209898247,
                                         -0.7556969386491817,
                                          0.3279350524218167,
                                          1.078117272505244,
                                          0.10391815458190773,
                                         -0.7434930272741371,
                                         -1.6965388530236032,
                                          -1.360748554100242,
                                         0.34939560927302815,
                                         0.03188634842980519,
                                         -1.2447472675125983,
                                          0.06092342743494014,
```

```
1.017082923902293,
-1.007905562333318,
-0.8576057837691866.
0.5321038189070756,
1.300652060018237,
-1.8122591145188616,
-1.247002191580596.
1.2529274198051785,
0.3750417535596218,
0.2898066740735119,
1.589675559301449,
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883.
0.2658818907332787,
-0.9372958671062981,
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732,
2.008892916411081,
0.15285666374274742,
-1.782425531898792,
0.07791440554206944,
-1.28397958204954,
-0.7247696039786395,
0.5612678373457747,
-0.004762916486662008,
0.4386089298525658.
0.010283368626678616,
0.8990610129088383,
0.03840864905637026,
-1.2418081984826976,
0.33190310279028407,
0.3061008622829172,
-0.06950158836023225,
0.93859456058615,
-0.02489786142317165,
0.9927840878492759,
-0.0709710381209458,
-1.4546153026559692,
-0.6707274766895803,
1.0492831078613678.
1.59883886587945,
-0.7948795957139008,
0.011914265512354442,
0.29611851635537545,
-0.026452865362460363,
0.17911271593442915,
-0.268102313362264,
-0.31698956355176716,
0.5150163737561883,
-0.2617344493849528,
-0.08207987775663798,
-0.7031192006515304,
0.10296103394319861,
-1.3322481995457,
-0.8096620548125795,
0.22894179493051453,
-0.6404807766018014,
0.5981001234262467,
0.6725836248662437,
-0.24769451099401643,
-1.5367942204876157,
0.32496629998060117,
0.8231756699235411,
0.27229759145944715,
-0.4283887626472357,
```

```
-0.48124012627536317,
                                                                         -0.23642700938756703,
                                                                         -0.22983768395119897,
                                                                         0.7841497681166887,
                                                                         0.5963513861028734.
                                                                         -0.8505831212819382,
                                                                         0.6516631671421783,
                                                                         0.6698405071431395,
                                                                         0.7826636181190869,
                                                                         -1.6023915303224998.
                                                                         0.6733061844063541,
                                                                         1.5755992624240989]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric2_sample#7'},
                                             "redundant": \ \{"identity\_factors": [[0, 0, 0, 0], [1, 1, 1, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.397817460329861],
                                                               [12, 6, 21, 8, -3.2115716730808748]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
```

0.6783210911797265, 1.178917544999848,

```
'run_time_sec': 8.9400794506073}},
{ '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': [ -5.647934061474703e-18,
                                         1.4787834906243755,
                                         1.478918229526628,
                                         1.478918229526628,
                                          2.0077351764243123,
                                          2.4302809101456218,
                                          2.4302809101456218,
                                          3.009709563144601,
                                         3.009709563144601.
                                         3.239471043198664,
                                          3.2405283031129133,
                                         3.2405283031129133,
                                         3.2656598154222434,
                                         3.5353392937639825,
                                          6.198713539858257,
                                          6.213604956994236,
                                         6.73397854893658,
                                         6.73397854893658,
                                         6.743547791194661,
                                         6.744609103740889,
                                          6.744609103740889,
                                         6.749543065628153,
                                         6.749543065628153,
                                          8.615256229309818,
                                          8.635090640841518,
                                          9.012323512360366,
                                          9.012323512360366,
                                         9.930483613907942,
                                         9.930483613907942,
                                         11.782061805135282,
                                         0.6870051227789642,
                                         0.5234095533264759,
                                         0.11216801162302814,
                                          0.044591843687496906,
                                          -0.747159787599118,
                                          1.5727279855217766,
                                         -0.16958009141159439,
                                         -0.7234855106318131,
                                         0.45999589631996707,
                                         1.3613822619347415,
                                         0.5234464983029046,
                                         0.18337466193510712,
                                         1.0660408011194182,
                                         1.2813123812864906,
                                          0.34899885807903364,
                                         1.2204971120849089,
                                         0.37250493843195553.
                                         0.3861568591798728,
                                          -0.4881036169368887,
                                         0.23720347697856276,
                                          0.8136369801063428,
                                         -0.8595161765585049,
                                          0.6710512785075716,
                                          0.5103741134651811,
                                         -0.48491784736765847,
                                         -1.939727949979543,
                                         0.5221979500550953,
                                          -0.39618913325979604,
                                         -0.5258671175956018,
                                         0.08753210163723862,
                                         1.3619602585721242,
                                          -1.2518915867901346,
```

```
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274.
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961,
0.4198375873878555.
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473,
0.4465655907565091.
-1.4308928069625704,
1.6254306194316424,
-0.16298810299835312,
-1.249293985363804,
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616,
-1.1357659634071433,
-0.5734897531715744,
-1.6096579963890296.
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403,
0.06392732561319403,
0.7711512775812011,
-1.8472478314151175,
-0.46160141905881696,
1.8963279721150403,
-2.313663424814036,
0.060952702837845166,
-1.4971949982077863,
1.3040610818975555,
0.10605679464403613,
-1.138800572315487,
-0.03947636943653289,
0.07839455865010819,
-0.6470277815644087,
0.946101637008616,
-0.32144060478582315,
-0.6371693991779968,
0.30580409265523,
-0.2617129381706641,
0.4094287336545931.
0.49837362733711055,
-0.9058714721495094,
0.6137893604415533,
0.8546844695081749,
-0.8205470722456557.
-0.598852289145785,
0.46823811794119646,
1.2205247300232143,
0.031629319060699435,
1.1369587010491427,
0.12298062775535874,
-0.016960252964031076,
1.1127338626212067,
0.37972118532018134,
-0.1475616440844684,
0.32749925367563326,
0.030050642250761914,
0.17169542743574548,
-0.5825729547476518,
0.7052714548722974,
0.9884296874822006,
-0.500384308215816,
0.01722431287494931,
0.40290712722731054,
-0.029200452046427447,
1.2704708243944813,
2.3709704014259345,
-2.0267551524865275.
0.7347873374577798,
-0.34767223966060473,
```

```
-0.010995780695540691.
                                                                         -0.481889271583797,
                                                                         0.7008500159073542,
                                                                         2.3944065221124076,
                                                                         -0.08320445199579081.
                                                                         2.02470278988152,
                                                                         0.02142760118000664,
                                                                         1.6794429086669174,
                                                                         1.6046551807968945,
                                                                         0.2831685070910348,
                                                                         1.58051355985949351},
                                             'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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': { 'fiq_dpi': 100, 'status': False, 'type': 'png'},
                                                          'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric2_sample#8'},
                                             'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.429933051303131],
                                                               [12, 6, 21, 8, -3.1990719612158447]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001.
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 8.73015832901001}},
```

0.009778943736386289, 0.221000841842164,

```
{ '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': [ 0.3773346757087749,
                                         0.5734233884194113,
                                         0.5734233884194113,
                                         1.2094818154974225,
                                         1.2528672337957094,
                                         1.3073966674132076,
                                         4.193348178434801,
                                          4.228670385547864,
                                          4.228670385547864,
                                          4.228670385547864,
                                         4.228670385547864,
                                         4.228670385547864,
                                         4.274742575727675,
                                         5.343872214974395,
                                         5.354523589318104,
                                          5.449133113124401,
                                          5.449133113124401,
                                          5.449133113124401,
                                         5.449133113124401,
                                         6.208341300319731,
                                         6.208341300319731,
                                          6.738723848778546,
                                         6.7473872692498285,
                                         8.515456463543387,
                                          8.552181104315652,
                                          8.552181104315652,
                                          8.552181104315652,
                                         9.363042150968939,
                                         9.363042150968939,
                                         11.478464454984158,
                                         -0.2683676450988651,
                                         -0.9370321768196137,
                                         0.03790413469005285,
                                         -0.3520989510779511,
                                          0.5131804204688105,
                                          0.767748989456867,
                                          -1.1529933056041268,
                                         1.0195402939041247,
                                         -0.5189860890713169,
                                         1.700377968800765,
                                         0.48912124484584857,
                                         1.506730848787325,
                                          0.4485612726223177,
                                          -1.6248073049289613,
                                          0.10079320215400162,
                                         1.7454590745233427,
                                         1.474284546585253,
                                         0.08837986403943651.
                                         1.215839965531947,
                                          -0.42666568442503866,
                                         0.04298065245990749,
                                         -1.495484471060033,
                                         0.39055472334393304,
                                          -0.06187227108331559,
                                          1.0010296249342066,
                                         -0.33745943355443286,
                                         -0.19046242319241546,
                                         -0.4884459619425607,
                                         0.8930564792122229,
                                         0.09947441181287657,
                                         -1.4049039336860292,
                                         1.0413688199593338,
                                          0.027348986225077598,
```

```
1.5457890290583323,
0.8022774572900748,
-1.0377116853398.
0.5652694406258009,
0.9990396087940023,
-0.3409174955760714,
-0.8590373420111477.
0.3662952964918326,
0.6492392290096071,
-1.0735392409833318,
-0.620775369578654,
0.5064494688850749.
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637,
0.13897118193917846,
0.13192395570874205.
-0.560408177185694,
-0.7293430452459922,
1.2393938765994381,
0.16520016983754293,
-0.04218705839108043,
1.9844775109402493,
-0.40811731341033075,
0.40494641878472026,
0.44317505546879765,
-0.14541224425415586,
-1.3628454492957067,
0.35572573997739254,
-0.17363781014762678,
-0.21765464091811726,
0.25867396534698067,
-0.19299239511743832,
0.842583631219517,
0.01538577194684443.
-1.3780712180305699,
0.30168991607554185,
0.03816118508668757,
-0.6330896266111891,
-0.14462412237866193.
0.22751230177420415,
2.198362599080823,
0.5538971259685714,
1.6735676153080048,
0.01161307703421222.
0.15241612900647253,
-0.4114895408906573,
0.020024246948836234,
-0.361021382333633,
1.2366726872792735,
-0.8652479233612058,
-0.38157323774943186,
-1.2043495043519374,
0.03294448415473864,
1.864475600371399,
-0.048446953541905424,
1.483038428004856,
0.02119809714572118,
-0.20756566215919184.
1.2566509021622863,
0.4040298326697209,
0.0492062183426151,
0.3396501220758691,
0.09097515161528406,
-0.4545275805495163,
1.5327906096069877,
-0.47568898039994184,
0.7447654713950665.
0.7179833985093875,
-0.03692927531761856,
```

```
0.2387893529411216.
                                                                         1.5195379458286031,
                                                                         -0.5337205856413728,
                                                                         -0.5741707032781822,
                                                                         1.298358172715442,
                                                                         -0.010829860462227588,
                                                                         -1.9037204771139875,
                                                                         1.5774751765228583,
                                                                         -0.28550943128124906,
                                                                         1.5531884118568244]},
                                             'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric2_sample#4'},
                                             'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 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, 7, 0, -6.44845457619454],
                                                               [12, 6, 21, 8, -3.24468946816992]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                'value':
0 } ,
                                                                                      'noise_prob': [ 0.001,
                                                                                                       0.001.
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 11.057755708694458}},
                               { 'config': { 'ansatz': { 'gateset': 1,
```

0.11509825242982577, 0.020898935398901888,

```
'layer': 30,
            'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0],
                                          'cn': [ 0.5,
                                                  0.5,
                                                  0.5,
                                                  0.5,
                                                  0.5,
                                                  0.51,
                                          'r': 0},
                       'time': {'max': 10.0, 'min': 0.0},
                       'type': 'xy-iss'}},
'init_param': { 'value': [ 0.08591881204796584,
                           1.5026023651616802,
                           1.9179097588555833,
                           1.9179097588555831,
                           1.9179097588555831,
                           1.9179097588555831,
                           2.8800636946459592,
                           2.9523818900173797,
                           2.9523818900173797,
                           2.954896407422686,
                           3.0487820562708485.
                           3.0487820562708485,
                           3.9462134206000328,
                           3.9462134206000328,
                           5.170248653928018,
                           5.170248653928018,
                           6.5066905594049205,
                           6.5066905594049205,
                           6.5066905594049205,
                           6.914119522580601,
                           6.914119522580601,
                           6.9842551957162815,
                           7.300516913785898,
                           8.782483894556266,
                           8.782483894556266,
                           8.999633503017922,
                           8.999633503017922,
                           8.999633503017922,
                           9.414122362394847,
                           9.414122362394847,
                           0.09854676674938925,
                           -0.05173289612974198,
                           0.30094803169630163,
                           -1.1984142138894447,
                           0.08610670053567002,
                           0.2851928692216035,
                           0.26177875477440216,
                           0.11764473243628538,
                           0.3495067876706816,
                           -0.9678438601279628,
                           -0.08762050677252062,
                           0.014826088936787857,
                           -0.30347729159143555,
                           -1.1730530788097624,
                           -0.12550631929596553,
                           2.258056275075482,
                           -0.5160508087356981,
                           0.004541093619226378,
                           -0.9345420797218197.
                           0.47154522212338745,
                           -0.9129446894819914,
                           0.2768683391341781,
                           0.29975752794333804,
                           -0.16177915588279423,
                           0.6021148977823381,
                           0.35405737535162146,
                           0.8149645603473178,
                           -0.7074306860917636,
                           -0.8281028342440522,
                           -0.20840122350984505,
                           -0.19593362207831977,
                           1.2208184674045053,
                           -0.10408257731449277,
                           0.9878855326441833,
```

```
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756,
-0.44913621684685756,
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635.
-0.4440190475287521,
0.5925479388494825,
0.1500100176310508,
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612,
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243,
-0.8246572495389679,
-0.28480932751570914,
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418.
-1.0170156037248201,
-0.035476380392734465,
0.9940259955458774,
-0.657126951929564,
-0.4786936406484008,
1.4564140457987391,
-1.062151832750044,
-0.01496017231630948,
0.16259290081999456,
0.601493806263198,
-0.20485253219607644,
-1.2421776762345744,
1.152288606322054,
1.1883019471730756,
0.9817659575699377,
0.9653429636905305,
0.5382122852444811,
0.722384759736696,
-0.13079560936986118,
-0.9638314109375934,
-0.13358671856975504,
-0.3949417844115237,
1.01780227278121.
0.6746960094686067,
0.14295933107831804,
-0.37974724013569766,
0.3641245559377578,
0.12972678280008856.
0.5949873255000262,
0.8499370211382984,
-0.0792654431528575,
1.9402087793428133,
-0.5583113020357903.
0.6535986429024293,
1.0008805619835928,
0.16556690201288055,
1.1071973338235597,
0.07194244573338314.
-0.9146859400815048,
-0.005186820541518637,
0.4795762978809806,
0.6475066336984044,
0.11860845746693519,
0.08044881503693782,
0.5402817334108434,
1.5532870492056725,
0.36643388228039625,
1.6150985923432208,
0.22271977417212363,
-0.04956133994172771,
-0.6258533610916538,
-0.6517224443292691,
```

0.2594825887888975,

```
-0.009813928289633511.
                                                                         0.5249350004928881,
                                                                         -0.01015655683116892,
                                                                         -0.48671658518654837,
                                                                         -0.588311268126242,
                                                                         -0.25978871509233853,
                                                                         0.9039610340757382,
                                                                         1.5549616218831699,
                                                                         -0.05330158954092406]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric2_sample#3'},
                                             'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.410492799212101],
                                                               [12, 6, 21, 8, -3.2577133670016694]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.0011,
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001.
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 10.180011987686157}},
                               { 'config': { 'ansatz': { 'gateset': 1,
                                                          'layer': 30,
```

-0.1286341552665023, 0.48749759828242367,

```
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0],
                                          'cn': [ 0.5,
                                                  0.5,
                                                  0.5,
                                                  0.5,
                                                  0.51,
                                          'r': 0},
                       'time': {'max': 10.0, 'min': 0.0},
                       'type': 'xy-iss'}},
'init_param': { 'value': [ 0.33528943002425843,
                           0.8608925283648261,
                           2.8309935233222867,
                           2.8382233121900358,
                           2.847558790018716,
                           2.8477263794127468,
                           3.9337993695450666,
                           3.9337993695450666,
                           3.9337993695450666,
                           3.9337993695450666,
                           3.9337993695450666,
                           5.127462455084763.
                           5.128383696390232,
                           5.132051241075024,
                           5.132231848473024,
                           5.132297186784173,
                           5.132297186784173,
                           5.132297186784173,
                           5.132320898992942,
                           5.134903164275234,
                           5.734798022200061,
                           5.734798022200061,
                           5.734798022200061,
                           6.71748919093495,
                           6.71748919093495,
                           9.773430860122208,
                           9.791656954875775,
                           9.791980525916317,
                           9.804782964874805,
                           9.947289619134542,
                           0.6818618664375632,
                           0.42253658736184846,
                           0.19067339209915313,
                           -2.314563573529872,
                           -1.7784854373672185,
                           -0.10945476580518654,
                           0.08980428543050965,
                           0.6265702304745648,
                           -0.12016219313034968,
                           0.005450784512528824,
                           0.9621316606784164,
                           -0.01940541263687908,
                           -1.2890091107885369,
                           -0.09216272929775945,
                           -0.8615487717558121,
                           0.021600758375482327,
                           1.1068545366678577,
                           -0.06436428812394061,
                           -1.8186253546793636,
                           -0.2455724158610742.
                           0.7444478114283775,
                           1.0647343146888184,
                           -1.6388802958603008,
                           -0.05032235091912311,
                           0.7589104637111997,
                           0.0934759886788552,
                           0.7280377617711271,
                           -0.10012682423470079,
                           -2.7917715562202794,
                           0.5843828201862561,
                           1.2003794612588048,
                           -0.2782652692858759,
                           1.253725179404932,
                           -0.831140674623039,
                           -1.3898002860152843,
```

```
1.7689493816619246,
-0.768539740515663,
-0.5265628815801298,
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446.
0.06348552937029919,
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522.
-0.5743460857513,
0.873550995352649,
0.8797938271812764,
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805,
-0.4012501825920459,
-0.4763388197192611,
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537,
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616,
0.6716489600966955,
0.08900519900900147,
0.7708643633651343,
0.0944251249629154,
-0.053131619179539805,
-0.132883145931867,
0.44414428660563765,
-0.3164026614336652,
0.9835391768228284,
-0.49696354121947833,
0.3510514174127117,
-0.24991518010085176,
-0.7780713458689107,
1.3387260017849976,
0.712191280671364,
-0.4436070432657242,
1.090195713122469.
0.3876483875477464,
1.113683201871723,
0.09724940056823322,
-1.3265075307540413,
-1.8530581309545013,
0.335564434910613,
0.16061631243062188,
0.6994545842241634,
-0.0055568765936962455,
1.8148369905661879.
-0.9149620921846291,
-0.5341673651010566,
-0.6583203681162046,
-0.05148037848607484,
-0.1302834828824637.
-0.2083684341417298,
-0.7142637766159184,
0.4980789266978527,
-2.030263033934291,
-0.002330467371510849,
-0.7835259213136883,
-0.18712783689065152,
-0.271594041353006,
0.606962231033315,
0.19917323339650786,
0.581852597021436,
1.0547240409345577,
0.07111303544026976.
1.4877210254684077,
0.08669172360020491,
```

```
1.117305276662395.
                                                                         -1.0742437197416552,
                                                                         0.30921812342286065,
                                                                         -0.06994991433225481,
                                                                         1.0419800264617582.
                                                                         1.4507701003592177,
                                                                         0.2408413974211676,
                                                                         1.6573761327725358]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric2_sample#2'},
                                             'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.333005581610797],
                                                               [12, 6, 21, 8, -3.165101785859742]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.0011,
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 10.927413940429688}},
                               { 'config': { 'ansatz': { 'gateset': 1,
                                                          'layer': 30,
                                                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0],
```

0.8024105605127613, 0.8315802366658298.

```
'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': [ 1.5680106786222674e-17,
                           1.0238650999177359,
                           1.0238650999177359,
                           1.0238650999177359,
                           1.7041550191762513,
                           2.070931805530806,
                           2.586234954306046,
                           2.6265616878606783,
                           2.7566136785306155,
                           2.7689271757054255,
                           4.271831894498143,
                           4.271831894498143,
                           4.271831894498143.
                           5.004110362344359,
                           5.004110362344359,
                           5.529689350278954,
                           5.529689350278954,
                           5.529689350278954,
                           5.5493166460873375,
                           7.855838962179162,
                           7.855838962179162,
                           8.508023697610218,
                           8.540796404638465,
                           8.940056981382925,
                           8.940056981382925,
                           8.940056981382925,
                           8.940056981382925,
                           9.524293982069336,
                           9.524293982069336,
                           9.815045396471412,
                           0.717685470636315,
                           0.29125971197830336,
                           0.013619559122678915,
                           -0.46174394022911175,
                           -0.7802589318548062,
                           1.8785332138943256.
                           -0.07718385116900997,
                           -0.4181315830102034,
                           0.3859499067718677,
                           0.7218523694763775,
                           0.16350787496293626,
                           -0.06274337543165032,
                           1.048639096314506,
                           0.9454500907927006,
                           -0.18328208251477485,
                           0.5336296017995852,
                           0.7047960543548563,
                           -0.4717130073686535,
                           -0.14327049451726778,
                           0.5646728024946054,
                           0.1377201649736573.
                           1.0845662084088512,
                           0.7117671017527167,
                           1.8562916393289055,
                           -1.0958742208007046,
                           0.314756410152813,
                           1.0055290931424188,
                           -1.2653176839886926,
                           -0.6435463058390287,
                           -0.13689785210195535,
                           0.5185042269644529,
                           -0.07994120596020922,
                           -1.3394312085309903,
                           -0.01354724643952521,
                           -0.8508707890759795,
                           -0.7258020036409927,
```

```
-0.1513648764845159,
-0.5702686618598916,
-0.20804467461705725.
-0.059043388294177074,
0.9724468840137966,
1.6889388278999584,
0.19460354666786345.
1.52688995899303,
0.40690710189505636,
0.054839646577847824,
-1.9384169999074634,
-0.8955556931339368.
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788,
-0.008629533947631484,
1.3318794505555018.
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042.
0.6437292330207226,
0.02590432636550948,
0.44592066957482307,
-0.0809779454755679,
-1.1390483539597829,
0.4898473400025203,
0.11381426982162568,
0.6089836387514223,
0.17594570893388972,
0.012948010393531988,
-0.547404644839424,
0.028969189369927453,
1.1006601522977721,
-0.6406183594181203,
-0.12562720825840668,
2.0392738219317867,
0.9906966768182601,
0.03179376057566713.
1.5460159269414353,
-0.01674613470972367,
-1.1841027420803907,
0.24496917335434354,
-0.07332300856328518,
0.25897293698241475,
0.35918978324443196,
-0.007942172382781155,
0.4618323110818234,
-0.08547471514820712.
-0.5115221242285567,
0.4563488682048878,
-1.2086759202201718,
0.14282176979415442,
0.48263581465206523,
0.09855500655515351,
0.5327824526475502,
-0.19110982084320108,
-0.775795154813047,
-0.31907838177549175,
0.03477100089693282,
0.7436201132387485,
-0.022209896476399357,
-0.14741027177548285,
-0.10110024079398225,
0.20359400710495562,
-0.15623022021775929,
0.1964090589605299,
0.18042072654891128,
0.8910666012551952,
0.03518277211157266,
0.11858050209575345,
0.6912090997145024.
0.05142750966379351,
1.2523961498884204,
```

```
-1.0074319345942784,
                                                                         0.29535289246662044,
                                                                         -0.002280412475169233,
                                                                         0.45599081133710123,
                                                                         -1.6715207166067523.
                                                                         0.3320227490012926,
                                                                         1.5421306314740455]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric2_sample#1'},
                                             'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.515742960091852],
                                                               [12, 6, 21, 8, -3.36492111003702]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 10.475180864334106}},
                               { 'config': { 'ansatz': { 'gateset': 1,
                                                          'layer': 30,
                                                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0],
                                                                                        'cn': [ 0.5,
```

-1.1477698487953947, -0.16063831357643202.

```
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': [ -6.331146189926128e-17,
                           0.7069927066774304,
                           0.7069927066774304,
                           0.7069927066774305.
                           0.7069927066774304,
                           1.0044153364322925,
                           1.0092418692996383,
                           2.470333794214341,
                           2.478143749866421,
                           3.5776564981759003,
                           3.5776564981759003,
                           3.5776564981759003,
                           3.61745967653339,
                           3.6981780389472076.
                           3.755720232685741,
                           3.9712286023902594,
                           3.9712286023902594,
                           4.519037432417192,
                           4.519037432417193,
                           4.519037432417193,
                           5.280953883299406,
                           5.280953883299406,
                           6.620356980277175,
                           6.620356980277175,
                           6.620356980277175,
                           6.620356980277176,
                           8.214004051881032,
                           8.214004051881032,
                           9.105951544537387,
                           10.829366164164977,
                           1.4490195266558639,
                           1.145329650589643,
                           -0.9374272684957279,
                           -1.2910248872233119,
                           0.9701069453007352,
                           2.0238893871034924,
                           -0.6731600678051081,
                           -0.7305037462514778,
                           0.6743483023845589,
                           1.611766624162738,
                           -0.162446688913207,
                           -0.2464021583836281,
                           1.3073653685111934,
                           1.560629053845934,
                           -0.09768282308379246,
                           -0.31393750682085847,
                           0.1625705045557987,
                           -0.1344649185634244,
                           -0.03516682581352061,
                           0.15934568227883428,
                           1.4484389719925783,
                           0.31346340320241645.
                           -1.5406853809043388,
                           0.3831701903776482,
                           0.07255447956326048,
                           -0.4619144712511035,
                           0.6220101497739178,
                           -0.08645510294766677,
                           -0.036774035023737585,
                           -0.02433291891195538,
                           1.2745777688613118,
                           0.806643386980706,
                           -0.1734465019831428,
                           -1.474099767063678,
                           -1.2534035864969235,
                           0.024086803725753666,
                           -0.5946515656594247,
```

```
3.047855036387052,
0.561263952510902,
-0.27353577574812815.
0.476385213099692,
-0.4183083264972014,
-0.07584344603997495,
-0.04004176630390785.
0.6379867024754904,
3.306912023625799,
0.6758488609505069,
-0.49379826249780634,
0.04089533617940984.
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808,
0.043470303912556706,
0.2301819741695647.
1.9247102260310271,
0.19401136489510468,
0.17784496580796996,
-0.12037519976757159,
0.10596613899479704.
0.02480260398862852,
0.33616247382037256,
-0.2960626605489573,
1.2038327046358004,
-0.4266046665751028,
-0.14331073423696536,
0.33240571018120446,
0.13743208352564132,
0.21308235615415505,
-0.8816113951868988,
-0.03958129872975694,
1.7385124490728345,
1.3953860705003918,
0.7193393529381484,
-0.5890148767931709,
1.6845229617798814,
-0.04059142172715042,
-0.6588344885662398,
-1.5492107393137406,
0.9886630320432893,
1.3955090248591298,
-1.7521400718196618,
-0.02012078102450614.
1.5598528019020075,
-0.041272015671692544,
0.6659176073691222,
-0.10884895615623923,
-0.8860283635501729,
-0.042494102069769425,
-0.5241060846215897,
-0.049429521011899694,
-1.6158837397685775,
-0.29703279066650246.
0.6940812648197017,
-1.0869617874060826,
-1.1891726572683667,
0.03935191545498333,
-1.7727595774952096.
-0.0005664350349098603,
-1.2288438066739866,
2.182693040857262,
1.2648198022740724,
0.636776362006322,
-1.1418938134635428,
0.04892386539982865,
-0.6595482134655696,
-0.016038133219537475,
-1.53365152672916,
-0.5818287115590742,
-0.8537662908823758,
1.3418170063691075.
-0.32888813707646736,
```

-0.018460135902194714,

```
1.5026664500941838,
                                                                        1.809610363246633.
                                                                         -1.5283405786971713,
                                                                         0.5470095670143573,
                                                                        -1.4753657998350065,
                                                                         0.8122840148585063,
                                                                        1.5317878779716176]},
                                             'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                '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_noisy_time_evo_ric2_sample#5'},
                                             'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 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, 7, 0, -6.311563719128683],
                                                              [12, 6, 21, 8, -3.2712898811023576]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                  'identity_factors': [0, 0, 0, 0],
                                                                  'noise_level': [4, 2, 7, 0],
                                                                  'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0 } ,
                                                                                      'noise_prob': [ 0.001,
                                                                                                      0.001.
                                                                                                      0.001,
                                                                                                      0.0011,
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                'value':
0 } ,
                                                                                      'noise_prob': [ 0.001,
                                                                                                      0.001,
                                                                                                      0.001,
                                                                                                      0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                  'odd_wires': 4}],
                                             'run_time_sec': 9.587943077087402}}],
               '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},
```

-0.8323242421777916,

```
'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': 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': True, 'type': 'png'},
                         'file_name_prefix': 'xy_noisey_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': [ 3.5476707600867368,
                                       2.3562053879970173,
                                       1.7833099820235232,
                                       2.4654982864165467,
                                       3.6613143494662093,
                                       3.6462371631182062,
                                       3.2935768662401737,
                                       3.7145398712422657,
                                       2.5227446974102397,
                                       2.4756634278387035],
            'noise_details': { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 7, 0],
                                'noise_profile': { 'noise_on_init_param': { 'status': False,
                                                                               'value': 0},
                                                    'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                    'status': True,
                                                    'type': 'depolarizing'},
                                'odd_wires': 4},
            'optimized_minimum_cost': [ -6.515742960091897,
                                          -6.3330055816107915,
                                          -6.410492799212151,
                                          -6.4484545761945915,
                                          -6.311563719128753,
                                         -6.46067826504545,
                                         -6.397817460329919.
                                         -6.429933051303193,
                                         -6.536182288327426,
                                         -6.511175848027232],
            'optimized_parameters': [ [ 1.5680106786222674e-17,
                                         1.0238650999177359,
                                         1.0238650999177359,
                                         1.0238650999177359,
                                         1.7041550191762513,
                                         2.070931805530806,
                                         2.586234954306046,
                                         2.6265616878606783,
                                         2.7566136785306155,
                                         2.7689271757054255.
                                         4.271831894498143,
                                          4.271831894498143,
```

```
4.271831894498143,
5.004110362344359,
5.004110362344359,
5.529689350278954,
5.529689350278954,
5.529689350278954,
5.5493166460873375.
7.855838962179162,
7.855838962179162,
8.508023697610218,
8.540796404638465,
8.940056981382925.
8.940056981382925,
8.940056981382925,
8.940056981382925,
9.524293982069336,
9.524293982069336,
9.815045396471412,
0.717685470636315,
0.29125971197830336,
0.013619559122678915,
-0.46174394022911175.
-0.7802589318548062,
1.8785332138943256,
-0.07718385116900997,
-0.4181315830102034,
0.3859499067718677,
0.7218523694763775,
0.16350787496293626,
-0.06274337543165032,
1.048639096314506,
0.9454500907927006,
-0.18328208251477485,
0.5336296017995852,
0.7047960543548563,
-0.4717130073686535,
-0.14327049451726778,
0.5646728024946054,
0.1377201649736573,
1.0845662084088512.
0.7117671017527167,
1.8562916393289055,
-1.0958742208007046,
0.314756410152813,
1.0055290931424188,
-1.2653176839886926,
-0.6435463058390287,
-0.13689785210195535,
0.5185042269644529,
-0.07994120596020922.
-1.3394312085309903,
-0.01354724643952521,
-0.8508707890759795,
-0.7258020036409927,
-0.1513648764845159.
-0.5702686618598916,
-0.20804467461705725,
-0.059043388294177074,
0.9724468840137966,
1.6889388278999584.
0.19460354666786345,
1.52688995899303,
0.40690710189505636,
0.054839646577847824,
-1.9384169999074634,
-0.8955556931339368,
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788,
-0.008629533947631484,
1.3318794505555018,
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
```

```
0.7555528952477042,
  0.6437292330207226,
  0.02590432636550948.
  0.44592066957482307,
  -0.0809779454755679,
 -1.1390483539597829,
  0.4898473400025203.
 0.11381426982162568,
  0.6089836387514223,
  0.17594570893388972,
  0.012948010393531988,
 -0.547404644839424.
  0.028969189369927453,
 1.1006601522977721,
  -0.6406183594181203,
  -0.12562720825840668,
  2.0392738219317867,
  0.9906966768182601,
  0.03179376057566713,
  1.5460159269414353,
 -0.01674613470972367,
  -1.1841027420803907.
  0.24496917335434354,
  -0.07332300856328518,
  0.25897293698241475,
  0.35918978324443196,
  -0.007942172382781155,
  0.4618323110818234,
  -0.08547471514820712,
  -0.5115221242285567,
  0.4563488682048878,
 -1.2086759202201718,
  0.14282176979415442,
  0.48263581465206523,
  0.09855500655515351,
  0.5327824526475502,
  -0.19110982084320108,
  -0.775795154813047,
  -0.31907838177549175,
  0.03477100089693282,
  0.7436201132387485,
  -0.022209896476399357,
  -0.14741027177548285,
  -0.10110024079398225,
  0.20359400710495562,
  -0.15623022021775929,
  0.1964090589605299,
  0.18042072654891128,
  0.8910666012551952,
 0.03518277211157266.
 0.11858050209575345,
  0.6912090997145024,
  0.05142750966379351,
 1.2523961498884204,
 -1.1477698487953947.
  -0.16063831357643202,
  -1.0074319345942784,
  0.29535289246662044,
 -0.002280412475169233,
  0.45599081133710123.
  -1.6715207166067523,
  0.3320227490012926,
 1.5421306314740455],
[ 0.33528943002425843,
  0.8608925283648261,
  2.8309935233222867,
  2.8382233121900358,
  2.847558790018716,
  2.8477263794127468,
  3.9337993695450666,
  3.9337993695450666,
  3.9337993695450666,
  3.9337993695450666.
  3.9337993695450666,
```

5.127462455084763,

```
5.128383696390232,
5.132051241075024,
5.132231848473024,
5.132297186784173,
5.132297186784173,
5.132297186784173,
5.132320898992942.
5.134903164275234,
5.734798022200061,
5.734798022200061,
5.734798022200061,
6.71748919093495.
6.71748919093495,
9.773430860122208,
9.791656954875775,
9.791980525916317,
9.804782964874805.
9.947289619134542,
0.6818618664375632,
0.42253658736184846,
0.19067339209915313,
-2.314563573529872.
-1.7784854373672185,
-0.10945476580518654,
0.08980428543050965,
0.6265702304745648,
-0.12016219313034968,
0.005450784512528824,
0.9621316606784164,
-0.01940541263687908,
-1.2890091107885369,
-0.09216272929775945,
-0.8615487717558121,
0.021600758375482327,
1.1068545366678577,
-0.06436428812394061,
-1.8186253546793636,
-0.2455724158610742,
0.7444478114283775,
1.0647343146888184,
-1.6388802958603008,
-0.05032235091912311,
0.7589104637111997,
0.0934759886788552,
0.7280377617711271.
-0.10012682423470079,
-2.7917715562202794,
0.5843828201862561,
1.2003794612588048,
-0.2782652692858759.
1.253725179404932,
-0.831140674623039,
-1.3898002860152843,
1.7689493816619246,
-0.768539740515663,
-0.5265628815801298,
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446.
0.06348552937029919,
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522,
-0.5743460857513,
0.873550995352649,
0.8797938271812764,
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805,
-0.4012501825920459,
-0.4763388197192611,
-0.34431485887187113,
```

-1.1697954599661295,

```
0.5556509722807279,
  -0.5397649164737537
  -0.41722730509388967,
  0.9275888618509817,
  0.4371362266023078,
 -1.4110895986752616,
  0.6716489600966955,
 0.08900519900900147,
  0.7708643633651343,
  0.0944251249629154,
  -0.053131619179539805,
  -0.132883145931867,
 0.44414428660563765,
  -0.3164026614336652,
  0.9835391768228284,
  -0.49696354121947833,
  0.3510514174127117,
  -0.24991518010085176,
  -0.7780713458689107,
  1.3387260017849976,
  0.712191280671364,
 -0.4436070432657242.
 1.090195713122469,
 0.3876483875477464,
 1.113683201871723,
  0.09724940056823322,
  -1.3265075307540413,
  -1.8530581309545013,
  0.335564434910613,
  0.16061631243062188,
 0.6994545842241634,
 -0.0055568765936962455,
 1.8148369905661879,
  -0.9149620921846291,
  -0.5341673651010566,
 -0.6583203681162046,
  -0.05148037848607484,
  -0.1302834828824637,
  -0.2083684341417298,
  -0.7142637766159184,
 0.4980789266978527,
 -2.030263033934291,
  -0.002330467371510849,
  -0.7835259213136883,
 -0.18712783689065152,
  -0.271594041353006,
  0.606962231033315,
  0.19917323339650786,
  0.581852597021436,
 1.0547240409345577,
 0.07111303544026976,
 1.4877210254684077,
  0.08669172360020491,
  0.8024105605127613,
  0.8315802366658298.
  1.117305276662395,
  -1.0742437197416552,
  0.30921812342286065,
 -0.06994991433225481,
 1.0419800264617582.
 1.4507701003592177,
  0.2408413974211676,
 1.6573761327725358],
[ 0.08591881204796584,
 1.5026023651616802,
  1.9179097588555833,
  1.9179097588555831,
 1.9179097588555831,
 1.9179097588555831,
  2.8800636946459592,
  2.9523818900173797,
  2.9523818900173797,
  2.954896407422686,
  3.0487820562708485,
```

3.0487820562708485,

```
3.9462134206000328,
3.9462134206000328,
5.170248653928018.
5.170248653928018,
6.5066905594049205,
6.5066905594049205,
6.5066905594049205.
6.914119522580601,
6.914119522580601,
6.9842551957162815,
7.300516913785898,
8.782483894556266.
8.782483894556266,
8.999633503017922,
8.999633503017922,
8.999633503017922,
9.414122362394847.
9.414122362394847,
0.09854676674938925,
-0.05173289612974198,
0.30094803169630163,
-1.1984142138894447.
0.08610670053567002,
0.2851928692216035,
0.26177875477440216,
0.11764473243628538,
0.3495067876706816,
-0.9678438601279628,
-0.08762050677252062,
0.014826088936787857,
-0.30347729159143555,
-1.1730530788097624,
-0.12550631929596553,
2.258056275075482,
-0.5160508087356981
0.004541093619226378,
-0.9345420797218197,
0.47154522212338745,
-0.9129446894819914,
0.2768683391341781,
0.29975752794333804,
-0.16177915588279423,
0.6021148977823381,
0.35405737535162146,
0.8149645603473178,
-0.7074306860917636,
-0.8281028342440522,
-0.20840122350984505,
-0.19593362207831977,
1.2208184674045053,
-0.10408257731449277,
0.9878855326441833,
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756.
-0.44913621684685756,
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521.
0.5925479388494825,
0.1500100176310508,
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612,
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243,
-0.8246572495389679,
-0.28480932751570914,
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
```

```
-0.035476380392734465,
  0.9940259955458774,
 -0.657126951929564,
  -0.4786936406484008,
 1.4564140457987391,
  -1.062151832750044,
 -0.01496017231630948,
  0.16259290081999456,
  0.601493806263198,
  -0.20485253219607644,
  -1.2421776762345744,
  1.152288606322054,
 1.1883019471730756,
 0.9817659575699377,
  0.9653429636905305,
  0.5382122852444811,
 0.722384759736696,
  -0.13079560936986118,
  -0.9638314109375934,
  -0.13358671856975504,
  -0.3949417844115237,
 1.01780227278121.
 0.6746960094686067,
  0.14295933107831804,
  -0.37974724013569766,
  0.3641245559377578,
  0.12972678280008856,
  0.5949873255000262,
  0.8499370211382984,
  -0.0792654431528575,
 1.9402087793428133,
 -0.5583113020357903,
 0.6535986429024293,
 1.0008805619835928,
 0.16556690201288055,
 1.1071973338235597,
 0.07194244573338314,
  -0.9146859400815048,
  -0.005186820541518637,
  0.4795762978809806,
 0.6475066336984044,
 0.11860845746693519,
  0.08044881503693782,
 0.5402817334108434,
 1.5532870492056725,
 0.36643388228039625,
 1.6150985923432208,
  0.22271977417212363,
  -0.04956133994172771,
 -0.6258533610916538,
 -0.6517224443292691,
 0.2594825887888975,
 -0.1286341552665023,
  0.48749759828242367,
 -0.009813928289633511,
  0.5249350004928881,
  -0.01015655683116892,
  -0.48671658518654837,
 -0.588311268126242,
 -0.25978871509233853.
  0.9039610340757382,
 1.5549616218831699,
 -0.05330158954092406],
[ 0.3773346757087749,
  0.5734233884194113,
  0.5734233884194113,
  1.2094818154974225,
 1.2528672337957094,
 1.3073966674132076,
  4.193348178434801,
  4.228670385547864,
  4.228670385547864,
  4.228670385547864,
  4.228670385547864,
```

4.228670385547864,

```
4.274742575727675,
5.343872214974395,
5.354523589318104.
5.449133113124401,
5.449133113124401,
5.449133113124401,
5.449133113124401.
6.208341300319731,
6.208341300319731,
6.738723848778546,
6.7473872692498285,
8.515456463543387.
8.552181104315652,
8.552181104315652,
8.552181104315652,
9.363042150968939,
9.363042150968939,
11.478464454984158,
-0.2683676450988651,
-0.9370321768196137,
0.03790413469005285,
-0.3520989510779511.
0.5131804204688105,
0.767748989456867,
-1.1529933056041268,
1.0195402939041247,
-0.5189860890713169,
1.700377968800765,
0.48912124484584857,
1.506730848787325,
0.4485612726223177,
-1.6248073049289613,
0.10079320215400162,
1.7454590745233427,
1.474284546585253,
0.08837986403943651,
1.215839965531947,
-0.42666568442503866,
0.04298065245990749,
-1.495484471060033,
0.39055472334393304,
-0.06187227108331559,
1.0010296249342066,
-0.33745943355443286,
-0.19046242319241546.
-0.4884459619425607,
0.8930564792122229,
0.09947441181287657,
-1.4049039336860292,
1.0413688199593338.
0.027348986225077598,
1.5457890290583323,
0.8022774572900748,
-1.0377116853398,
0.5652694406258009.
0.9990396087940023,
-0.3409174955760714,
-0.8590373420111477,
0.3662952964918326,
0.6492392290096071.
-1.0735392409833318,
-0.620775369578654,
0.5064494688850749,
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637,
0.13897118193917846,
0.13192395570874205.
-0.560408177185694,
```

-0.7293430452459922,

```
1.2393938765994381,
 0.16520016983754293
 -0.04218705839108043,
 1.9844775109402493,
 -0.40811731341033075,
 0.40494641878472026,
 0.44317505546879765.
 -0.14541224425415586,
 -1.3628454492957067,
 0.35572573997739254,
 -0.17363781014762678,
 -0.21765464091811726.
 0.25867396534698067,
 -0.19299239511743832,
 0.842583631219517,
 0.01538577194684443
 -1.3780712180305699,
 0.30168991607554185,
 0.03816118508668757,
 -0.6330896266111891,
 -0.14462412237866193,
 0.22751230177420415.
 2.198362599080823,
 0.5538971259685714,
 1.6735676153080048,
 0.01161307703421222,
 0.15241612900647253,
  -0.4114895408906573,
 0.020024246948836234,
 -0.361021382333633,
 1.2366726872792735,
 -0.8652479233612058,
 -0.38157323774943186,
 -1.2043495043519374,
 0.03294448415473864,
 1.864475600371399,
 -0.048446953541905424,
 1.483038428004856,
 0.02119809714572118
 -0.20756566215919184.
 1.2566509021622863,
 0.4040298326697209,
 0.0492062183426151,
 0.3396501220758691,
 0.09097515161528406,
 -0.4545275805495163,
 1.5327906096069877,
  -0.47568898039994184,
 0.7447654713950665,
 0.7179833985093875.
 -0.03692927531761856,
 0.11509825242982577,
 0.020898935398901888,
 0.2387893529411216,
 1.5195379458286031,
 -0.5337205856413728,
  -0.5741707032781822,
 1.298358172715442,
 -0.010829860462227588,
 -1.9037204771139875.
 1.5774751765228583,
 -0.28550943128124906,
 1.5531884118568244],
[ -6.331146189926128e-17,
 0.7069927066774304,
 0.7069927066774304,
 0.7069927066774305,
 0.7069927066774304,
 1.0044153364322925,
 1.0092418692996383,
 2.470333794214341,
 2.478143749866421,
 3.5776564981759003,
 3.5776564981759003,
```

3.5776564981759003,

```
3.61745967653339,
3.6981780389472076,
3.755720232685741.
3.9712286023902594,
3.9712286023902594,
4.519037432417192,
4.519037432417193.
4.519037432417193,
5.280953883299406,
5.280953883299406,
6.620356980277175,
6.620356980277175.
6.620356980277175,
6.620356980277176,
8.214004051881032,
8.214004051881032,
9.105951544537387,
10.829366164164977,
1.4490195266558639,
1.145329650589643,
-0.9374272684957279,
-1.2910248872233119.
0.9701069453007352,
2.0238893871034924,
-0.6731600678051081,
-0.7305037462514778,
0.6743483023845589,
1.611766624162738,
-0.162446688913207,
-0.2464021583836281,
1.3073653685111934,
1.560629053845934,
-0.09768282308379246,
-0.31393750682085847,
0.1625705045557987,
-0.1344649185634244,
-0.03516682581352061,
0.15934568227883428,
1.4484389719925783,
0.31346340320241645,
-1.5406853809043388,
0.3831701903776482,
0.07255447956326048,
-0.4619144712511035,
0.6220101497739178.
-0.08645510294766677,
-0.036774035023737585,
-0.02433291891195538,
1.2745777688613118,
0.806643386980706,
-0.1734465019831428,
-1.474099767063678,
-1.2534035864969235,
0.024086803725753666,
-0.5946515656594247.
3.047855036387052,
0.561263952510902,
-0.27353577574812815,
0.476385213099692,
-0.4183083264972014.
-0.07584344603997495,
-0.04004176630390785,
0.6379867024754904,
3.306912023625799,
0.6758488609505069,
-0.49379826249780634,
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808,
0.043470303912556706,
0.2301819741695647,
1.9247102260310271,
0.19401136489510468,
```

0.17784496580796996,

```
-0.12037519976757159,
 0.10596613899479704,
 0.02480260398862852.
 0.33616247382037256,
 -0.2960626605489573,
 1.2038327046358004,
 -0.4266046665751028.
 -0.14331073423696536,
 0.33240571018120446,
 0.13743208352564132,
 0.21308235615415505,
 -0.8816113951868988,
 -0.03958129872975694,
 1.7385124490728345,
 1.3953860705003918,
 0.7193393529381484,
 -0.5890148767931709,
 1.6845229617798814,
  -0.04059142172715042,
  -0.6588344885662398,
 -1.5492107393137406,
 0.9886630320432893.
 1.3955090248591298,
 -1.7521400718196618,
 -0.02012078102450614,
 1.5598528019020075,
 -0.041272015671692544,
 0.6659176073691222,
  -0.10884895615623923,
 -0.8860283635501729,
 -0.042494102069769425,
 -0.5241060846215897,
 -0.049429521011899694,
 -1.6158837397685775,
 -0.29703279066650246,
 0.6940812648197017,
 -1.0869617874060826,
  -1.1891726572683667,
 0.03935191545498333,
 -1.7727595774952096,
 -0.0005664350349098603,
 -1.2288438066739866,
 2.182693040857262,
 1.2648198022740724,
 0.636776362006322.
 -1.1418938134635428,
 0.04892386539982865,
  -0.6595482134655696,
  -0.016038133219537475,
 -1.53365152672916,
 -0.5818287115590742,
 -0.8537662908823758,
 1.3418170063691075,
 -0.32888813707646736
 -0.018460135902194714,
 -0.8323242421777916,
 1.5026664500941838,
 1.809610363246633,
 -1.5283405786971713,
 0.5470095670143573.
 -1.4753657998350065,
 0.8122840148585063,
 1.5317878779716176],
[ 3.750846163374531e-05,
 0.22285241391868899,
 0.26252411232084344,
 0.26252411232084344,
 0.26252411232084344,
 1.459545906754556.
 1.4595459067545562,
 1.6094835194149661,
 2.5927782099427628,
 2.5927782099427628.
 2.5927782099427628,
```

2.5927782099427623,

```
3.3552499939702187,
3.3552499939702187,
5.033284106467877.
5.033284106467877,
5.056477210452712,
6.768913439946703,
6.768913439946703.
7.2782492670747585,
7.2782492670747585,
7.2782492670747585,
7.2782492670747585,
7.2782492670747585.
7.2782492670747585,
8.934198246659292,
8.937369801451712,
9.544406408519471,
9.544406408519471.
10.23170722265548,
-0.4501443853573418,
0.06519513561037263,
-0.13386490845883003,
-0.01542333988020039.
0.3988203537526196,
0.9163371790808124,
0.08159154039220383,
-0.11665429084087826,
-0.21130662780886203,
1.515236372470638,
0.4436142129357345,
-0.28780404896369716,
0.3681425383234808,
0.648176841676201,
0.3046875502986337,
0.05897820457762899,
0.09316951897603123,
1.5277657654344678,
-0.655141628591867,
0.073084468489131,
-0.11423944001370272,
0.3986898081963471,
1.0974832156349317,
1.8462557861113,
0.5998463368708868,
-0.0014214294560794885,
0.4026665434776887.
-0.03860309342262787,
0.3728818533964108,
1.7322816292529104,
0.42156018976657544,
0.9872712539907578.
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974,
0.4324416138472369.
0.7909276553155474,
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866,
-0.0743310361925915.
1.1363109745761366,
0.32003332101567866,
0.08535303128967886,
1.1165485958252095,
0.476282782575683,
0.11414859665640108,
0.8927652783900955,
0.027791184984770272,
0.8970588198442948,
-0.04579755391586939,
0.10596016247070955,
0.4721342517962854,
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
```

```
-0.20639835153288702,
  0.2928189752635581,
 -0.4120973709154422.
  -0.16251962266938982,
  -0.928532755338732,
  0.13709877636127538,
  0.09386847134985479.
 -0.9415336108192559,
  -1.3861285848764584,
  0.5116476525314603,
  -1.5694556777668651,
  0.31948518026769196,
 -0.0136576069296156,
 0.8752899744519326,
 -0.448175539102687,
  -0.8567162669878051,
  0.737642795798484.
  -0.5233142967805873,
  -0.020239952918795164,
  0.9696407297918527,
  1.064479355466651,
 -0.43102633401249074.
 0.3234367312145231,
  0.02606795235445944,
  0.2525608175326581,
 0.09544790103129135,
  0.30399471295861424,
  0.6638935631613432,
  2.095756590649309,
  -0.5383535092385583,
  -0.1523671776118538,
  -0.49733805370513506,
 1.0814777965289457,
  -0.5541810322110113,
  0.4702060218904802,
  0.1941018040115748,
  0.027389458133440587,
  -0.6339976476553459,
  0.824073822166477,
 -0.8904328829691108
 0.5852778403101284,
 -0.37705413851354036,
  -0.20234246488211116,
  0.19390975159216547,
 -0.03854894368679599,
  -0.5885610444718222,
  0.2892174263372239,
  -0.7158388932188376,
  -0.03853087013753846,
  0.36228239756074476,
 0.06448164730191597,
  0.8103021451607575,
  0.04195704491201313,
  2.1946244272306323,
 1.1078290402756337.
  -0.0920096926231485,
  0.7957980849005134,
  0.10683086015182242,
 0.04139972880547422,
 1.068477454710041.
 1.5812878062267348,
 1.0292383703670558,
 1.5822631942162138],
[ 0.003375513600300809,
  0.4884127443235871,
  0.6719352108785641,
  0.9073170135093351,
 1.4946633690060278,
 1.5076957064847494,
  3.872917838142945,
  3.872917838142945,
  3.872917838142945,
  3.872917838142945.
  5.047622474508209,
```

5.054336886650782,

```
5.067626550795242,
5.0733174878702085,
5.094629387163461,
5.749571576552799,
5.7731554023304374,
7.144946717661993,
7.144946717661993.
7.144946717661993,
7.144946717661993,
7.602314289267704,
7.602314289267704,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832.
9.661071929582006,
0.2735947252101626,
2.471262065567802,
0.18954222370300397,
0.2633058348660961.
0.07494334922808346,
1.4980157261935538,
0.3538857424122425,
0.26341770410626436,
0.17174804107002956,
-0.22912718472194316,
0.11060714764109056,
-0.30804859927082595,
2.8406850614439736,
1.0823654569610508,
0.9668529413216363,
1.8727663516543385,
-0.0901659930896485,
0.05868560690604535,
0.24212775097742179,
1.0092515209898247,
-0.7556969386491817,
0.3279350524218167,
1.078117272505244,
0.10391815458190773,
-0.7434930272741371,
-1.6965388530236032,
-1.360748554100242.
0.34939560927302815,
0.03188634842980519,
-1.2447472675125983,
0.06092342743494014,
1.017082923902293,
-1.007905562333318,
-0.8576057837691866,
0.5321038189070756,
1.300652060018237,
-1.8122591145188616.
-1.247002191580596,
1.2529274198051785,
0.3750417535596218,
0.2898066740735119,
1.589675559301449.
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883,
0.2658818907332787,
-0.9372958671062981.
-1.0664167087973948,
```

-0.7139434901419379,

```
1.3816698348804732,
 2.008892916411081,
 0.15285666374274742.
 -1.782425531898792,
 0.07791440554206944,
 -1.28397958204954,
 -0.7247696039786395.
 0.5612678373457747,
 -0.004762916486662008,
 0.4386089298525658,
 0.010283368626678616,
 0.8990610129088383.
 0.03840864905637026,
 -1.2418081984826976,
 0.33190310279028407,
 0.3061008622829172,
 -0.06950158836023225,
 0.93859456058615,
  -0.02489786142317165,
 0.9927840878492759,
 -0.0709710381209458,
 -1.4546153026559692.
 -0.6707274766895803,
 1.0492831078613678,
 1.59883886587945,
 -0.7948795957139008,
 0.011914265512354442,
 0.29611851635537545,
  -0.026452865362460363,
 0.17911271593442915,
 -0.268102313362264,
 -0.31698956355176716,
 0.5150163737561883,
 -0.2617344493849528,
 -0.08207987775663798,
 -0.7031192006515304,
 0.10296103394319861,
  -1.3322481995457,
  -0.8096620548125795,
 0.22894179493051453,
 -0.6404807766018014,
 0.5981001234262467,
 0.6725836248662437,
 -0.24769451099401643,
 -1.5367942204876157,
 0.32496629998060117,
 0.8231756699235411,
 0.27229759145944715,
 -0.4283887626472357,
 0.6783210911797265,
 1.178917544999848,
 -0.48124012627536317,
 -0.23642700938756703,
 -0.22983768395119897,
 0.7841497681166887.
 0.5963513861028734,
  -0.8505831212819382,
 0.6516631671421783,
 0.6698405071431395,
 0.7826636181190869.
 -1.6023915303224998,
 0.6733061844063541,
 1.5755992624240989],
[ -5.647934061474703e-18,
 1.4787834906243755,
 1.478918229526628,
 1.478918229526628,
 2.0077351764243123,
 2.4302809101456218,
 2.4302809101456218,
 3.009709563144601,
 3.009709563144601,
 3.239471043198664,
 3.2405283031129133,
```

3.2405283031129133,

```
3.2656598154222434,
3.5353392937639825,
6.198713539858257,
6.213604956994236,
6.73397854893658,
6.73397854893658,
6.743547791194661.
6.744609103740889,
6.744609103740889,
6.749543065628153,
6.749543065628153,
8.615256229309818.
8.635090640841518,
9.012323512360366,
9.012323512360366,
9.930483613907942,
9.930483613907942,
11.782061805135282,
0.6870051227789642,
0.5234095533264759,
0.11216801162302814,
0.044591843687496906.
-0.747159787599118,
1.5727279855217766,
-0.16958009141159439,
-0.7234855106318131,
0.45999589631996707,
1.3613822619347415,
0.5234464983029046,
0.18337466193510712,
1.0660408011194182,
1.2813123812864906,
0.34899885807903364,
1.2204971120849089,
0.37250493843195553,
0.3861568591798728,
-0.4881036169368887,
0.23720347697856276,
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716,
0.5103741134651811,
-0.48491784736765847,
-1.939727949979543,
0.5221979500550953.
-0.39618913325979604,
-0.5258671175956018,
0.08753210163723862,
1.3619602585721242,
-1.2518915867901346.
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274,
-0.7045257843816373,
-0.4468310259761979.
0.6091022847926961,
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836.
0.37020611055835473,
0.4465655907565091,
-1.4308928069625704,
1.6254306194316424,
-0.16298810299835312,
-1.249293985363804,
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616,
-1.1357659634071433,
-0.5734897531715744,
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403,
```

```
0.06392732561319403,
 0.7711512775812011,
 -1.8472478314151175,
 -0.46160141905881696,
 1.8963279721150403,
 -2.313663424814036,
 0.060952702837845166,
 -1.4971949982077863,
 1.3040610818975555,
 0.10605679464403613,
 -1.138800572315487,
 -0.03947636943653289,
 0.07839455865010819,
 -0.6470277815644087,
 0.946101637008616,
 -0.32144060478582315,
 -0.6371693991779968,
 0.30580409265523,
  -0.2617129381706641,
 0.4094287336545931,
 0.49837362733711055,
 -0.9058714721495094.
 0.6137893604415533,
 0.8546844695081749,
 -0.8205470722456557,
 -0.598852289145785,
 0.46823811794119646,
 1.2205247300232143,
 0.031629319060699435,
 1.1369587010491427,
 0.12298062775535874
 -0.016960252964031076,
 1.1127338626212067,
 0.37972118532018134,
 -0.1475616440844684,
 0.32749925367563326,
 0.030050642250761914,
 0.17169542743574548,
 -0.5825729547476518,
 0.7052714548722974,
 0.9884296874822006,
 -0.500384308215816,
 0.01722431287494931,
 0.40290712722731054,
 -0.029200452046427447.
 1.2704708243944813,
 2.3709704014259345,
  -2.0267551524865275,
 0.7347873374577798,
 -0.34767223966060473,
 0.009778943736386289,
 0.221000841842164,
 -0.010995780695540691,
 -0.481889271583797,
 0.7008500159073542.
 2.3944065221124076,
  -0.08320445199579081,
  2.02470278988152,
 0.02142760118000664,
 1.6794429086669174.
 1.6046551807968945,
 0.2831685070910348,
 1.5805135598594935],
[ 0.0019047787007362745,
 0.7201496918445128,
 0.7201496918445128,
 0.7201496918445127,
 0.7226708680142584,
 0.8068041864232433,
 1.3847174673528184,
 1.6031895944534578,
 2.458865333289775,
 2.458865333289775.
 2.721120236828938,
```

2.721120236828938,

```
3.554687304897056,
3.554687304897056,
4.537252190232355,
4.537252190232355,
5.239770593633025,
5.242363659304797,
5.566731623636481.
5.566731623636481,
5.566731623636481,
5.566731623636481,
5.566731623636481,
7.6484324534494865.
7.6484324534494865,
8.96757120343865,
9.352637118466301,
9.381932224950582,
9.966925955531599,
9.966925955531599,
0.29840004251263574,
0.3207087147269936,
-0.22478909909228914,
-1.2242611593120782.
0.061748844824383295,
1.9931455249507801,
0.02449362327304914,
-0.23402928130657288,
0.3399922671860315,
0.2355005268966802,
0.7912945290539132,
-0.9147564287830934,
0.12280724330167514,
0.42016875545313104,
0.6183328009701774,
0.9098148543333162,
0.2439503202728901,
0.4941740976390827,
0.0721485641264495,
0.20051214721509877,
0.14273239312798908,
-0.03846070968482946,
0.11474641891065286,
0.1552743298359438,
-0.050455466832234855,
0.24385918138398863,
0.0646818550964626.
1.0379575003266166,
0.4438839418702803,
0.6652939620943935,
0.6574583263339632,
0.6386444070388955,
0.30923240052603657,
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079,
0.25272330748816335,
-0.05865013289270936,
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059.
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661,
0.256318263131488,
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428,
```

```
-0.007804627058269528,
 -2.9100406031766375
 -0.17918863042787767,
 -0.29620353111227854,
 -0.2953351498676352,
 0.4434234593316091,
 0.0018987515325079429.
 0.5290648024022053,
 0.011057994967698829,
 0.03103232328752182,
 -0.21693206073792237,
 -0.07883582131375938,
 -0.2554965378040217,
 1.978711034134111,
 -0.02822992907519939,
 1.110830733101554,
 0.04155227001102173,
 0.17370289874025888,
  -0.08435695708516765,
 0.38686640173882947,
 1.0727525781247964,
 -1.4871438236674412.
 0.1437881416009117,
 -0.15769165641037303,
 0.46096388290194723,
 0.3881288491041242,
 0.3113157866411551,
 -0.21237825892214532,
 1.3408904937177344,
 0.033287678968192874,
 -0.22654084728278404,
 0.09162287503278096,
 1.1250326534568733,
 0.670327239820091,
 -1.4911819217025961,
 0.8417198858779599,
 0.018685303562101165,
  -0.5955098452611822,
 1.37350461224772,
 -0.5503685346151788,
 0.07415629279393592,
 0.22396953453102358,
 -0.02219350017922496,
 2.5136787648879593,
 1.5560141766956836,
 -0.037039417521638966,
  -1.5578667717297374,
  -0.15174825264689498,
  -0.0075908588231686416,
 -0.1347910987366526.
 0.7535559035800633,
 2.9519825568174283,
 -0.8640992588734872,
 -0.486197602889753,
 -0.029079605859607876,
 0.1393557947212105,
  -0.03201203543340934,
  -0.17255788414719309,
 -0.6220837667998668,
 0.10441375911567917.
 0.7019930428559267,
 1.822960884928266,
 0.0010256621400676815],
[ 0.00030922277578629,
 0.881375055029912,
 0.881375055029912,
 0.8813750550299119,
 0.9803845151714838,
 0.9803845151714838,
 1.201629973822729,
 1.2441077564052723,
 1.8660677974280824,
 1.8660677974280824.
 2.651002314516478,
```

2.651002314516478,

```
3.233637461790533,
4.36384995486056,
4.36384995486056,
4.975714528653046,
4.975714528653046,
6.591840750700408,
6.591840750700408.
8.234009055219385,
8.238223602720305,
8.238223602720305,
8.238223602720305,
8.903406631369169.
8.903406631369169,
8.903406631369169,
9.126449234760914,
9.126449234760914,
9.441918167657187.
9.441918167657187,
0.4384156956352651,
-0.017407483354635628,
-0.13579407977759564,
-0.08181457210659056.
-0.5635031413839604,
0.570197125887921,
-0.07389454022208618,
0.18950484918514415,
0.23442314823895152,
0.5187197914643009,
0.03760777637611914,
1.2080522066616035,
-0.006796933498365149,
0.7597395812711474,
0.3165595784185247,
0.09234381717322694,
-0.047116958459538144,
0.02161370846364295,
-0.3330735946096464,
-0.310519881157395,
-0.1321730433969341,
-0.32004747583182785,
0.38880240494533963,
0.5587916266845782,
-0.04068226055752174,
-0.04929253976644778,
0.7350044083650977,
-0.3347542084226466,
0.07994172439872818,
0.177027499128215,
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313,
-1.8841797053563085,
-0.39250057722196113.
0.0604718224769807,
-0.15658247224402194,
1.097732135880844,
-0.47958374693582667,
-0.13884788062191106.
1.2517060190766023,
0.08912037934357776,
1.8722824819152626,
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875,
-0.29954118659750983,
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836.
0.8344869723837732,
-0.235921407746533,
```

```
-0.4874528967327087,
                                                    0.05731267695545898,
                                                    0.32920686175801595,
                                                    0.0470036094807545,
                                                    0.6942117349751494,
                                                    -0.24738597040458754,
                                                    -0.3530344251488351,
                                                    -0.7207866325012796,
                                                    0.6865004571010461,
                                                    -0.022934954570734595,
                                                    -0.4703523591474931,
                                                    0.00010065187353926284,
                                                    -0.25737840979321513,
                                                    -0.37927040299996573,
                                                    0.3323512575736423,
                                                    -0.7162822410895011,
                                                    -0.8849129065134153,
                                                    -0.02984860970928172,
                                                    0.9857401879405846,
                                                    0.13869536095324345,
                                                    -0.4901093246549395.
                                                    -0.15185390643388375,
                                                    -1.1107951730061545,
                                                    1.1255217267520845,
                                                    -0.36113008327046914,
                                                    0.12498769155032201,
                                                    1.105653484876161,
                                                    -0.0826241142760939,
                                                    -0.6079720837354008,
                                                    -0.4798331114275297,
                                                    -1.1230771992973987,
                                                    0.13634359721928585,
                                                    -1.0117198549615587,
                                                    0.0420371772323395,
                                                    0.4704689604818435,
                                                    -0.1136051809968673,
                                                    -0.4158299646895606,
                                                    0.7682233881623428,
                                                    -0.8567828943049521,
                                                    -1.0844985071567337,
                                                    0.8118563616911731,
                                                    -1.0011580890685694,
                                                    0.06773503500153778,
                                                    -0.9972068257582826,
                                                    0.22064841214728595,
                                                    1.015101892093672,
                                                    -0.023903188302909387,
                                                    -1.5448535965900865,
                                                    0.40727537812840897,
                                                    0.6273868528756265,
                                                    -0.06403282214251436,
                                                    0.1402221940396834,
                                                    0.011807494022614938,
                                                    0.19970219531306482,
                                                    -0.3159297567283321,
                                                    0.5243897804672414,
                                                    0.6302439365729751,
                                                    0.4184253509022523,
                                                    0.38422115408735924.
                                                    0.8610939738936156,
                                                    0.3457693810952046,
                                                    0.19105880264763628]],
                       'run_time_sec': 68892.59480500221}}],
'zne': [ { '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': [ -6.331146189926128e-17,
                                                   0.7069927066774304,
                                                   0.7069927066774304,
                                                   0.7069927066774305,
```

-0.2726490308679638,

```
0.7069927066774304,
1.0044153364322925,
1.0092418692996383.
2.470333794214341,
2.478143749866421,
3.5776564981759003,
3.5776564981759003.
3.5776564981759003,
3.61745967653339,
3.6981780389472076,
3.755720232685741,
3.9712286023902594,
3.9712286023902594,
4.519037432417192,
4.519037432417193,
4.519037432417193,
5.280953883299406.
5.280953883299406,
6.620356980277175,
6.620356980277175,
6.620356980277175,
6.620356980277176.
8.214004051881032,
8.214004051881032,
9.105951544537387,
10.829366164164977,
1.4490195266558639,
1.145329650589643,
-0.9374272684957279,
-1.2910248872233119,
0.9701069453007352,
2.0238893871034924,
-0.6731600678051081,
-0.7305037462514778,
0.6743483023845589.
1.611766624162738,
-0.162446688913207,
-0.2464021583836281,
1.3073653685111934,
1.560629053845934,
-0.09768282308379246,
-0.31393750682085847,
0.1625705045557987,
-0.1344649185634244,
-0.03516682581352061.
0.15934568227883428,
1.4484389719925783,
0.31346340320241645,
-1.5406853809043388,
0.3831701903776482,
0.07255447956326048,
-0.4619144712511035,
0.6220101497739178,
-0.08645510294766677,
-0.036774035023737585.
-0.02433291891195538,
1.2745777688613118,
0.806643386980706,
-0.1734465019831428,
-1.474099767063678.
-1.2534035864969235,
0.024086803725753666,
-0.5946515656594247,
3.047855036387052,
0.561263952510902,
-0.27353577574812815,
0.476385213099692,
-0.4183083264972014,
-0.07584344603997495,
-0.04004176630390785,
0.6379867024754904,
3.306912023625799,
0.6758488609505069.
-0.49379826249780634,
```

0.04089533617940984,

```
-0.2647421675477994,
                           0.1974729438666808.
                           0.043470303912556706,
                           0.2301819741695647,
                           1.9247102260310271,
                           0.19401136489510468,
                           0.17784496580796996,
                           -0.12037519976757159,
                           0.10596613899479704,
                           0.02480260398862852,
                           0.33616247382037256.
                           -0.2960626605489573,
                           1.2038327046358004,
                           -0.4266046665751028,
                           -0.14331073423696536,
                           0.33240571018120446,
                           0.13743208352564132,
                           0.21308235615415505,
                           -0.8816113951868988,
                           -0.03958129872975694,
                           1.7385124490728345.
                           1.3953860705003918,
                           0.7193393529381484,
                           -0.5890148767931709,
                           1.6845229617798814,
                           -0.04059142172715042,
                           -0.6588344885662398,
                           -1.5492107393137406,
                           0.9886630320432893,
                           1.3955090248591298,
                           -1.7521400718196618,
                           -0.02012078102450614,
                           1.5598528019020075,
                           -0.041272015671692544,
                           0.6659176073691222,
                           -0.10884895615623923,
                           -0.8860283635501729,
                           -0.042494102069769425,
                           -0.5241060846215897,
                           -0.049429521011899694,
                           -1.6158837397685775,
                           -0.29703279066650246,
                           0.6940812648197017,
                           -1.0869617874060826,
                           -1.1891726572683667,
                           0.03935191545498333,
                           -1.7727595774952096,
                           -0.0005664350349098603,
                           -1.2288438066739866.
                           2.182693040857262,
                           1.2648198022740724,
                           0.636776362006322,
                           -1.1418938134635428,
                           0.04892386539982865,
                           -0.6595482134655696,
                           -0.016038133219537475,
                           -1.53365152672916,
                           -0.5818287115590742,
                           -0.8537662908823758,
                           1.3418170063691075,
                           -0.32888813707646736,
                           -0.018460135902194714,
                           -0.8323242421777916,
                           1.5026664500941838,
                           1.809610363246633,
                           -1.5283405786971713,
                           0.5470095670143573,
                           -1.4753657998350065,
                           0.8122840148585063,
                           1.5317878779716176]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   'status': True,
                   'type': 'depolarizing'},
```

0.4062429454438471,

```
'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_noisy_time_evo_ric2_sample#5'},
              'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.311563719128683],
                                        [12, 6, 21, 8, -3.2712898811023576]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.458427429199219e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -7.474021363079925,
                              'others': { 'beta_coeffiecients': [ 1.3823529411764706,
                                                                   -0.38235294117647056],
                                           'cost_richardson_zne': 2.057093425605536,
                                           'sorted_expectation_vals': [ -6.311563719128683,
                                                                        -3.2712898811023576],
                                           'sorted_noise': [13, 47]},
                              'sampled data': [ [4, 2, 7, 0, -6.311563719128683],
                                                [12, 6, 21, 8, -3.2712898811023576]],
                              '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': [ -5.647934061474703e-18,
                                         1.4787834906243755,
                                         1.478918229526628,
                                         1.478918229526628,
                                         2.0077351764243123,
                                         2.4302809101456218.
                                         2.4302809101456218,
                                         3.009709563144601,
                                         3.009709563144601,
                                         3.239471043198664,
                                         3.2405283031129133.
                                         3.2405283031129133,
                                         3.2656598154222434,
                                         3.5353392937639825,
                                         6.198713539858257,
                                         6.213604956994236,
                                         6.73397854893658,
                                         6.73397854893658,
                                         6.743547791194661,
                                         6.744609103740889,
                                         6.744609103740889.
                                         6.749543065628153,
                                         6.749543065628153,
                                         8.615256229309818,
                                         8.635090640841518,
                                         9.012323512360366,
                                         9.012323512360366,
                                         9.930483613907942,
                                         9.930483613907942,
                                         11.782061805135282.
                                         0.6870051227789642,
                                         0.5234095533264759,
                                         0.11216801162302814,
                                         0.044591843687496906,
                                         -0.747159787599118,
                                         1.5727279855217766,
```

```
-0.16958009141159439,
-0.7234855106318131,
0.45999589631996707.
1.3613822619347415,
0.5234464983029046,
0.18337466193510712,
1.0660408011194182.
1.2813123812864906,
0.34899885807903364,
1.2204971120849089,
0.37250493843195553,
0.3861568591798728.
-0.4881036169368887,
0.23720347697856276,
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716.
0.5103741134651811,
-0.48491784736765847,
-1.939727949979543,
0.5221979500550953,
-0.39618913325979604.
-0.5258671175956018,
0.08753210163723862,
1.3619602585721242,
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274,
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961,
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473,
0.4465655907565091,
-1.4308928069625704,
1.6254306194316424.
-0.16298810299835312,
-1.249293985363804,
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616.
-1.1357659634071433,
-0.5734897531715744,
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708.
-1.1270394146554403,
0.06392732561319403,
0.7711512775812011,
-1.8472478314151175,
-0.46160141905881696.
1.8963279721150403,
-2.313663424814036,
0.060952702837845166,
-1.4971949982077863,
1.3040610818975555.
0.10605679464403613,
-1.138800572315487,
-0.03947636943653289,
0.07839455865010819,
-0.6470277815644087,
0.946101637008616,
-0.32144060478582315,
-0.6371693991779968,
0.30580409265523,
-0.2617129381706641,
0.4094287336545931,
0.49837362733711055,
-0.9058714721495094.
0.6137893604415533,
0.8546844695081749,
```

```
-0.8205470722456557,
                                       -0.598852289145785,
                                       0.46823811794119646.
                                       1.2205247300232143,
                                       0.031629319060699435,
                                       1.1369587010491427,
                                       0.12298062775535874.
                                       -0.016960252964031076,
                                       1.1127338626212067,
                                       0.37972118532018134,
                                       -0.1475616440844684,
                                       0.32749925367563326.
                                       0.030050642250761914,
                                       0.17169542743574548,
                                       -0.5825729547476518,
                                       0.7052714548722974,
                                       0.9884296874822006,
                                       -0.500384308215816,
                                       0.01722431287494931,
                                       0.40290712722731054,
                                       -0.029200452046427447,
                                       1.2704708243944813.
                                       2.3709704014259345,
                                       -2.0267551524865275,
                                       0.7347873374577798,
                                       -0.34767223966060473,
                                       0.009778943736386289,
                                       0.221000841842164,
                                       -0.010995780695540691,
                                       -0.481889271583797,
                                       0.7008500159073542,
                                       2.3944065221124076,
                                       -0.08320445199579081,
                                       2.02470278988152,
                                       0.02142760118000664,
                                       1.6794429086669174,
                                       1.6046551807968945,
                                       0.2831685070910348,
                                       1.5805135598594935]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric2_sample#8'},
            'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                       'constraint': True,
                                       'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.429933051303131],
                                      [12, 6, 21, 8, -3.1990719612158447]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.361701965332031e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -7.665262291630623,
                            'others': { 'beta_coeffiecients': [ 1.3823529411764706,
                                                                 -0.38235294117647056],
                                        'cost_richardson_zne': 2.057093425605536,
                                        'sorted_expectation_vals': [ -6.429933051303131,
                                                                      -3.1990719612158447],
                                        'sorted_noise': [13, 47]},
                            'sampled data': [ [4, 2, 7, 0, -6.429933051303131],
                                              [12, 6, 21, 8, -3.1990719612158447]],
                            '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': [ 3.750846163374531e-05,
                                         0.22285241391868899,
                                         0.26252411232084344,
                                         0.26252411232084344,
                                         0.26252411232084344,
                                         1.459545906754556,
                                         1.4595459067545562,
                                         1.6094835194149661,
                                         2.5927782099427628,
                                         2.5927782099427628,
                                         2.5927782099427628,
                                         2.5927782099427623,
                                         3.3552499939702187,
                                         3.3552499939702187,
                                         5.033284106467877.
                                         5.033284106467877,
                                         5.056477210452712,
                                         6.768913439946703,
                                         6.768913439946703,
                                         7.2782492670747585,
                                         7.2782492670747585,
                                         7.2782492670747585,
                                         7.2782492670747585,
                                         7.2782492670747585,
                                         7.2782492670747585,
                                         8.934198246659292,
                                         8.937369801451712,
                                         9.544406408519471,
                                         9.544406408519471,
                                         10.23170722265548,
                                         -0.4501443853573418,
                                         0.06519513561037263,
                                         -0.13386490845883003,
                                         -0.01542333988020039,
                                         0.3988203537526196,
                                         0.9163371790808124,
                                         0.08159154039220383,
                                         -0.11665429084087826,
                                         -0.21130662780886203,
                                         1.515236372470638,
                                         0.4436142129357345,
                                         -0.28780404896369716,
                                         0.3681425383234808,
                                         0.648176841676201,
                                         0.3046875502986337,
                                         0.05897820457762899,
                                         0.09316951897603123,
                                         1.5277657654344678,
                                         -0.655141628591867,
                                         0.073084468489131,
                                         -0.11423944001370272,
                                         0.3986898081963471,
                                         1.0974832156349317.
                                         1.8462557861113,
                                         0.5998463368708868,
                                         -0.0014214294560794885,
                                         0.4026665434776887,
                                         -0.03860309342262787,
                                         0.3728818533964108,
                                         1.7322816292529104,
                                         0.42156018976657544,
                                         0.9872712539907578,
                                         0.5749190583224287,
                                         0.1654949387796794,
                                         1.0577776390475342,
                                         -0.5892377479966974,
                                         0.4324416138472369,
                                         0.7909276553155474,
```

```
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866,
-0.0743310361925915,
1.1363109745761366,
0.32003332101567866,
0.08535303128967886.
1.1165485958252095,
0.476282782575683,
0.11414859665640108,
0.8927652783900955,
0.027791184984770272.
0.8970588198442948,
-0.04579755391586939,
0.10596016247070955,
0.4721342517962854,
0.3142323996684511.
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702,
0.2928189752635581,
-0.4120973709154422.
-0.16251962266938982,
-0.928532755338732,
0.13709877636127538,
0.09386847134985479,
-0.9415336108192559,
-1.3861285848764584,
0.5116476525314603,
-1.5694556777668651,
0.31948518026769196,
-0.0136576069296156,
0.8752899744519326,
-0.448175539102687,
-0.8567162669878051,
0.737642795798484,
-0.5233142967805873,
-0.020239952918795164,
0.9696407297918527,
1.064479355466651.
-0.43102633401249074,
0.3234367312145231,
0.02606795235445944,
0.2525608175326581,
0.09544790103129135,
0.30399471295861424,
0.6638935631613432,
2.095756590649309,
-0.5383535092385583,
-0.1523671776118538.
-0.49733805370513506,
1.0814777965289457,
-0.5541810322110113,
0.4702060218904802,
0.1941018040115748,
0.027389458133440587,
-0.6339976476553459,
0.824073822166477,
-0.8904328829691108,
0.5852778403101284,
-0.37705413851354036,
-0.20234246488211116,
0.19390975159216547,
-0.03854894368679599,
-0.5885610444718222,
0.2892174263372239,
-0.7158388932188376,
-0.03853087013753846,
0.36228239756074476,
0.06448164730191597,
0.8103021451607575,
0.04195704491201313,
2.1946244272306323,
1.1078290402756337,
```

-0.0920096926231485,

```
0.7957980849005134,
                                         0.10683086015182242,
                                         0.04139972880547422,
                                         1.068477454710041,
                                         1.5812878062267348,
                                         1.0292383703670558,
                                         1.5822631942162138]},
              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric2_sample#6'},
              'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.4606782650454075],
                                        [12, 6, 21, 8, -3.2738854608106305]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 3.337860107421875e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -7.679157866664586,
                              'others': { 'beta_coefficients': [ 1.3823529411764706,
                                                                   -0.38235294117647056],
                                           'cost_richardson_zne': 2.057093425605536,
                                           'sorted_expectation_vals': [ -6.4606782650454075,
                                                                        -3.2738854608106305],
                                          'sorted_noise': [13, 47]},
                              'sampled data': [ [4, 2, 7, 0, -6.4606782650454075],
                                                [12, 6, 21, 8, -3.2738854608106305]],
                              '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': [ 0.00030922277578629,
                                         0.881375055029912,
                                         0.881375055029912,
                                         0.8813750550299119,
                                         0.9803845151714838,
                                         0.9803845151714838,
                                         1.201629973822729,
                                         1.2441077564052723,
                                         1.8660677974280824,
                                         1.8660677974280824.
                                         2.651002314516478,
                                         2.651002314516478,
                                         3.233637461790533,
                                         4.36384995486056,
                                         4.36384995486056,
                                         4.975714528653046,
                                         4.975714528653046,
                                         6.591840750700408,
                                         6.591840750700408.
                                         8.234009055219385,
                                         8.238223602720305,
                                         8.238223602720305,
                                         8.238223602720305.
                                         8.903406631369169,
                                         8.903406631369169,
```

```
8.903406631369169,
9.126449234760914,
9.126449234760914,
9.441918167657187,
9.441918167657187,
0.4384156956352651,
-0.017407483354635628.
-0.13579407977759564,
-0.08181457210659056,
-0.5635031413839604,
0.570197125887921,
-0.07389454022208618,
0.18950484918514415,
0.23442314823895152,
0.5187197914643009,
0.03760777637611914,
1.2080522066616035.
-0.006796933498365149,
0.7597395812711474,
0.3165595784185247,
0.09234381717322694,
-0.047116958459538144.
0.02161370846364295,
-0.3330735946096464,
-0.310519881157395,
-0.1321730433969341,
-0.32004747583182785,
0.38880240494533963,
0.5587916266845782,
-0.04068226055752174,
-0.04929253976644778,
0.7350044083650977,
-0.3347542084226466,
0.07994172439872818,
0.177027499128215,
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313,
-1.8841797053563085,
-0.39250057722196113,
0.0604718224769807,
-0.15658247224402194,
1.097732135880844.
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626,
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481.
-1.8818047463381875,
-0.29954118659750983,
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836.
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
0.32920686175801595,
0.0470036094807545,
0.6942117349751494,
-0.24738597040458754,
-0.3530344251488351,
-0.7207866325012796,
0.6865004571010461,
-0.022934954570734595,
-0.4703523591474931,
0.00010065187353926284,
```

```
-0.25737840979321513,
                                       -0.37927040299996573,
                                       0.3323512575736423.
                                       -0.7162822410895011,
                                       -0.8849129065134153,
                                       -0.02984860970928172,
                                       0.9857401879405846.
                                       0.13869536095324345,
                                       -0.4901093246549395,
                                       -0.15185390643388375,
                                       -1.1107951730061545,
                                       1.1255217267520845,
                                       -0.36113008327046914,
                                       0.12498769155032201,
                                       1.105653484876161,
                                       -0.0826241142760939,
                                       -0.6079720837354008,
                                       -0.4798331114275297,
                                       -1.1230771992973987,
                                       0.13634359721928585,
                                       -1.0117198549615587,
                                       0.0420371772323395.
                                       0.4704689604818435,
                                       -0.1136051809968673,
                                       -0.4158299646895606,
                                       0.7682233881623428,
                                       -0.8567828943049521,
                                       -1.0844985071567337,
                                       0.8118563616911731,
                                       -1.0011580890685694,
                                       0.06773503500153778,
                                       -0.9972068257582826,
                                       0.22064841214728595,
                                       1.015101892093672,
                                       -0.023903188302909387,
                                       -1.5448535965900865,
                                       0.40727537812840897,
                                       0.6273868528756265,
                                       -0.06403282214251436,
                                       0.1402221940396834.
                                       0.011807494022614938,
                                       0.19970219531306482,
                                       -0.3159297567283321,
                                       0.5243897804672414,
                                       0.6302439365729751.
                                       0.4184253509022523,
                                       0.38422115408735924,
                                       0.8610939738936156,
                                       0.3457693810952046,
                                       0.19105880264763628]},
            'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric2_sample#10'},
            'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                       'constraint': True,
                                       'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.5111758480272135],
                                      [12, 6, 21, 8, -3.5131084000754242]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.814697265625e-05,
```

```
'zne_values': { 'degree': 0,
                              'extrapolated_value': -7.657495754597014,
                              'others': { 'beta_coeffiecients': [ 1.3823529411764706,
                                                                   -0.38235294117647056],
                                           'cost_richardson_zne': 2.057093425605536,
                                           'sorted_expectation_vals': [ -6.5111758480272135,
                                                                        -3.5131084000754242],
                                           'sorted_noise': [13, 47]},
                              'sampled data': [ [4, 2, 7, 0, -6.5111758480272135],
                                                [12, 6, 21, 8, -3.5131084000754242]],
                              'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'laver': 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': [ 0.33528943002425843,
                                         0.8608925283648261,
                                         2.8309935233222867,
                                         2.8382233121900358.
                                         2.847558790018716,
                                         2.8477263794127468,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         5.127462455084763,
                                         5.128383696390232,
                                         5.132051241075024,
                                         5.132231848473024,
                                         5.132297186784173,
                                         5.132297186784173,
                                         5.132297186784173,
                                         5.132320898992942,
                                         5.134903164275234,
                                         5.734798022200061,
                                         5.734798022200061,
                                         5.734798022200061,
                                         6.71748919093495,
                                         6.71748919093495,
                                         9.773430860122208,
                                         9.791656954875775,
                                         9.791980525916317,
                                         9.804782964874805,
                                         9.947289619134542,
                                         0.6818618664375632,
                                         0.42253658736184846,
                                         0.19067339209915313,
                                         -2.314563573529872,
                                         -1.7784854373672185,
                                         -0.10945476580518654,
                                         0.08980428543050965,
                                         0.6265702304745648,
                                         -0.12016219313034968,
                                         0.005450784512528824,
                                         0.9621316606784164,
                                         -0.01940541263687908.
                                         -1.2890091107885369,
                                         -0.09216272929775945,
                                         -0.8615487717558121,
                                         0.021600758375482327,
                                         1.1068545366678577,
                                         -0.06436428812394061,
                                         -1.8186253546793636,
                                         -0.2455724158610742,
                                         0.7444478114283775,
                                         1.0647343146888184,
                                         -1.6388802958603008,
                                         -0.05032235091912311,
                                         0.7589104637111997,
                                         0.0934759886788552,
                                         0.7280377617711271,
```

```
-0.10012682423470079,
-2.7917715562202794,
0.5843828201862561.
1.2003794612588048,
-0.2782652692858759,
1.253725179404932,
-0.831140674623039.
-1.3898002860152843,
1.7689493816619246,
-0.768539740515663,
-0.5265628815801298,
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446,
0.06348552937029919,
-0.7478835175458556.
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522,
-0.5743460857513,
0.873550995352649.
0.8797938271812764,
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805,
-0.4012501825920459,
-0.4763388197192611,
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537,
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616.
0.6716489600966955,
0.08900519900900147,
0.7708643633651343,
0.0944251249629154.
-0.053131619179539805,
-0.132883145931867,
0.44414428660563765,
-0.3164026614336652,
0.9835391768228284,
-0.49696354121947833,
0.3510514174127117,
-0.24991518010085176,
-0.7780713458689107,
1.3387260017849976.
0.712191280671364,
-0.4436070432657242,
1.090195713122469,
0.3876483875477464,
1.113683201871723.
0.09724940056823322,
-1.3265075307540413,
-1.8530581309545013,
0.335564434910613,
0.16061631243062188,
0.6994545842241634,
-0.0055568765936962455,
1.8148369905661879,
-0.9149620921846291.
-0.5341673651010566,
-0.6583203681162046,
-0.05148037848607484,
-0.1302834828824637,
-0.2083684341417298,
-0.7142637766159184,
0.4980789266978527,
-2.030263033934291,
-0.002330467371510849.
-0.7835259213136883,
```

-0.18712783689065152,

```
-0.271594041353006,
                                         0.606962231033315,
                                         0.19917323339650786.
                                         0.581852597021436,
                                         1.0547240409345577,
                                         0.07111303544026976,
                                         1.4877210254684077.
                                         0.08669172360020491,
                                         0.8024105605127613,
                                         0.8315802366658298,
                                         1.117305276662395,
                                         -1.0742437197416552,
                                         0.30921812342286065,
                                         -0.06994991433225481,
                                         1.0419800264617582,
                                         1.4507701003592177,
                                         0.2408413974211676,
                                         1.6573761327725358]},
              'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric2_sample#2'},
              'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                         'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.333005581610797],
                                        [12, 6, 21, 8, -3.165101785859742]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 3.600120544433594e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -7.544262915280317,
                              'others': { 'beta_coefficients': [ 1.3823529411764706,
                                                                   -0.38235294117647056],
                                          'cost_richardson_zne': 2.057093425605536,
                                          'sorted_expectation_vals': [ -6.333005581610797,
                                                                        -3.165101785859742],
                                          'sorted_noise': [13, 47]},
                              'sampled data': [ [4, 2, 7, 0, -6.333005581610797],
                                                [12, 6, 21, 8, -3.165101785859742]],
                              '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': [ 0.0019047787007362745,
                                         0.7201496918445128,
                                         0.7201496918445128.
                                         0.7201496918445127,
                                         0.7226708680142584,
                                         0.8068041864232433,
                                         1.3847174673528184,
                                         1.6031895944534578.
                                         2.458865333289775,
                                         2.458865333289775,
                                         2.721120236828938,
                                         2.721120236828938.
                                         3.554687304897056,
                                         3.554687304897056,
```

```
4.537252190232355,
4.537252190232355,
5.239770593633025,
5.242363659304797,
5.566731623636481,
5.566731623636481,
5.566731623636481.
5.566731623636481,
5.566731623636481,
7.6484324534494865,
7.6484324534494865,
8.96757120343865.
9.352637118466301,
9.381932224950582,
9.966925955531599,
9.966925955531599,
0.29840004251263574.
0.3207087147269936,
-0.22478909909228914,
-1.2242611593120782,
0.061748844824383295,
1.9931455249507801.
0.02449362327304914,
-0.23402928130657288,
0.3399922671860315,
0.2355005268966802,
0.7912945290539132,
-0.9147564287830934,
0.12280724330167514,
0.42016875545313104,
0.6183328009701774,
0.9098148543333162,
0.2439503202728901,
0.4941740976390827,
0.0721485641264495,
0.20051214721509877,
0.14273239312798908,
-0.03846070968482946,
0.11474641891065286,
0.1552743298359438,
-0.050455466832234855,
0.24385918138398863,
0.0646818550964626,
1.0379575003266166,
0.4438839418702803.
0.6652939620943935,
0.6574583263339632,
0.6386444070388955,
0.30923240052603657,
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079,
0.25272330748816335,
-0.05865013289270936,
0.324900593333006.
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059,
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661,
0.256318263131488,
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428,
-0.007804627058269528,
-2.9100406031766375,
```

```
-0.17918863042787767,
                           -0.29620353111227854,
                           -0.2953351498676352.
                           0.4434234593316091,
                           0.0018987515325079429,
                           0.5290648024022053,
                           0.011057994967698829,
                           0.03103232328752182,
                           -0.21693206073792237,
                           -0.07883582131375938,
                           -0.2554965378040217,
                           1.978711034134111.
                           -0.02822992907519939,
                           1.110830733101554,
                           0.04155227001102173,
                           0.17370289874025888,
                           -0.08435695708516765.
                           0.38686640173882947,
                           1.0727525781247964,
                           -1.4871438236674412,
                           0.1437881416009117,
                           -0.15769165641037303.
                           0.46096388290194723,
                           0.3881288491041242,
                           0.3113157866411551,
                           -0.21237825892214532,
                           1.3408904937177344,
                           0.033287678968192874,
                           -0.22654084728278404,
                           0.09162287503278096,
                           1.1250326534568733,
                           0.670327239820091,
                           -1.4911819217025961,
                           0.8417198858779599,
                           0.018685303562101165,
                           -0.5955098452611822,
                           1.37350461224772,
                           -0.5503685346151788,
                           0.07415629279393592,
                           0.22396953453102358.
                           -0.02219350017922496,
                           2.5136787648879593,
                           1.5560141766956836,
                           -0.037039417521638966,
                           -1.5578667717297374,
                           -0.15174825264689498,
                           -0.0075908588231686416,
                           -0.1347910987366526,
                           0.7535559035800633,
                           2.9519825568174283.
                           -0.8640992588734872,
                           -0.486197602889753,
                           -0.029079605859607876,
                           0.1393557947212105,
                           -0.03201203543340934
                           -0.17255788414719309,
                           -0.6220837667998668,
                           0.10441375911567917,
                           0.7019930428559267,
                           1.822960884928266.
                           0.0010256621400676815]},
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric2_sample#9'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0]]},
'run': 'zne',
'state': 'dmatrix',
```

```
'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.536182288327376],
                                        [12, 6, 21, 8, -3.450081350248876]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 3.62396240234375e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -7.7161620587691555,
                              'others': { 'beta_coefficients': [ 1.3823529411764706,
                                                                   -0.38235294117647056],
                                           'cost_richardson_zne': 2.057093425605536,
                                           'sorted_expectation_vals': [ -6.536182288327376,
                                                                        -3.450081350248876],
                                           'sorted_noise': [13, 47]},
                              'sampled data': [ [4, 2, 7, 0, -6.536182288327376],
                                                [12, 6, 21, 8, -3.450081350248876]],
                              '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': [ 0.08591881204796584,
                                         1.5026023651616802,
                                         1.9179097588555833,
                                         1.9179097588555831,
                                         1.9179097588555831,
                                         1.9179097588555831,
                                         2.8800636946459592,
                                         2.9523818900173797,
                                         2.9523818900173797,
                                         2.954896407422686,
                                         3.0487820562708485,
                                         3.0487820562708485,
                                         3.9462134206000328,
                                         3.9462134206000328,
                                         5.170248653928018,
                                         5.170248653928018.
                                         6.5066905594049205,
                                         6.5066905594049205,
                                         6.5066905594049205,
                                         6.914119522580601,
                                         6.914119522580601.
                                         6.9842551957162815,
                                         7.300516913785898,
                                         8.782483894556266,
                                         8.782483894556266,
                                         8.999633503017922,
                                         8.999633503017922,
                                         8.999633503017922,
                                         9.414122362394847,
                                         9.414122362394847,
                                         0.09854676674938925.
                                         -0.05173289612974198,
                                         0.30094803169630163,
                                         -1.1984142138894447,
                                         0.08610670053567002,
                                         0.2851928692216035,
                                         0.26177875477440216,
                                         0.11764473243628538,
                                         0.3495067876706816,
                                         -0.9678438601279628,
                                         -0.08762050677252062,
                                         0.014826088936787857,
                                         -0.30347729159143555,
                                         -1.1730530788097624,
                                         -0.12550631929596553,
                                         2.258056275075482,
```

```
-0.5160508087356981,
0.004541093619226378,
-0.9345420797218197,
0.47154522212338745,
-0.9129446894819914,
0.2768683391341781,
0.29975752794333804.
-0.16177915588279423,
0.6021148977823381,
0.35405737535162146,
0.8149645603473178,
-0.7074306860917636.
-0.8281028342440522,
-0.20840122350984505,
-0.19593362207831977,
1.2208184674045053,
-0.10408257731449277.
0.9878855326441833,
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756,
-0.44913621684685756.
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521,
0.5925479388494825,
0.1500100176310508,
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612,
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243,
-0.8246572495389679,
-0.28480932751570914,
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
-0.035476380392734465,
0.9940259955458774,
-0.657126951929564,
-0.4786936406484008.
1.4564140457987391,
-1.062151832750044,
-0.01496017231630948,
0.16259290081999456,
0.601493806263198,
-0.20485253219607644,
-1.2421776762345744,
1.152288606322054,
1.1883019471730756,
0.9817659575699377.
0.9653429636905305,
0.5382122852444811,
0.722384759736696,
-0.13079560936986118,
-0.9638314109375934.
-0.13358671856975504,
-0.3949417844115237,
1.01780227278121,
0.6746960094686067,
0.14295933107831804,
-0.37974724013569766,
0.3641245559377578,
0.12972678280008856,
0.5949873255000262.
0.8499370211382984,
-0.0792654431528575,
1.9402087793428133,
-0.5583113020357903.
0.6535986429024293,
```

1.0008805619835928,

```
1.1071973338235597.
                                         0.07194244573338314,
                                         -0.9146859400815048,
                                         -0.005186820541518637,
                                         0.4795762978809806,
                                         0.6475066336984044.
                                         0.11860845746693519,
                                         0.08044881503693782,
                                         0.5402817334108434,
                                         1.5532870492056725,
                                         0.36643388228039625.
                                         1.6150985923432208,
                                         0.22271977417212363,
                                         -0.04956133994172771,
                                         -0.6258533610916538,
                                         -0.6517224443292691,
                                         0.2594825887888975,
                                         -0.1286341552665023,
                                         0.48749759828242367,
                                         -0.009813928289633511,
                                         0.5249350004928881.
                                         -0.01015655683116892,
                                         -0.48671658518654837,
                                         -0.588311268126242,
                                         -0.25978871509233853,
                                         0.9039610340757382,
                                         1.5549616218831699,
                                         -0.05330158954092406]},
              'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric2_sample#3'},
              'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                         'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.410492799212101],
                                        [12, 6, 21, 8, -3.2577133670016694]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 3.62396240234375e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -7.615967287998442,
                              'others': { 'beta_coefficients': [ 1.3823529411764706,
                                                                   -0.38235294117647056],
                                          'cost_richardson_zne': 2.057093425605536,
                                          'sorted_expectation_vals': [ -6.410492799212101,
                                                                        -3.2577133670016694],
                                          'sorted_noise': [13, 47]},
                              'sampled data': [ [4, 2, 7, 0, -6.410492799212101],
                                                [12, 6, 21, 8, -3.2577133670016694]],
                              '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': [ 1.5680106786222674e-17,
                                         1.0238650999177359,
                                         1.0238650999177359,
```

0.16556690201288055,

```
1.0238650999177359,
1.7041550191762513,
2.070931805530806.
2.586234954306046,
2.6265616878606783,
2.7566136785306155,
2.7689271757054255.
4.271831894498143,
4.271831894498143,
4.271831894498143,
5.004110362344359,
5.004110362344359.
5.529689350278954,
5.529689350278954,
5.529689350278954,
5.5493166460873375,
7.855838962179162,
7.855838962179162,
8.508023697610218,
8.540796404638465,
8.940056981382925,
8.940056981382925.
8.940056981382925,
8.940056981382925,
9.524293982069336,
9.524293982069336,
9.815045396471412,
0.717685470636315,
0.29125971197830336,
0.013619559122678915,
-0.46174394022911175,
-0.7802589318548062,
1.8785332138943256,
-0.07718385116900997,
-0.4181315830102034,
0.3859499067718677,
0.7218523694763775,
0.16350787496293626,
-0.06274337543165032,
1.048639096314506,
0.9454500907927006,
-0.18328208251477485,
0.5336296017995852,
0.7047960543548563,
-0.4717130073686535.
-0.14327049451726778,
0.5646728024946054,
0.1377201649736573,
1.0845662084088512,
0.7117671017527167,
1.8562916393289055,
-1.0958742208007046,
0.314756410152813,
1.0055290931424188,
-1.2653176839886926,
-0.6435463058390287,
-0.13689785210195535,
0.5185042269644529,
-0.07994120596020922,
-1.3394312085309903.
-0.01354724643952521,
-0.8508707890759795,
-0.7258020036409927,
-0.1513648764845159,
-0.5702686618598916,
-0.20804467461705725,
-0.059043388294177074,
0.9724468840137966,
1.6889388278999584,
0.19460354666786345,
1.52688995899303,
0.40690710189505636,
0.054839646577847824,
-1.9384169999074634,
```

-0.8955556931339368,

```
0.22344394192624842,
                           -2.4039574731682265,
                           -0.22903568222623788.
                           -0.008629533947631484,
                           1.3318794505555018,
                           -0.04476169800775707,
                           -0.5314892190926975,
                           -0.05384939938166128,
                           0.5067524952638964,
                           0.7555528952477042,
                           0.6437292330207226,
                           0.02590432636550948.
                           0.44592066957482307,
                           -0.0809779454755679,
                           -1.1390483539597829,
                           0.4898473400025203,
                           0.11381426982162568,
                           0.6089836387514223,
                           0.17594570893388972,
                           0.012948010393531988,
                           -0.547404644839424,
                           0.028969189369927453,
                           1.1006601522977721,
                           -0.6406183594181203,
                           -0.12562720825840668,
                           2.0392738219317867,
                           0.9906966768182601,
                           0.03179376057566713,
                           1.5460159269414353,
                           -0.01674613470972367,
                           -1.1841027420803907,
                           0.24496917335434354,
                           -0.07332300856328518,
                           0.25897293698241475,
                           0.35918978324443196,
                           -0.007942172382781155,
                           0.4618323110818234,
                           -0.08547471514820712,
                           -0.5115221242285567,
                           0.4563488682048878,
                           -1.2086759202201718,
                           0.14282176979415442,
                           0.48263581465206523,
                           0.09855500655515351,
                           0.5327824526475502,
                           -0.19110982084320108,
                           -0.775795154813047,
                           -0.31907838177549175,
                           0.03477100089693282,
                           0.7436201132387485.
                           -0.022209896476399357,
                           -0.14741027177548285,
                           -0.10110024079398225,
                           0.20359400710495562,
                           -0.15623022021775929,
                           0.1964090589605299,
                           0.18042072654891128,
                           0.8910666012551952,
                           0.03518277211157266,
                           0.11858050209575345,
                           0.6912090997145024,
                           0.05142750966379351,
                           1.2523961498884204,
                           -1.1477698487953947,
                           -0.16063831357643202,
                           -1.0074319345942784,
                           0.29535289246662044,
                           -0.002280412475169233,
                           0.45599081133710123,
                           -1.6715207166067523,
                           0.3320227490012926,
                           1.5421306314740455]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric2_sample#1'},
              'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                         'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.515742960091852],
                                        [12, 6, 21, 8, -3.36492111003702]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 0.0001556873321533203,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -7.720468961583405,
                              'others': { 'beta_coeffiecients': [ 1.3823529411764706,
                                                                  -0.38235294117647056],
                                          'cost_richardson_zne': 2.057093425605536,
                                          'sorted_expectation_vals': [ -6.515742960091852,
                                                                        -3.36492111003702],
                                          'sorted_noise': [13, 47]},
                              'sampled data': [ [4, 2, 7, 0, -6.515742960091852],
                                                [12, 6, 21, 8, -3.36492111003702]],
                              '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': [ 0.3773346757087749,
                                         0.5734233884194113,
                                         0.5734233884194113,
                                         1.2094818154974225,
                                         1.2528672337957094.
                                         1.3073966674132076,
                                         4.193348178434801,
                                         4.228670385547864,
                                         4.228670385547864,
                                         4.228670385547864.
                                         4.228670385547864,
                                         4.228670385547864,
                                         4.274742575727675,
                                         5.343872214974395,
                                         5.354523589318104.
                                         5.449133113124401,
                                         5.449133113124401,
                                         5.449133113124401,
                                         5.449133113124401,
                                         6.208341300319731.
                                         6.208341300319731,
                                         6.738723848778546,
                                         6.7473872692498285,
                                         8.515456463543387,
                                         8.552181104315652,
                                         8.552181104315652,
                                         8.552181104315652,
                                         9.363042150968939,
                                         9.363042150968939,
                                         11.478464454984158,
                                         -0.2683676450988651,
                                         -0.9370321768196137,
                                         0.03790413469005285,
                                         -0.3520989510779511,
                                         0.5131804204688105,
```

```
0.767748989456867,
-1.1529933056041268,
1.0195402939041247,
-0.5189860890713169,
1.700377968800765,
0.48912124484584857,
1.506730848787325.
0.4485612726223177,
-1.6248073049289613,
0.10079320215400162,
1.7454590745233427,
1.474284546585253.
0.08837986403943651,
1.215839965531947,
-0.42666568442503866,
0.04298065245990749,
-1.495484471060033.
0.39055472334393304,
-0.06187227108331559,
1.0010296249342066,
-0.33745943355443286,
-0.19046242319241546.
-0.4884459619425607,
0.8930564792122229,
0.09947441181287657,
-1.4049039336860292,
1.0413688199593338,
0.027348986225077598,
1.5457890290583323,
0.8022774572900748,
-1.0377116853398,
0.5652694406258009,
0.9990396087940023,
-0.3409174955760714,
-0.8590373420111477,
0.3662952964918326,
0.6492392290096071,
-1.0735392409833318,
-0.620775369578654,
0.5064494688850749,
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893.
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637,
0.13897118193917846,
0.13192395570874205.
-0.560408177185694,
-0.7293430452459922,
1.2393938765994381,
0.16520016983754293,
-0.04218705839108043,
1.9844775109402493,
-0.40811731341033075,
0.40494641878472026,
0.44317505546879765,
-0.14541224425415586.
-1.3628454492957067,
0.35572573997739254,
-0.17363781014762678,
-0.21765464091811726,
0.25867396534698067,
-0.19299239511743832,
0.842583631219517,
0.01538577194684443,
-1.3780712180305699,
0.30168991607554185,
0.03816118508668757,
-0.6330896266111891,
-0.14462412237866193,
0.22751230177420415,
```

2.198362599080823,

```
1.6735676153080048,
                                       0.01161307703421222.
                                       0.15241612900647253,
                                       -0.4114895408906573,
                                       0.020024246948836234,
                                       -0.361021382333633.
                                       1.2366726872792735,
                                       -0.8652479233612058,
                                       -0.38157323774943186,
                                       -1.2043495043519374,
                                       0.03294448415473864.
                                       1.864475600371399,
                                       -0.048446953541905424,
                                       1.483038428004856,
                                       0.02119809714572118,
                                       -0.20756566215919184,
                                       1.2566509021622863,
                                       0.4040298326697209,
                                       0.0492062183426151,
                                       0.3396501220758691,
                                       0.09097515161528406.
                                       -0.4545275805495163,
                                       1.5327906096069877,
                                       -0.47568898039994184,
                                       0.7447654713950665,
                                       0.7179833985093875,
                                       -0.03692927531761856,
                                       0.11509825242982577,
                                       0.020898935398901888,
                                       0.2387893529411216,
                                       1.5195379458286031,
                                       -0.5337205856413728,
                                       -0.5741707032781822,
                                       1.298358172715442,
                                       -0.010829860462227588,
                                       -1.9037204771139875,
                                       1.5774751765228583,
                                       -0.28550943128124906,
                                       1.5531884118568244]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric2_sample#4'},
            'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                        'constraint': True,
                                       'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.44845457619454],
                                      [12, 6, 21, 8, -3.24468946816992]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.62396240234375e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -7.673423588086306,
                            'others': { 'beta_coeffiecients': [ 1.3823529411764706,
                                                                 -0.38235294117647056],
                                         'cost_richardson_zne': 2.057093425605536,
                                        'sorted_expectation_vals': [ -6.44845457619454,
                                                                      -3.24468946816992],
                                        'sorted_noise': [13, 47]},
                            'sampled data': [ [4, 2, 7, 0, -6.44845457619454],
                                              [12, 6, 21, 8, -3.24468946816992]],
```

0.5538971259685714,

```
'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': [ 0.003375513600300809,
                                         0.4884127443235871,
                                         0.6719352108785641,
                                         0.9073170135093351.
                                         1.4946633690060278,
                                         1.5076957064847494,
                                         3.872917838142945,
                                         3.872917838142945,
                                         3.872917838142945,
                                         3.872917838142945,
                                         5.047622474508209,
                                         5.054336886650782,
                                         5.067626550795242,
                                         5.0733174878702085.
                                         5.094629387163461,
                                         5.749571576552799,
                                         5.7731554023304374,
                                         7.144946717661993,
                                         7.144946717661993,
                                         7.144946717661993,
                                         7.144946717661993,
                                         7.602314289267704,
                                         7.602314289267704,
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         9.661071929582006,
                                         0.2735947252101626,
                                         2.471262065567802,
                                         0.18954222370300397,
                                         0.2633058348660961,
                                         0.07494334922808346,
                                         1.4980157261935538,
                                         0.3538857424122425,
                                         0.26341770410626436,
                                         0.17174804107002956,
                                          -0.22912718472194316,
                                         0.11060714764109056,
                                         -0.30804859927082595,
                                         2.8406850614439736,
                                         1.0823654569610508,
                                         0.9668529413216363,
                                         1.8727663516543385,
                                         -0.0901659930896485,
                                         0.05868560690604535,
                                         0.24212775097742179,
                                         1.0092515209898247,
                                         -0.7556969386491817,
                                         0.3279350524218167.
                                         1.078117272505244,
                                         0.10391815458190773,
                                         -0.7434930272741371,
                                         -1.6965388530236032,
                                         -1.360748554100242,
                                         0.34939560927302815,
                                         0.03188634842980519,
                                         -1.2447472675125983,
                                         0.06092342743494014,
                                         1.017082923902293,
                                         -1.007905562333318,
                                         -0.8576057837691866,
                                         0.5321038189070756,
                                         1.300652060018237,
                                         -1.8122591145188616,
```

```
-1.247002191580596,
1.2529274198051785,
0.3750417535596218,
0.2898066740735119,
1.589675559301449,
2.3222772390172888,
-1.568740409290771.
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058.
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883,
0.2658818907332787.
-0.9372958671062981,
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732,
2.008892916411081.
0.15285666374274742,
-1.782425531898792,
0.07791440554206944,
-1.28397958204954,
-0.7247696039786395,
0.5612678373457747,
-0.004762916486662008,
0.4386089298525658,
0.010283368626678616,
0.8990610129088383,
0.03840864905637026,
-1.2418081984826976,
0.33190310279028407,
0.3061008622829172,
-0.06950158836023225,
0.93859456058615,
-0.02489786142317165,
0.9927840878492759.
-0.0709710381209458,
-1.4546153026559692,
-0.6707274766895803,
1.0492831078613678,
1.59883886587945.
-0.7948795957139008,
0.011914265512354442,
0.29611851635537545,
-0.026452865362460363,
0.17911271593442915.
-0.268102313362264,
-0.31698956355176716,
0.5150163737561883,
-0.2617344493849528,
-0.08207987775663798,
-0.7031192006515304,
0.10296103394319861,
-1.3322481995457,
-0.8096620548125795,
0.22894179493051453,
-0.6404807766018014,
0.5981001234262467,
0.6725836248662437,
-0.24769451099401643,
-1.5367942204876157,
0.32496629998060117,
0.8231756699235411,
0.27229759145944715,
-0.4283887626472357.
0.6783210911797265,
1.178917544999848,
-0.48124012627536317,
-0.23642700938756703.
-0.22983768395119897,
0.7841497681166887,
```

```
0.5963513861028734,
                                                                -0.8505831212819382.
                                                                0.6516631671421783.
                                                                0.6698405071431395,
                                                                0.7826636181190869,
                                                                -1.6023915303224998,
                                                                0.6733061844063541,
                                                                1.5755992624240989]},
                                     'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                                        'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                        '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_noisy_time_evo_ric2_sample#7'},
                                    'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0]]},
                                    'run': 'zne',
                                    'state': 'dmatrix',
                                     'vqe': { 'iteration': 1,
                                             'optimization': { 'algorithm': 'SLSQP',
                                                                'constraint': True,
                                                                'status': False}},
                                    'zne': { 'data_points': [ [4, 2, 7, 0, -6.397817460329861],
                                                               [12, 6, 21, 8, -3.2115716730808748]],
                                             'degree': 0,
                                             'method': 'richardson',
                                             'sampling': 'default'}},
                        'output': { 'exact_sol': -8.566772233505624,
                                    'run_time_sec': 0.00014829635620117188,
                                    'zne_values': { 'degree': 0,
                                                     'extrapolated_value': -7.6160879083956505,
                                                     'others': { 'beta_coeffiecients': [ 1.3823529411764706,
                                                                                          -0.38235294117647056],
                                                                 'cost_richardson_zne': 2.057093425605536,
                                                                 'sorted_expectation_vals': [ -6.397817460329861,
                                                                                               -3.2115716730808748],
                                                                 'sorted_noise': [13, 47]},
                                                     'sampled data': [ [4, 2, 7, 0, -6.397817460329861],
                                                                       [12, 6, 21, 8, -3.2115716730808748]],
                                                     'sampling': 'default'}}}],
'xy-ric3': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
                                                      'laver': 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': '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': '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 \times 5 \times 6 + 0.5 \times 5 \times 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':
                                                                             '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,

False,

```
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.
 1.0900003904895101,
 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,
 -0.17185617277774212,
 -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,
```

```
-0.17191397249005735,
                                                         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],
                                                                       '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': [ 3.750846163374531e-05,
                                                         0.22285241391868899,
                                                         0.26252411232084344,
                                                         0.26252411232084344,
                                                         0.26252411232084344,
                                                         1.459545906754556,
                                                         1.4595459067545562,
                                                         1.6094835194149661,
                                                         2.5927782099427628,
                                                         2.5927782099427628,
                                                         2.5927782099427628,
                                                         2.5927782099427623,
                                                         3.3552499939702187,
                                                         3.3552499939702187,
                                                         5.033284106467877,
```

0.05578672583947999,

```
5.033284106467877,
5.056477210452712,
6.768913439946703,
6.768913439946703,
7.2782492670747585,
7.2782492670747585,
7.2782492670747585.
7.2782492670747585,
7.2782492670747585,
7.2782492670747585,
8.934198246659292,
8.937369801451712.
9.544406408519471,
9.544406408519471,
10.23170722265548,
-0.4501443853573418,
0.06519513561037263,
-0.13386490845883003,
-0.01542333988020039,
0.3988203537526196,
0.9163371790808124,
0.08159154039220383.
-0.11665429084087826,
-0.21130662780886203,
1.515236372470638,
0.4436142129357345,
-0.28780404896369716,
0.3681425383234808,
0.648176841676201,
0.3046875502986337,
0.05897820457762899,
0.09316951897603123,
1.5277657654344678,
-0.655141628591867,
0.073084468489131,
-0.11423944001370272,
0.3986898081963471,
1.0974832156349317,
1.8462557861113,
0.5998463368708868,
-0.0014214294560794885,
0.4026665434776887,
-0.03860309342262787,
0.3728818533964108,
1.7322816292529104.
0.42156018976657544,
0.9872712539907578,
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974,
0.4324416138472369,
0.7909276553155474,
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866,
-0.0743310361925915,
1.1363109745761366,
0.32003332101567866,
0.08535303128967886.
1.1165485958252095,
0.476282782575683,
0.11414859665640108,
0.8927652783900955,
0.027791184984770272,
0.8970588198442948,
-0.04579755391586939,
0.10596016247070955,
0.4721342517962854,
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702.
0.2928189752635581,
-0.4120973709154422,
```

```
-0.16251962266938982,
                           -0.928532755338732,
                           0.13709877636127538.
                           0.09386847134985479,
                           -0.9415336108192559,
                           -1.3861285848764584,
                           0.5116476525314603.
                           -1.5694556777668651,
                           0.31948518026769196,
                           -0.0136576069296156,
                           0.8752899744519326,
                           -0.448175539102687,
                           -0.8567162669878051,
                           0.737642795798484,
                           -0.5233142967805873,
                           -0.020239952918795164,
                           0.9696407297918527,
                           1.064479355466651,
                           -0.43102633401249074,
                           0.3234367312145231,
                           0.02606795235445944,
                           0.2525608175326581.
                           0.09544790103129135,
                           0.30399471295861424,
                           0.6638935631613432,
                           2.095756590649309,
                           -0.5383535092385583,
                           -0.1523671776118538,
                           -0.49733805370513506,
                           1.0814777965289457,
                           -0.5541810322110113,
                           0.4702060218904802,
                           0.1941018040115748,
                           0.027389458133440587,
                           -0.6339976476553459,
                           0.824073822166477,
                           -0.8904328829691108,
                           0.5852778403101284,
                           -0.37705413851354036,
                           -0.20234246488211116,
                           0.19390975159216547,
                           -0.03854894368679599,
                           -0.5885610444718222,
                           0.2892174263372239,
                           -0.7158388932188376,
                           -0.03853087013753846,
                           0.36228239756074476,
                           0.06448164730191597,
                           0.8103021451607575,
                           0.04195704491201313.
                           2.1946244272306323,
                           1.1078290402756337,
                           -0.0920096926231485,
                           0.7957980849005134,
                           0.10683086015182242,
                           0.04139972880547422,
                           1.068477454710041,
                           1.5812878062267348,
                           1.0292383703670558,
                           1.5822631942162138]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric3_sample#6'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 0]]},
'run': 'redundant',
```

```
'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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.4606782650454075],
                                                               [12, 6, 21, 8, -3.273885460810631],
                                                               [20, 10, 35, 16, -1.6974907774474755]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                  'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.0011,
                                                                                        'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001.
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4}],
                                             'run_time_sec': 19.287668466567993}},
                               { '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},
```

'state': 'dmatrix',

```
'type': 'xy-iss'}},
'init_param': { 'value': [ 0.33528943002425843,
                           0.8608925283648261,
                           2.8309935233222867,
                           2.8382233121900358,
                           2.847558790018716,
                           2.8477263794127468,
                           3.9337993695450666,
                           3.9337993695450666,
                           3.9337993695450666,
                           3.9337993695450666,
                           3.9337993695450666,
                           5.127462455084763,
                           5.128383696390232,
                           5.132051241075024,
                           5.132231848473024,
                           5.132297186784173,
                           5.132297186784173,
                           5.132297186784173,
                           5.132320898992942,
                           5.134903164275234,
                           5.734798022200061,
                           5.734798022200061,
                           5.734798022200061,
                           6.71748919093495,
                           6.71748919093495,
                           9.773430860122208,
                           9.791656954875775,
                           9.791980525916317,
                           9.804782964874805,
                           9.947289619134542,
                           0.6818618664375632,
                           0.42253658736184846,
                           0.19067339209915313,
                           -2.314563573529872,
                           -1.7784854373672185,
                           -0.10945476580518654,
                           0.08980428543050965,
                           0.6265702304745648,
                           -0.12016219313034968,
                           0.005450784512528824,
                           0.9621316606784164,
                           -0.01940541263687908,
                           -1.2890091107885369,
                           -0.09216272929775945,
                           -0.8615487717558121,
                           0.021600758375482327,
                           1.1068545366678577,
                           -0.06436428812394061,
                           -1.8186253546793636,
                           -0.2455724158610742,
                           0.7444478114283775,
                           1.0647343146888184,
                           -1.6388802958603008,
                           -0.05032235091912311,
                           0.7589104637111997,
                           0.0934759886788552,
                           0.7280377617711271,
                           -0.10012682423470079,
                           -2.7917715562202794.
                           0.5843828201862561,
                           1.2003794612588048,
                           -0.2782652692858759,
                           1.253725179404932,
                           -0.831140674623039,
                           -1.3898002860152843,
                           1.7689493816619246,
                           -0.768539740515663,
                           -0.5265628815801298,
                           -0.8222194498348508,
                           -0.4525275176973082,
                           0.8944486767447871,
                           1.1352373194126446,
                           0.06348552937029919,
                           -0.7478835175458556,
```

```
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522.
-0.5743460857513,
0.873550995352649,
0.8797938271812764,
-0.37270941226617715.
0.20553479070949218,
0.6188766136751805,
-0.4012501825920459,
-0.4763388197192611,
-0.34431485887187113.
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537,
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616,
0.6716489600966955,
0.08900519900900147,
0.7708643633651343.
0.0944251249629154,
-0.053131619179539805,
-0.132883145931867,
0.44414428660563765,
-0.3164026614336652,
0.9835391768228284,
-0.49696354121947833,
0.3510514174127117,
-0.24991518010085176,
-0.7780713458689107,
1.3387260017849976,
0.712191280671364,
-0.4436070432657242,
1.090195713122469.
0.3876483875477464,
1.113683201871723,
0.09724940056823322,
-1.3265075307540413,
-1.8530581309545013,
0.335564434910613,
0.16061631243062188,
0.6994545842241634,
-0.0055568765936962455,
1.8148369905661879,
-0.9149620921846291,
-0.5341673651010566,
-0.6583203681162046,
-0.05148037848607484.
-0.1302834828824637,
-0.2083684341417298,
-0.7142637766159184,
0.4980789266978527,
-2.030263033934291.
-0.002330467371510849,
-0.7835259213136883,
-0.18712783689065152,
-0.271594041353006,
0.606962231033315,
0.19917323339650786,
0.581852597021436,
1.0547240409345577,
0.07111303544026976,
1.4877210254684077,
0.08669172360020491,
0.8024105605127613,
0.8315802366658298,
1.117305276662395,
-1.0742437197416552,
0.30921812342286065,
-0.06994991433225481,
1.0419800264617582.
1.4507701003592177,
```

0.2408413974211676,

```
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric3_sample#2'},
                                             'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                   [1, 1, 1, 0],
                                                                                   [2, 2, 2, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.333005581610797],
                                                               [12, 6, 21, 8, -3.1651017858597426],
                                                               [20, 10, 35, 16, -1.6439583689682524]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
```

1.6573761327725358]},

```
0.001],
                                                       'status': True,
                                                        'type': 'depolarizing'},
                                    'odd_wires': 4}],
              'run_time_sec': 17.832751750946045}},
{ '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': [ 1.5680106786222674e-17,
                                         1.0238650999177359,
                                          1.0238650999177359,
                                         1.0238650999177359,
                                         1.7041550191762513.
                                          2.070931805530806,
                                          2.586234954306046,
                                          2.6265616878606783,
                                          2.7566136785306155,
                                          2.7689271757054255,
                                          4.271831894498143,
                                          4.271831894498143,
                                          4.271831894498143,
                                          5.004110362344359,
                                          5.004110362344359,
                                          5.529689350278954,
                                          5.529689350278954,
                                         5.529689350278954,
                                          5.5493166460873375,
                                         7.855838962179162,
                                          7.855838962179162,
                                          8.508023697610218,
                                          8.540796404638465,
                                         8.940056981382925,
                                          8.940056981382925,
                                          8.940056981382925,
                                         8.940056981382925,
                                         9.524293982069336,
                                          9.524293982069336,
                                          9.815045396471412,
                                          0.717685470636315,
                                          0.29125971197830336,
                                         0.013619559122678915,
                                         -0.46174394022911175,
                                          -0.7802589318548062,
                                         1.8785332138943256,
                                         -0.07718385116900997,
                                         -0.4181315830102034,
                                         0.3859499067718677,
                                          0.7218523694763775,
                                          0.16350787496293626
                                         -0.06274337543165032,
                                         1.048639096314506.
                                          0.9454500907927006,
                                          -0.18328208251477485,
                                          0.5336296017995852,
                                          0.7047960543548563,
                                          -0.4717130073686535,
                                          -0.14327049451726778,
                                          0.5646728024946054,
                                          0.1377201649736573,
                                         1.0845662084088512,
                                         0.7117671017527167,
                                         1.8562916393289055,
                                         -1.0958742208007046,
                                         0.314756410152813,
                                         1.0055290931424188,
                                          -1.2653176839886926,
```

```
-0.6435463058390287,
-0.13689785210195535,
0.5185042269644529,
-0.07994120596020922,
-1.3394312085309903,
-0.01354724643952521,
-0.8508707890759795.
-0.7258020036409927,
-0.1513648764845159,
-0.5702686618598916,
-0.20804467461705725,
-0.059043388294177074,
0.9724468840137966,
1.6889388278999584,
0.19460354666786345,
1.52688995899303,
0.40690710189505636,
0.054839646577847824,
-1.9384169999074634,
-0.8955556931339368,
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788,
-0.008629533947631484,
1.3318794505555018,
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042,
0.6437292330207226,
0.02590432636550948,
0.44592066957482307,
-0.0809779454755679,
-1.1390483539597829,
0.4898473400025203,
0.11381426982162568,
0.6089836387514223,
0.17594570893388972,
0.012948010393531988.
-0.547404644839424,
0.028969189369927453,
1.1006601522977721,
-0.6406183594181203,
-0.12562720825840668,
2.0392738219317867,
0.9906966768182601,
0.03179376057566713,
1.5460159269414353,
-0.01674613470972367.
-1.1841027420803907,
0.24496917335434354,
-0.07332300856328518,
0.25897293698241475,
0.35918978324443196,
-0.007942172382781155,
0.4618323110818234,
-0.08547471514820712,
-0.5115221242285567,
0.4563488682048878,
-1.2086759202201718,
0.14282176979415442,
0.48263581465206523,
0.09855500655515351,
0.5327824526475502,
-0.19110982084320108,
-0.775795154813047,
-0.31907838177549175,
0.03477100089693282.
0.7436201132387485,
-0.022209896476399357,
-0.14741027177548285,
-0.10110024079398225,
0.20359400710495562,
```

-0.15623022021775929,

```
0.8910666012551952.
                                                                         0.03518277211157266,
                                                                         0.11858050209575345,
                                                                         0.6912090997145024,
                                                                         0.05142750966379351.
                                                                         1.2523961498884204,
                                                                         -1.1477698487953947,
                                                                         -0.16063831357643202,
                                                                         -1.0074319345942784,
                                                                         0.29535289246662044.
                                                                         -0.002280412475169233,
                                                                         0.45599081133710123,
                                                                         -1.6715207166067523,
                                                                         0.3320227490012926,
                                                                        1.5421306314740455]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric3_sample#1'},
                                             'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                   [1, 1, 1, 0],
                                                                                   [2, 2, 2, 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, 7, 0, -6.515742960091852],
                                                              [12, 6, 21, 8, -3.36492111003702],
                                                              [20, 10, 35, 16, -1.7545658776574033]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0 } ,
                                                                                      'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0 } ,
                                                                                      'noise_prob': [ 0.001,
```

0.1964090589605299, 0.18042072654891128,

```
0.001,
                                                                        0.001,
                                                                        0.001],
                                                       'status': True,
                                                       'type': 'depolarizing'},
                                    'odd_wires': 4},
                                  { 'gates_num': [20, 5, 5, 16],
                                    'identity_factors': [2, 2, 2, 0],
                                    'noise_level': [20, 10, 35, 16],
                                    'noise_profile': { 'noise_on_init_param': { 'status':
                                                                                 'value':
                                                        'noise_prob': [ 0.001,
                                                                        0.001,
                                                                        0.001,
                                                                        0.001],
                                                        'status': True,
                                                        'type': 'depolarizing'},
                                    'odd_wires': 4}],
              'run_time_sec': 16.81493878364563}},
{ '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': [ 0.0019047787007362745,
                                          0.7201496918445128,
                                          0.7201496918445128,
                                          0.7201496918445127,
                                          0.7226708680142584,
                                          0.8068041864232433,
                                          1.3847174673528184,
                                          1.6031895944534578,
                                          2.458865333289775,
                                          2.458865333289775,
                                          2.721120236828938,
                                          2.721120236828938,
                                          3.554687304897056,
                                          3.554687304897056,
                                          4.537252190232355,
                                          4.537252190232355,
                                          5.239770593633025,
                                          5.242363659304797,
                                          5.566731623636481,
                                          5.566731623636481,
                                          5.566731623636481,
                                          5.566731623636481,
                                          5.566731623636481,
                                          7.6484324534494865,
                                          7.6484324534494865,
                                          8.96757120343865,
                                          9.352637118466301,
                                          9.381932224950582,
                                          9.966925955531599,
                                          9.966925955531599,
                                          0.29840004251263574,
                                          0.3207087147269936,
                                          -0.22478909909228914,
                                          -1.2242611593120782,
                                          0.061748844824383295,
                                          1.9931455249507801,
                                          0.02449362327304914,
                                          -0.23402928130657288,
                                          0.3399922671860315,
                                          0.2355005268966802,
                                          0.7912945290539132,
                                          -0.9147564287830934,
```

False,

0 } ,

```
0.12280724330167514,
0.42016875545313104,
0.6183328009701774.
0.9098148543333162,
0.2439503202728901,
0.4941740976390827,
0.0721485641264495.
0.20051214721509877,
0.14273239312798908,
-0.03846070968482946,
0.11474641891065286,
0.1552743298359438,
-0.050455466832234855,
0.24385918138398863,
0.0646818550964626,
1.0379575003266166,
0.4438839418702803,
0.6652939620943935,
0.6574583263339632,
0.6386444070388955,
0.30923240052603657,
-0.34636230410321134.
0.23860747048870812,
-0.8837469955189079,
0.25272330748816335,
-0.05865013289270936,
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059,
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661.
0.256318263131488,
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428.
-0.007804627058269528,
-2.9100406031766375,
-0.17918863042787767,
-0.29620353111227854,
-0.2953351498676352.
0.4434234593316091,
0.0018987515325079429,
0.5290648024022053,
0.011057994967698829,
0.03103232328752182.
-0.21693206073792237,
-0.07883582131375938,
-0.2554965378040217,
1.978711034134111,
-0.02822992907519939,
1.110830733101554,
0.04155227001102173,
0.17370289874025888,
-0.08435695708516765,
0.38686640173882947,
1.0727525781247964,
-1.4871438236674412,
0.1437881416009117,
-0.15769165641037303,
0.46096388290194723,
0.3881288491041242,
0.3113157866411551,
-0.21237825892214532.
1.3408904937177344,
0.033287678968192874,
```

```
-0.22654084728278404,
                                       0.09162287503278096,
                                       1.1250326534568733.
                                       0.670327239820091,
                                       -1.4911819217025961,
                                       0.8417198858779599,
                                       0.018685303562101165.
                                       -0.5955098452611822,
                                       1.37350461224772,
                                       -0.5503685346151788,
                                       0.07415629279393592,
                                       0.22396953453102358.
                                       -0.02219350017922496,
                                       2.5136787648879593,
                                       1.5560141766956836,
                                       -0.037039417521638966,
                                       -1.5578667717297374,
                                       -0.15174825264689498,
                                       -0.0075908588231686416,
                                       -0.1347910987366526,
                                       0.7535559035800633,
                                       2.9519825568174283.
                                       -0.8640992588734872,
                                       -0.486197602889753,
                                       -0.029079605859607876,
                                       0.1393557947212105,
                                       -0.03201203543340934,
                                       -0.17255788414719309,
                                       -0.6220837667998668,
                                       0.10441375911567917,
                                       0.7019930428559267,
                                       1.822960884928266,
                                       0.0010256621400676815]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric3_sample#9'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                  [2, 2, 2, 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, 7, 0, -6.536182288327376],
                             [12, 6, 21, 8, -3.450081350248876],
                             [20, 10, 35, 16, -1.8650932993173606]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                 'identity_factors': [0, 0, 0, 0],
                                 'noise_level': [4, 2, 7, 0],
                                 'noise_profile': { 'noise_on_init_param': { 'status':
```

```
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001.
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 18.563719034194946}},
                               { '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': [ -6.331146189926128e-17,
                                                                         0.7069927066774304,
                                                                         0.7069927066774304,
                                                                         0.7069927066774305,
                                                                         0.7069927066774304,
                                                                         1.0044153364322925,
                                                                         1.0092418692996383,
                                                                         2.470333794214341,
                                                                         2.478143749866421,
                                                                         3.5776564981759003,
                                                                         3.5776564981759003.
                                                                         3.5776564981759003,
                                                                         3.61745967653339,
                                                                         3.6981780389472076,
                                                                         3.755720232685741,
                                                                         3.9712286023902594,
                                                                         3.9712286023902594,
                                                                         4.519037432417192,
                                                                         4.519037432417193,
                                                                         4.519037432417193,
                                                                         5.280953883299406,
                                                                         5.280953883299406,
                                                                         6.620356980277175,
                                                                         6.620356980277175,
                                                                         6.620356980277175,
                                                                         6.620356980277176,
```

```
8.214004051881032,
8.214004051881032,
9.105951544537387,
10.829366164164977,
1.4490195266558639,
1.145329650589643,
-0.9374272684957279.
-1.2910248872233119,
0.9701069453007352,
2.0238893871034924,
-0.6731600678051081,
-0.7305037462514778.
0.6743483023845589,
1.611766624162738,
-0.162446688913207,
-0.2464021583836281,
1.3073653685111934,
1.560629053845934,
-0.09768282308379246,
-0.31393750682085847,
0.1625705045557987,
-0.1344649185634244.
-0.03516682581352061,
0.15934568227883428,
1.4484389719925783,
0.31346340320241645,
-1.5406853809043388,
0.3831701903776482,
0.07255447956326048,
-0.4619144712511035,
0.6220101497739178,
-0.08645510294766677,
-0.036774035023737585,
-0.02433291891195538,
1.2745777688613118,
0.806643386980706,
-0.1734465019831428,
-1.474099767063678,
-1.2534035864969235,
0.024086803725753666.
-0.5946515656594247,
3.047855036387052,
0.561263952510902,
-0.27353577574812815,
0.476385213099692.
-0.4183083264972014,
-0.07584344603997495,
-0.04004176630390785,
0.6379867024754904,
3.306912023625799,
0.6758488609505069,
-0.49379826249780634,
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808,
0.043470303912556706,
0.2301819741695647,
1.9247102260310271,
0.19401136489510468.
0.17784496580796996,
-0.12037519976757159,
0.10596613899479704,
0.02480260398862852,
0.33616247382037256,
-0.2960626605489573,
1.2038327046358004,
-0.4266046665751028
-0.14331073423696536.
0.33240571018120446,
0.13743208352564132,
0.21308235615415505,
-0.8816113951868988,
-0.03958129872975694,
```

1.7385124490728345,

```
0.7193393529381484,
                                       -0.5890148767931709.
                                       1.6845229617798814,
                                       -0.04059142172715042,
                                       -0.6588344885662398,
                                       -1.5492107393137406.
                                       0.9886630320432893,
                                       1.3955090248591298,
                                       -1.7521400718196618,
                                       -0.02012078102450614,
                                       1.5598528019020075.
                                       -0.041272015671692544,
                                       0.6659176073691222,
                                       -0.10884895615623923,
                                       -0.8860283635501729,
                                       -0.042494102069769425,
                                       -0.5241060846215897,
                                       -0.049429521011899694,
                                       -1.6158837397685775,
                                       -0.29703279066650246,
                                       0.6940812648197017.
                                       -1.0869617874060826,
                                       -1.1891726572683667,
                                       0.03935191545498333,
                                       -1.7727595774952096,
                                       -0.0005664350349098603,
                                       -1.2288438066739866,
                                       2.182693040857262,
                                       1.2648198022740724,
                                       0.636776362006322,
                                       -1.1418938134635428,
                                       0.04892386539982865,
                                       -0.6595482134655696,
                                       -0.016038133219537475,
                                       -1.53365152672916,
                                       -0.5818287115590742,
                                       -0.8537662908823758,
                                       1.3418170063691075,
                                       -0.32888813707646736.
                                       -0.018460135902194714,
                                       -0.8323242421777916,
                                       1.5026664500941838,
                                       1.809610363246633,
                                       -1.5283405786971713,
                                       0.5470095670143573,
                                       -1.4753657998350065,
                                       0.8122840148585063,
                                       1.5317878779716176]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric3_sample#5'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                 [1, 1, 1, 0],
                                                 [2, 2, 2, 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 '
```

1.3953860705003918,

```
'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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.311563719128683],
                                                               [12, 6, 21, 8, -3.2712898811023576],
                                                               [20, 10, 35, 16, -1.7533390824025292]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.0011,
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                              'run_time_sec': 18.336748838424683}},
                               { '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': [ 0.003375513600300809,
                                                                         0.4884127443235871,
                                                                         0.6719352108785641,
                                                                         0.9073170135093351,
                                                                         1.4946633690060278,
                                                                         1.5076957064847494,
                                                                         3.872917838142945,
                                                                         3.872917838142945,
                                                                         3.872917838142945,
                                                                          3.872917838142945,
```

```
5.047622474508209,
5.054336886650782,
5.067626550795242,
5.0733174878702085,
5.094629387163461,
5.749571576552799,
5.7731554023304374.
7.144946717661993,
7.144946717661993,
7.144946717661993,
7.144946717661993,
7.602314289267704.
7.602314289267704,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832,
9.661071929582006,
0.2735947252101626,
2.471262065567802.
0.18954222370300397,
0.2633058348660961,
0.07494334922808346,
1.4980157261935538,
0.3538857424122425,
0.26341770410626436,
0.17174804107002956,
-0.22912718472194316,
0.11060714764109056,
-0.30804859927082595,
2.8406850614439736,
1.0823654569610508,
0.9668529413216363,
1.8727663516543385,
-0.0901659930896485,
0.05868560690604535,
0.24212775097742179,
1.0092515209898247,
-0.7556969386491817,
0.3279350524218167,
1.078117272505244,
0.10391815458190773,
-0.7434930272741371,
-1.6965388530236032,
-1.360748554100242,
0.34939560927302815,
0.03188634842980519,
-1.2447472675125983.
0.06092342743494014,
1.017082923902293,
-1.007905562333318,
-0.8576057837691866,
0.5321038189070756,
1.300652060018237,
-1.8122591145188616,
-1.247002191580596,
1.2529274198051785,
0.3750417535596218.
0.2898066740735119,
1.589675559301449,
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883.
0.2658818907332787,
-0.9372958671062981,
```

```
-1.0664167087973948,
                           -0.7139434901419379,
                           1.3816698348804732,
                           2.008892916411081,
                           0.15285666374274742,
                           -1.782425531898792,
                           0.07791440554206944,
                           -1.28397958204954,
                           -0.7247696039786395,
                           0.5612678373457747,
                           -0.004762916486662008,
                           0.4386089298525658.
                           0.010283368626678616,
                           0.8990610129088383,
                           0.03840864905637026,
                           -1.2418081984826976,
                           0.33190310279028407,
                           0.3061008622829172,
                           -0.06950158836023225,
                           0.93859456058615,
                           -0.02489786142317165,
                           0.9927840878492759.
                           -0.0709710381209458,
                           -1.4546153026559692,
                           -0.6707274766895803,
                           1.0492831078613678,
                           1.59883886587945,
                           -0.7948795957139008,
                           0.011914265512354442,
                           0.29611851635537545,
                           -0.026452865362460363
                           0.17911271593442915,
                           -0.268102313362264,
                           -0.31698956355176716,
                           0.5150163737561883,
                           -0.2617344493849528,
                           -0.08207987775663798,
                           -0.7031192006515304,
                           0.10296103394319861,
                           -1.3322481995457,
                           -0.8096620548125795,
                           0.22894179493051453,
                           -0.6404807766018014,
                           0.5981001234262467,
                           0.6725836248662437,
                           -0.24769451099401643,
                           -1.5367942204876157,
                           0.32496629998060117,
                           0.8231756699235411,
                           0.27229759145944715.
                           -0.4283887626472357,
                           0.6783210911797265,
                           1.178917544999848,
                           -0.48124012627536317,
                           -0.23642700938756703,
                           -0.22983768395119897,
                           0.7841497681166887,
                           0.5963513861028734,
                           -0.8505831212819382,
                           0.6516631671421783.
                           0.6698405071431395,
                           0.7826636181190869,
                           -1.6023915303224998,
                           0.6733061844063541,
                           1.5755992624240989]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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'},
```

```
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                    [1, 1, 1, 0],
                                                                                    [2, 2, 2, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.397817460329862],
                                                               [12, 6, 21, 8, -3.2115716730808748],
                                                               [20, 10, 35, 16, -1.641958817033255]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4}],
                                              'run_time_sec': 18.9512722492218}},
                               { 'config': { 'ansatz': { 'gateset': 1,
                                                          'layer': 30,
                                                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0],
                                                                                        'cn': [ 0.5,
                                                                                                 0.5,
                                                                                                 0.5,
```

'file\_name\_prefix': 'AUTOMATE\_xy\_noisy\_time\_evo\_ric3\_sample#7'},

```
0.5,
                                                  0.5,
                                                  0.5],
                                          'r': 0},
                       'time': {'max': 10.0, 'min': 0.0},
                       'type': 'xy-iss'}},
'init_param': { 'value': [ 0.08591881204796584,
                           1.5026023651616802,
                           1.9179097588555833,
                           1.9179097588555831,
                           1.9179097588555831,
                           1.9179097588555831,
                           2.8800636946459592,
                           2.9523818900173797,
                           2.9523818900173797,
                           2.954896407422686,
                           3.0487820562708485,
                           3.0487820562708485,
                           3.9462134206000328,
                           3.9462134206000328,
                           5.170248653928018,
                           5.170248653928018.
                           6.5066905594049205,
                           6.5066905594049205,
                           6.5066905594049205,
                           6.914119522580601,
                           6.914119522580601,
                           6.9842551957162815,
                           7.300516913785898,
                           8.782483894556266,
                           8.782483894556266,
                           8.999633503017922,
                           8.999633503017922,
                           8.999633503017922,
                           9.414122362394847,
                           9.414122362394847,
                           0.09854676674938925,
                           -0.05173289612974198,
                           0.30094803169630163,
                           -1.1984142138894447,
                           0.08610670053567002,
                           0.2851928692216035,
                           0.26177875477440216,
                           0.11764473243628538,
                           0.3495067876706816,
                           -0.9678438601279628,
                           -0.08762050677252062,
                           0.014826088936787857,
                           -0.30347729159143555,
                           -1.1730530788097624,
                           -0.12550631929596553,
                           2.258056275075482,
                           -0.5160508087356981,
                           0.004541093619226378,
                           -0.9345420797218197,
                           0.47154522212338745,
                           -0.9129446894819914,
                           0.2768683391341781,
                           0.29975752794333804,
                           -0.16177915588279423,
                           0.6021148977823381,
                           0.35405737535162146,
                           0.8149645603473178,
                           -0.7074306860917636,
                           -0.8281028342440522,
                           -0.20840122350984505,
                           -0.19593362207831977,
                           1.2208184674045053,
                           -0.10408257731449277,
                           0.9878855326441833,
                           0.6508295623732647,
                           -0.31520021014255994,
                           -1.502007043998756,
                           -0.44913621684685756,
                           -0.2831231513937543,
```

```
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521,
0.5925479388494825,
0.1500100176310508,
-0.4655542365338734,
0.09847924242741647.
-0.25695620197439545,
-0.5449201592551612,
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243.
-0.8246572495389679,
-0.28480932751570914,
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
-0.035476380392734465,
0.9940259955458774,
-0.657126951929564,
-0.4786936406484008.
1.4564140457987391,
-1.062151832750044,
-0.01496017231630948,
0.16259290081999456,
0.601493806263198,
-0.20485253219607644,
-1.2421776762345744,
1.152288606322054,
1.1883019471730756,
0.9817659575699377,
0.9653429636905305,
0.5382122852444811,
0.722384759736696,
-0.13079560936986118,
-0.9638314109375934,
-0.13358671856975504,
-0.3949417844115237,
1.01780227278121.
0.6746960094686067,
0.14295933107831804,
-0.37974724013569766,
0.3641245559377578,
0.12972678280008856,
0.5949873255000262,
0.8499370211382984,
-0.0792654431528575,
1.9402087793428133,
-0.5583113020357903,
0.6535986429024293,
1.0008805619835928,
0.16556690201288055,
1.1071973338235597,
0.07194244573338314.
-0.9146859400815048,
-0.005186820541518637,
0.4795762978809806,
0.6475066336984044,
0.11860845746693519.
0.08044881503693782,
0.5402817334108434,
1.5532870492056725,
0.36643388228039625,
1.6150985923432208,
0.22271977417212363,
-0.04956133994172771,
-0.6258533610916538,
-0.6517224443292691,
0.2594825887888975,
-0.1286341552665023,
0.48749759828242367,
-0.009813928289633511.
0.5249350004928881,
-0.01015655683116892,
```

```
-0.588311268126242,
                                                                         -0.25978871509233853,
                                                                         0.9039610340757382,
                                                                         1.5549616218831699,
                                                                         -0.05330158954092406]},
                                             'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric3_sample#3'},
                                             'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                   [1, 1, 1, 0],
                                                                                   [2, 2, 2, 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, 7, 0, -6.4104927992121],
                                                              [12, 6, 21, 8, -3.25771336700167],
                                                              [20, 10, 35, 16, -1.674813432318219]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0},
                                                                                      'noise_prob': [ 0.001,
                                                                                                      0.001,
                                                                                                      0.001,
                                                                                                      0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0 } ,
                                                                                      'noise_prob': [ 0.001,
                                                                                                      0.001,
                                                                                                      0.001,
                                                                                                      0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
```

-0.48671658518654837,

'value':

```
0},
```

```
'noise_prob': [ 0.001,
                                                                         0.001,
                                                                         0.001,
                                                                         0.001],
                                                         'status': True,
                                                         'type': 'depolarizing'},
                                     'odd_wires': 4}],
               'run_time_sec': 17.06001567840576}},
\{ \text{ 'config': } \{ \text{ 'ansatz': } \{ \text{ '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': [ 0.00030922277578629,
                                           0.881375055029912,
                                           0.881375055029912,
                                           0.8813750550299119,
                                           0.9803845151714838,
                                           0.9803845151714838,
                                           1.201629973822729,
                                           1.2441077564052723,
                                           1.8660677974280824,
                                           1.8660677974280824,
                                           2.651002314516478,
                                           2.651002314516478,
                                           3.233637461790533,
                                           4.36384995486056,
                                           4.36384995486056,
                                           4.975714528653046,
                                           4.975714528653046,
                                           6.591840750700408,
                                           6.591840750700408,
                                           8.234009055219385,
                                           8.238223602720305,
                                           8.238223602720305,
                                           8.238223602720305,
                                           8.903406631369169,
                                           8.903406631369169,
                                           8.903406631369169,
                                           9.126449234760914,
                                           9.126449234760914,
                                           9.441918167657187,
                                           9.441918167657187,
                                           0.4384156956352651,
                                           -0.017407483354635628,
                                           -0.13579407977759564,
                                           -0.08181457210659056,
                                           -0.5635031413839604,
                                           0.570197125887921,
                                           -0.07389454022208618,
                                           0.18950484918514415.
                                           0.23442314823895152,
                                           0.5187197914643009,
                                           0.03760777637611914,
                                           1.2080522066616035,
                                           -0.006796933498365149,
                                           0.7597395812711474,
                                           0.3165595784185247,
                                           0.09234381717322694,
                                           -0.047116958459538144,
                                           0.02161370846364295,
                                           -0.3330735946096464,
                                           -0.310519881157395,
                                           -0.1321730433969341,
                                           -0.32004747583182785,
```

0.38880240494533963,

```
0.5587916266845782,
-0.04068226055752174,
-0.04929253976644778.
0.7350044083650977,
-0.3347542084226466,
0.07994172439872818,
0.177027499128215.
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313.
-1.8841797053563085,
-0.39250057722196113,
0.0604718224769807,
-0.15658247224402194,
1.097732135880844.
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626.
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875,
-0.29954118659750983,
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
0.32920686175801595,
0.0470036094807545,
0.6942117349751494,
-0.24738597040458754,
-0.3530344251488351,
-0.7207866325012796,
0.6865004571010461,
-0.022934954570734595.
-0.4703523591474931,
0.00010065187353926284,
-0.25737840979321513,
-0.37927040299996573,
0.3323512575736423.
-0.7162822410895011,
-0.8849129065134153,
-0.02984860970928172,
0.9857401879405846,
0.13869536095324345,
-0.4901093246549395,
-0.15185390643388375,
-1.1107951730061545,
1.1255217267520845,
-0.36113008327046914,
0.12498769155032201,
1.105653484876161,
-0.0826241142760939,
-0.6079720837354008,
-0.4798331114275297,
-1.1230771992973987,
0.13634359721928585,
-1.0117198549615587,
0.0420371772323395,
0.4704689604818435,
-0.1136051809968673,
-0.4158299646895606,
0.7682233881623428,
-0.8567828943049521,
```

-1.0844985071567337,

```
0.8118563616911731,
                                                                         -1.0011580890685694,
                                                                         0.06773503500153778.
                                                                         -0.9972068257582826,
                                                                         0.22064841214728595,
                                                                        1.015101892093672,
                                                                         -0.023903188302909387.
                                                                         -1.5448535965900865,
                                                                         0.40727537812840897,
                                                                         0.6273868528756265,
                                                                         -0.06403282214251436,
                                                                         0.1402221940396834,
                                                                         0.011807494022614938,
                                                                         0.19970219531306482,
                                                                        -0.3159297567283321,
                                                                         0.5243897804672414,
                                                                        0.6302439365729751,
                                                                         0.4184253509022523,
                                                                         0.38422115408735924,
                                                                         0.8610939738936156,
                                                                         0.3457693810952046,
                                                                         0.19105880264763628]},
                                             'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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],
                                                                                'r': 1},
                                                              'def': 'ising'},
                                             'output': {    'draw': {'fig_dpi': 100,    'status': False,    'type': 'png'},
                                                         'file_name_prefix':
'AUTOMATE_xy_noisy_time_evo_ric3_sample#10'},
                                             'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                   [1, 1, 1, 0],
                                                                                   [2, 2, 2, 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, 7, 0, -6.5111758480272135],
                                                              [12, 6, 21, 8, -3.513108400075424],
                                                              [20, 10, 35, 16, -1.9256894730075684]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                  'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                'value':
0 } ,
                                                                                      'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
```

```
'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 18.43172597885132}},
                               { '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': [ 0.3773346757087749,
                                                                         0.5734233884194113,
                                                                         0.5734233884194113,
                                                                         1.2094818154974225,
                                                                         1.2528672337957094,
                                                                         1.3073966674132076,
                                                                         4.193348178434801,
                                                                         4.228670385547864,
                                                                         4.228670385547864,
                                                                         4.228670385547864,
                                                                         4.228670385547864,
                                                                         4.228670385547864,
                                                                         4.274742575727675,
                                                                         5.343872214974395,
                                                                         5.354523589318104,
                                                                         5.449133113124401,
                                                                         5.449133113124401,
                                                                         5.449133113124401,
                                                                         5.449133113124401,
                                                                         6.208341300319731,
                                                                         6.208341300319731,
                                                                         6.738723848778546,
                                                                         6.7473872692498285,
                                                                         8.515456463543387,
                                                                         8.552181104315652,
                                                                         8.552181104315652,
                                                                         8.552181104315652,
                                                                         9.363042150968939,
                                                                         9.363042150968939,
                                                                         11.478464454984158,
                                                                         -0.2683676450988651,
                                                                         -0.9370321768196137,
                                                                         0.03790413469005285,
                                                                         -0.3520989510779511,
                                                                         0.5131804204688105,
```

0.767748989456867,

```
-1.1529933056041268,
1.0195402939041247,
-0.5189860890713169,
1.700377968800765,
0.48912124484584857,
1.506730848787325,
0.4485612726223177.
-1.6248073049289613,
0.10079320215400162,
1.7454590745233427,
1.474284546585253,
0.08837986403943651.
1.215839965531947,
-0.42666568442503866,
0.04298065245990749,
-1.495484471060033,
0.39055472334393304,
-0.06187227108331559,
1.0010296249342066,
-0.33745943355443286,
-0.19046242319241546,
-0.4884459619425607.
0.8930564792122229,
0.09947441181287657,
-1.4049039336860292,
1.0413688199593338,
0.027348986225077598,
1.5457890290583323,
0.8022774572900748,
-1.0377116853398,
0.5652694406258009,
0.9990396087940023,
-0.3409174955760714,
-0.8590373420111477,
0.3662952964918326,
0.6492392290096071.
-1.0735392409833318,
-0.620775369578654,
0.5064494688850749,
0.6065178361322348.
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637,
0.13897118193917846,
0.13192395570874205,
-0.560408177185694.
-0.7293430452459922,
1.2393938765994381,
0.16520016983754293,
-0.04218705839108043,
1.9844775109402493,
-0.40811731341033075,
0.40494641878472026,
0.44317505546879765,
-0.14541224425415586,
-1.3628454492957067.
0.35572573997739254,
-0.17363781014762678,
-0.21765464091811726,
0.25867396534698067,
-0.19299239511743832,
0.842583631219517,
0.01538577194684443,
-1.3780712180305699,
0.30168991607554185,
0.03816118508668757,
-0.6330896266111891,
-0.14462412237866193,
0.22751230177420415.
2.198362599080823,
0.5538971259685714,
```

```
0.01161307703421222,
                                        0.15241612900647253.
                                        -0.4114895408906573,
                                       0.020024246948836234,
                                       -0.361021382333633,
                                       1.2366726872792735.
                                       -0.8652479233612058,
                                        -0.38157323774943186,
                                        -1.2043495043519374,
                                        0.03294448415473864,
                                       1.864475600371399.
                                       -0.048446953541905424,
                                       1.483038428004856,
                                       0.02119809714572118,
                                       -0.20756566215919184,
                                       1.2566509021622863,
                                       0.4040298326697209,
                                        0.0492062183426151,
                                       0.3396501220758691,
                                       0.09097515161528406,
                                       -0.4545275805495163.
                                       1.5327906096069877,
                                       -0.47568898039994184,
                                       0.7447654713950665,
                                       0.7179833985093875,
                                       -0.03692927531761856,
                                        0.11509825242982577,
                                       0.020898935398901888,
                                       0.2387893529411216,
                                       1.5195379458286031,
                                       -0.5337205856413728,
                                       -0.5741707032781822,
                                       1.298358172715442,
                                       -0.010829860462227588,
                                       -1.9037204771139875,
                                       1.5774751765228583,
                                       -0.28550943128124906,
                                       1.5531884118568244]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric3_sample#4'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                  [2, 2, 2, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
'output': { 'data_points': [ [4, 2, 7, 0, -6.44845457619454],
                             [12, 6, 21, 8, -3.24468946816992],
                             [20, 10, 35, 16, -1.686607616211824]],
```

1.6735676153080048,

```
'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 17.2414448261261}},
                               { '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': [ -5.647934061474703e-18,
                                                                         1.4787834906243755,
                                                                         1.478918229526628,
                                                                         1.478918229526628,
                                                                         2.0077351764243123,
                                                                         2.4302809101456218,
                                                                         2.4302809101456218,
                                                                         3.009709563144601,
                                                                         3.009709563144601,
                                                                         3.239471043198664,
                                                                         3.2405283031129133,
                                                                         3.2405283031129133,
                                                                         3.2656598154222434,
                                                                         3.5353392937639825,
                                                                         6.198713539858257,
                                                                         6.213604956994236,
                                                                         6.73397854893658,
                                                                         6.73397854893658,
                                                                         6.743547791194661,
                                                                         6.744609103740889,
```

```
6.744609103740889,
6.749543065628153,
6.749543065628153.
8.615256229309818,
8.635090640841518,
9.012323512360366,
9.012323512360366.
9.930483613907942,
9.930483613907942,
11.782061805135282,
0.6870051227789642,
0.5234095533264759,
0.11216801162302814,
0.044591843687496906,
-0.747159787599118,
1.5727279855217766,
-0.16958009141159439,
-0.7234855106318131,
0.45999589631996707,
1.3613822619347415,
0.5234464983029046,
0.18337466193510712.
1.0660408011194182,
1.2813123812864906,
0.34899885807903364,
1.2204971120849089,
0.37250493843195553,
0.3861568591798728,
-0.4881036169368887,
0.23720347697856276,
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716,
0.5103741134651811,
-0.48491784736765847,
-1.939727949979543,
0.5221979500550953,
-0.39618913325979604,
-0.5258671175956018,
0.08753210163723862,
1.3619602585721242,
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274.
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961,
0.4198375873878555,
0.5765253059135943.
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473,
0.4465655907565091,
-1.4308928069625704.
1.6254306194316424,
-0.16298810299835312,
-1.249293985363804,
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616,
-1.1357659634071433,
-0.5734897531715744,
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403,
0.06392732561319403,
0.7711512775812011,
-1.8472478314151175,
-0.46160141905881696,
1.8963279721150403,
-2.313663424814036,
0.060952702837845166,
```

-1.4971949982077863,

```
1.3040610818975555,
                           0.10605679464403613,
                           -1.138800572315487,
                           -0.03947636943653289,
                           0.07839455865010819,
                           -0.6470277815644087,
                           0.946101637008616.
                           -0.32144060478582315,
                           -0.6371693991779968,
                           0.30580409265523,
                           -0.2617129381706641
                           0.4094287336545931.
                           0.49837362733711055,
                           -0.9058714721495094,
                           0.6137893604415533,
                           0.8546844695081749,
                           -0.8205470722456557,
                           -0.598852289145785,
                           0.46823811794119646,
                           1.2205247300232143,
                           0.031629319060699435,
                           1.1369587010491427.
                           0.12298062775535874,
                           -0.016960252964031076,
                           1.1127338626212067,
                           0.37972118532018134,
                           -0.1475616440844684,
                           0.32749925367563326,
                           0.030050642250761914,
                           0.17169542743574548,
                           -0.5825729547476518,
                           0.7052714548722974,
                           0.9884296874822006,
                           -0.500384308215816,
                           0.01722431287494931,
                           0.40290712722731054,
                           -0.029200452046427447,
                           1.2704708243944813,
                           2.3709704014259345,
                           -2.0267551524865275.
                           0.7347873374577798,
                           -0.34767223966060473,
                           0.009778943736386289,
                           0.221000841842164,
                           -0.010995780695540691,
                           -0.481889271583797,
                           0.7008500159073542,
                           2.3944065221124076,
                           -0.08320445199579081,
                           2.02470278988152,
                           0.02142760118000664,
                           1.6794429086669174,
                           1.6046551807968945,
                           0.2831685070910348,
                           1.5805135598594935]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric3_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.429933051303131],
                                                               [12, 6, 21, 8, -3.199071961215845],
                                                               [20, 10, 35, 16, -1.635137691104089]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001.
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001.
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.0011,
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                              'run_time_sec': 18.288968086242676}}],
               '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': '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': 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_noisey_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': [ 3.5476707600867368,
                                      2.3562053879970173,
                                      1.7833099820235232,
                                      2.4654982864165467.
                                       3.6613143494662093,
                                      3.6462371631182062,
                                      3.2935768662401737,
                                      3.7145398712422657,
                                      2.5227446974102397,
                                      2.4756634278387035],
            'noise_details': { 'gates_num': [4, 1, 1, 0],
                               'identity_factors': [0, 0, 0, 0],
                               'noise_level': [4, 2, 7, 0],
                               'noise_profile': { 'noise_on_init_param': { 'status': False,
                                                                             'value': 0},
                                                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                   'status': True,
                                                   'type': 'depolarizing'},
                               'odd_wires': 4},
            'optimized_minimum_cost': [ -6.515742960091897,
                                        -6.3330055816107915,
                                        -6.410492799212151,
                                        -6.4484545761945915,
                                         -6.311563719128753,
                                         -6.46067826504545,
                                         -6.397817460329919,
                                        -6.429933051303193.
                                        -6.536182288327426.
                                         -6.511175848027232],
            'optimized_parameters': [ [ 1.5680106786222674e-17,
                                        1.0238650999177359,
                                        1.0238650999177359.
                                        1.0238650999177359,
                                        1.7041550191762513,
                                        2.070931805530806,
                                        2.586234954306046,
                                        2.6265616878606783.
                                        2.7566136785306155,
                                        2.7689271757054255,
                                        4.271831894498143,
                                        4.271831894498143,
                                        4.271831894498143,
                                        5.004110362344359,
                                        5.004110362344359,
                                        5.529689350278954,
                                        5.529689350278954.
                                        5.529689350278954,
                                        5.5493166460873375,
                                        7.855838962179162,
                                        7.855838962179162,
                                        8.508023697610218,
                                        8.540796404638465,
```

```
8.940056981382925,
8.940056981382925,
8.940056981382925.
8.940056981382925,
9.524293982069336,
9.524293982069336,
9.815045396471412.
0.717685470636315,
0.29125971197830336,
0.013619559122678915,
-0.46174394022911175,
-0.7802589318548062.
1.8785332138943256,
-0.07718385116900997,
-0.4181315830102034,
0.3859499067718677,
0.7218523694763775,
0.16350787496293626,
-0.06274337543165032,
1.048639096314506,
0.9454500907927006
-0.18328208251477485.
0.5336296017995852,
0.7047960543548563,
-0.4717130073686535,
-0.14327049451726778,
0.5646728024946054,
0.1377201649736573,
1.0845662084088512,
0.7117671017527167,
1.8562916393289055,
-1.0958742208007046,
0.314756410152813,
1.0055290931424188,
-1.2653176839886926,
-0.6435463058390287,
-0.13689785210195535,
0.5185042269644529,
-0.07994120596020922,
-1.3394312085309903,
-0.01354724643952521,
-0.8508707890759795,
-0.7258020036409927,
-0.1513648764845159,
-0.5702686618598916.
-0.20804467461705725,
-0.059043388294177074,
0.9724468840137966,
1.6889388278999584,
0.19460354666786345,
1.52688995899303,
0.40690710189505636,
0.054839646577847824,
-1.9384169999074634,
-0.8955556931339368.
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788
-0.008629533947631484,
1.3318794505555018.
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042,
0.6437292330207226,
0.02590432636550948,
0.44592066957482307,
-0.0809779454755679,
-1.1390483539597829,
0.4898473400025203,
0.11381426982162568,
0.6089836387514223.
0.17594570893388972,
0.012948010393531988,
```

```
-0.547404644839424,
 0.028969189369927453,
 1.1006601522977721.
 -0.6406183594181203,
 -0.12562720825840668,
 2.0392738219317867,
 0.9906966768182601.
 0.03179376057566713,
 1.5460159269414353,
  -0.01674613470972367,
  -1.1841027420803907,
 0.24496917335434354,
 -0.07332300856328518,
 0.25897293698241475,
 0.35918978324443196,
 -0.007942172382781155,
 0.4618323110818234,
 -0.08547471514820712,
  -0.5115221242285567,
 0.4563488682048878,
 -1.2086759202201718,
 0.14282176979415442.
 0.48263581465206523,
 0.09855500655515351,
 0.5327824526475502,
 -0.19110982084320108,
 -0.775795154813047,
  -0.31907838177549175,
 0.03477100089693282,
 0.7436201132387485,
 -0.022209896476399357,
 -0.14741027177548285,
 -0.10110024079398225,
 0.20359400710495562,
 -0.15623022021775929,
 0.1964090589605299,
 0.18042072654891128,
 0.8910666012551952,
 0.03518277211157266,
 0.11858050209575345.
 0.6912090997145024,
 0.05142750966379351,
 1.2523961498884204,
 -1.1477698487953947,
 -0.16063831357643202.
 -1.0074319345942784,
 0.29535289246662044,
  -0.002280412475169233,
 0.45599081133710123,
 -1.6715207166067523,
 0.3320227490012926,
 1.5421306314740455],
[ 0.33528943002425843,
 0.8608925283648261,
 2.8309935233222867.
 2.8382233121900358,
  2.847558790018716,
 2.8477263794127468,
 3.9337993695450666,
 3.9337993695450666.
 3.9337993695450666,
 3.9337993695450666,
 3.9337993695450666,
 5.127462455084763,
 5.128383696390232,
 5.132051241075024,
 5.132231848473024,
 5.132297186784173,
 5.132297186784173,
 5.132297186784173,
 5.132320898992942,
 5.134903164275234,
 5.734798022200061,
 5.734798022200061,
```

5.734798022200061,

```
6.71748919093495,
6.71748919093495,
9.773430860122208,
9.791656954875775,
9.791980525916317,
9.804782964874805,
9.947289619134542.
0.6818618664375632,
0.42253658736184846,
0.19067339209915313,
-2.314563573529872,
-1.7784854373672185.
-0.10945476580518654,
0.08980428543050965,
0.6265702304745648,
-0.12016219313034968,
0.005450784512528824,
0.9621316606784164,
-0.01940541263687908,
-1.2890091107885369,
-0.09216272929775945,
-0.8615487717558121.
0.021600758375482327,
1.1068545366678577,
-0.06436428812394061,
-1.8186253546793636,
-0.2455724158610742,
0.7444478114283775,
1.0647343146888184,
-1.6388802958603008,
-0.05032235091912311,
0.7589104637111997,
0.0934759886788552,
0.7280377617711271,
-0.10012682423470079,
-2.7917715562202794,
0.5843828201862561,
1.2003794612588048,
-0.2782652692858759,
1.253725179404932,
-0.831140674623039,
-1.3898002860152843,
1.7689493816619246,
-0.768539740515663,
-0.5265628815801298.
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446,
0.06348552937029919,
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522,
-0.5743460857513.
0.873550995352649,
0.8797938271812764,
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805.
-0.4012501825920459,
-0.4763388197192611,
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537,
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616,
0.6716489600966955,
0.08900519900900147,
0.7708643633651343,
0.0944251249629154,
-0.053131619179539805,
```

```
-0.132883145931867,
 0.44414428660563765,
 -0.3164026614336652,
 0.9835391768228284,
  -0.49696354121947833,
 0.3510514174127117,
 -0.24991518010085176,
 -0.7780713458689107,
 1.3387260017849976,
 0.712191280671364,
  -0.4436070432657242,
 1.090195713122469.
 0.3876483875477464,
 1.113683201871723,
 0.09724940056823322,
 -1.3265075307540413,
 -1.8530581309545013.
 0.335564434910613,
 0.16061631243062188,
 0.6994545842241634,
 -0.0055568765936962455,
 1.8148369905661879.
 -0.9149620921846291,
 -0.5341673651010566,
 -0.6583203681162046,
 -0.05148037848607484,
 -0.1302834828824637,
 -0.2083684341417298,
  -0.7142637766159184,
 0.4980789266978527,
 -2.030263033934291,
 -0.002330467371510849,
 -0.7835259213136883,
 -0.18712783689065152,
 -0.271594041353006,
 0.606962231033315,
 0.19917323339650786,
 0.581852597021436,
 1.0547240409345577,
 0.07111303544026976,
 1.4877210254684077,
 0.08669172360020491,
 0.8024105605127613,
 0.8315802366658298,
 1.117305276662395,
 -1.0742437197416552,
 0.30921812342286065,
  -0.06994991433225481,
 1.0419800264617582,
 1.4507701003592177.
 0.2408413974211676,
 1.6573761327725358],
[ 0.08591881204796584,
 1.5026023651616802,
 1.9179097588555833.
 1.9179097588555831,
 1.9179097588555831,
 1.9179097588555831,
 2.8800636946459592,
 2.9523818900173797.
 2.9523818900173797,
 2.954896407422686,
 3.0487820562708485,
 3.0487820562708485,
 3.9462134206000328,
  3.9462134206000328,
 5.170248653928018,
 5.170248653928018,
 6.5066905594049205.
 6.5066905594049205,
 6.5066905594049205,
 6.914119522580601,
 6.914119522580601.
 6.9842551957162815,
```

7.300516913785898,

```
8.782483894556266,
8.782483894556266,
8.999633503017922.
8.999633503017922,
8.999633503017922,
9.414122362394847,
9.414122362394847.
0.09854676674938925,
-0.05173289612974198,
0.30094803169630163,
-1.1984142138894447,
0.08610670053567002.
0.2851928692216035,
0.26177875477440216,
0.11764473243628538,
0.3495067876706816,
-0.9678438601279628,
-0.08762050677252062,
0.014826088936787857,
-0.30347729159143555,
-1.1730530788097624,
-0.12550631929596553.
2.258056275075482,
-0.5160508087356981,
0.004541093619226378,
-0.9345420797218197,
0.47154522212338745.
-0.9129446894819914,
0.2768683391341781,
0.29975752794333804,
-0.16177915588279423,
0.6021148977823381,
0.35405737535162146,
0.8149645603473178,
-0.7074306860917636,
-0.8281028342440522,
-0.20840122350984505,
-0.19593362207831977,
1.2208184674045053,
-0.10408257731449277,
0.9878855326441833,
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756,
-0.44913621684685756,
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521,
0.5925479388494825,
0.1500100176310508,
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612.
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243,
-0.8246572495389679
-0.28480932751570914.
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
-0.035476380392734465,
0.9940259955458774,
-0.657126951929564,
-0.4786936406484008
1.4564140457987391,
-1.062151832750044,
-0.01496017231630948,
0.16259290081999456,
0.601493806263198,
-0.20485253219607644,
-1.2421776762345744,
```

```
1.152288606322054,
 1.1883019471730756,
 0.9817659575699377.
 0.9653429636905305,
 0.5382122852444811,
 0.722384759736696,
 -0.13079560936986118.
 -0.9638314109375934,
 -0.13358671856975504,
  -0.3949417844115237,
 1.01780227278121,
 0.6746960094686067.
 0.14295933107831804,
 -0.37974724013569766,
 0.3641245559377578,
 0.12972678280008856
 0.5949873255000262.
 0.8499370211382984,
  -0.0792654431528575,
 1.9402087793428133,
 -0.5583113020357903,
 0.6535986429024293.
 1.0008805619835928,
 0.16556690201288055,
 1.1071973338235597,
 0.07194244573338314,
 -0.9146859400815048,
  -0.005186820541518637,
 0.4795762978809806,
 0.6475066336984044,
 0.11860845746693519,
 0.08044881503693782,
 0.5402817334108434,
 1.5532870492056725,
 0.36643388228039625,
 1.6150985923432208,
 0.22271977417212363,
  -0.04956133994172771,
 -0.6258533610916538,
 -0.6517224443292691,
 0.2594825887888975,
 -0.1286341552665023,
 0.48749759828242367,
 -0.009813928289633511,
 0.5249350004928881.
 -0.01015655683116892,
  -0.48671658518654837,
  -0.588311268126242,
  -0.25978871509233853,
 0.9039610340757382.
 1.5549616218831699,
  -0.05330158954092406],
[ 0.3773346757087749,
 0.5734233884194113,
 0.5734233884194113.
 1.2094818154974225,
 1.2528672337957094,
 1.3073966674132076,
 4.193348178434801,
 4.228670385547864,
 4.228670385547864,
 4.228670385547864,
 4.228670385547864,
 4.228670385547864.
 4.274742575727675,
 5.343872214974395,
 5.354523589318104,
 5.449133113124401,
 5.449133113124401,
 5.449133113124401,
 5.449133113124401,
 6.208341300319731,
 6.208341300319731.
 6.738723848778546,
```

6.7473872692498285,

```
8.515456463543387,
8.552181104315652,
8.552181104315652.
8.552181104315652,
9.363042150968939,
9.363042150968939,
11.478464454984158,
-0.2683676450988651,
-0.9370321768196137,
0.03790413469005285,
-0.3520989510779511,
0.5131804204688105.
0.767748989456867,
-1.1529933056041268,
1.0195402939041247,
-0.5189860890713169,
1.700377968800765.
0.48912124484584857,
1.506730848787325,
0.4485612726223177,
-1.6248073049289613,
0.10079320215400162.
1.7454590745233427,
1.474284546585253,
0.08837986403943651,
1.215839965531947,
-0.42666568442503866.
0.04298065245990749,
-1.495484471060033,
0.39055472334393304,
-0.06187227108331559,
1.0010296249342066,
-0.33745943355443286,
-0.19046242319241546,
-0.4884459619425607,
0.8930564792122229,
0.09947441181287657,
-1.4049039336860292,
1.0413688199593338,
0.027348986225077598.
1.5457890290583323,
0.8022774572900748,
-1.0377116853398,
0.5652694406258009,
0.9990396087940023,
-0.3409174955760714,
-0.8590373420111477,
0.3662952964918326,
0.6492392290096071,
-1.0735392409833318.
-0.620775369578654,
0.5064494688850749,
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054.
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637.
0.13897118193917846,
0.13192395570874205,
-0.560408177185694,
-0.7293430452459922,
1.2393938765994381,
0.16520016983754293,
-0.04218705839108043,
1.9844775109402493,
-0.40811731341033075,
0.40494641878472026,
0.44317505546879765,
-0.14541224425415586,
-1.3628454492957067,
0.35572573997739254,
```

-0.17363781014762678,

```
-0.21765464091811726,
 0.25867396534698067,
 -0.19299239511743832.
 0.842583631219517,
 0.01538577194684443,
 -1.3780712180305699,
 0.30168991607554185.
 0.03816118508668757,
 -0.6330896266111891,
  -0.14462412237866193,
 0.22751230177420415,
 2.198362599080823.
 0.5538971259685714,
 1.6735676153080048,
 0.01161307703421222,
 0.15241612900647253,
 -0.4114895408906573.
 0.020024246948836234,
  -0.361021382333633,
 1.2366726872792735,
 -0.8652479233612058,
 -0.38157323774943186.
 -1.2043495043519374,
 0.03294448415473864,
 1.864475600371399,
 -0.048446953541905424,
 1.483038428004856,
 0.02119809714572118,
  -0.20756566215919184,
 1.2566509021622863,
 0.4040298326697209,
 0.0492062183426151,
 0.3396501220758691,
 0.09097515161528406,
 -0.4545275805495163,
 1.5327906096069877,
 -0.47568898039994184,
 0.7447654713950665,
 0.7179833985093875,
 -0.03692927531761856,
 0.11509825242982577,
 0.020898935398901888,
 0.2387893529411216,
 1.5195379458286031,
 -0.5337205856413728.
 -0.5741707032781822,
 1.298358172715442,
  -0.010829860462227588,
  -1.9037204771139875,
 1.5774751765228583,
 -0.28550943128124906,
 1.5531884118568244],
[ -6.331146189926128e-17,
 0.7069927066774304,
 0.7069927066774304.
 0.7069927066774305,
 0.7069927066774304,
 1.0044153364322925,
 1.0092418692996383,
 2.470333794214341.
 2.478143749866421,
 3.5776564981759003,
 3.5776564981759003,
 3.5776564981759003,
 3.61745967653339,
  3.6981780389472076,
  3.755720232685741,
 3.9712286023902594,
 3.9712286023902594.
 4.519037432417192,
 4.519037432417193,
 4.519037432417193,
 5.280953883299406.
 5.280953883299406,
```

6.620356980277175,

```
6.620356980277175,
6.620356980277175,
6.620356980277176,
8.214004051881032,
8.214004051881032,
9.105951544537387,
10.829366164164977.
1.4490195266558639,
1.145329650589643,
-0.9374272684957279,
-1.2910248872233119,
0.9701069453007352.
2.0238893871034924,
-0.6731600678051081,
-0.7305037462514778,
0.6743483023845589,
1.611766624162738.
-0.162446688913207,
-0.2464021583836281,
1.3073653685111934,
1.560629053845934,
-0.09768282308379246.
-0.31393750682085847,
0.1625705045557987,
-0.1344649185634244,
-0.03516682581352061,
0.15934568227883428,
1.4484389719925783,
0.31346340320241645,
-1.5406853809043388,
0.3831701903776482,
0.07255447956326048,
-0.4619144712511035,
0.6220101497739178,
-0.08645510294766677,
-0.036774035023737585,
-0.02433291891195538,
1.2745777688613118,
0.806643386980706,
-0.1734465019831428,
-1.474099767063678,
-1.2534035864969235,
0.024086803725753666,
-0.5946515656594247,
3.047855036387052,
0.561263952510902,
-0.27353577574812815,
0.476385213099692,
-0.4183083264972014
-0.07584344603997495.
-0.04004176630390785,
0.6379867024754904,
3.306912023625799,
0.6758488609505069,
-0.49379826249780634.
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808,
0.043470303912556706,
0.2301819741695647,
1.9247102260310271,
0.19401136489510468,
0.17784496580796996,
-0.12037519976757159,
0.10596613899479704,
0.02480260398862852,
0.33616247382037256,
-0.2960626605489573,
1.2038327046358004,
-0.4266046665751028,
-0.14331073423696536,
0.33240571018120446.
0.13743208352564132,
```

0.21308235615415505,

```
-0.8816113951868988,
 -0.03958129872975694,
 1.7385124490728345.
 1.3953860705003918,
 0.7193393529381484,
 -0.5890148767931709,
 1.6845229617798814,
 -0.04059142172715042,
 -0.6588344885662398,
  -1.5492107393137406,
 0.9886630320432893,
 1.3955090248591298.
 -1.7521400718196618,
 -0.02012078102450614,
 1.5598528019020075,
 -0.041272015671692544,
 0.6659176073691222.
 -0.10884895615623923,
  -0.8860283635501729,
  -0.042494102069769425,
 -0.5241060846215897,
 -0.049429521011899694.
 -1.6158837397685775,
 -0.29703279066650246,
 0.6940812648197017,
 -1.0869617874060826,
 -1.1891726572683667,
 0.03935191545498333,
  -1.7727595774952096,
 -0.0005664350349098603,
  -1.2288438066739866,
 2.182693040857262,
 1.2648198022740724,
 0.636776362006322,
 -1.1418938134635428,
 0.04892386539982865,
 -0.6595482134655696,
  -0.016038133219537475,
  -1.53365152672916,
 -0.5818287115590742,
 -0.8537662908823758,
 1.3418170063691075,
 -0.32888813707646736,
 -0.018460135902194714,
 -0.8323242421777916,
 1.5026664500941838,
 1.809610363246633,
  -1.5283405786971713,
 0.5470095670143573,
 -1.4753657998350065,
 0.8122840148585063,
 1.5317878779716176],
[ 3.750846163374531e-05,
 0.22285241391868899,
 0.26252411232084344.
 0.26252411232084344,
 0.26252411232084344,
 1.459545906754556,
 1.4595459067545562,
 1.6094835194149661.
 2.5927782099427628,
 2.5927782099427628,
 2.5927782099427628,
 2.5927782099427623,
 3.3552499939702187,
 3.3552499939702187,
 5.033284106467877,
 5.033284106467877,
 5.056477210452712.
 6.768913439946703,
 6.768913439946703,
 7.2782492670747585,
 7.2782492670747585.
 7.2782492670747585,
```

7.2782492670747585,

```
7.2782492670747585,
7.2782492670747585,
8.934198246659292,
8.937369801451712,
9.544406408519471,
9.544406408519471,
10.23170722265548.
-0.4501443853573418,
0.06519513561037263,
-0.13386490845883003,
-0.01542333988020039,
0.3988203537526196.
0.9163371790808124,
0.08159154039220383,
-0.11665429084087826,
-0.21130662780886203,
1.515236372470638.
0.4436142129357345,
-0.28780404896369716,
0.3681425383234808,
0.648176841676201,
0.3046875502986337.
0.05897820457762899,
0.09316951897603123,
1.5277657654344678,
-0.655141628591867,
0.073084468489131,
-0.11423944001370272,
0.3986898081963471,
1.0974832156349317,
1.8462557861113,
0.5998463368708868,
-0.0014214294560794885,
0.4026665434776887,
-0.03860309342262787,
0.3728818533964108,
1.7322816292529104,
0.42156018976657544,
0.9872712539907578,
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974,
0.4324416138472369,
0.7909276553155474.
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866,
-0.0743310361925915,
1.1363109745761366.
0.32003332101567866,
0.08535303128967886,
1.1165485958252095,
0.476282782575683,
0.11414859665640108.
0.8927652783900955,
0.027791184984770272,
0.8970588198442948,
-0.04579755391586939,
0.10596016247070955.
0.4721342517962854,
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702,
0.2928189752635581,
-0.4120973709154422,
-0.16251962266938982,
-0.928532755338732,
0.13709877636127538,
0.09386847134985479,
-0.9415336108192559,
-1.3861285848764584,
0.5116476525314603,
-1.5694556777668651,
```

```
0.31948518026769196,
 -0.0136576069296156,
 0.8752899744519326.
 -0.448175539102687,
 -0.8567162669878051,
 0.737642795798484,
 -0.5233142967805873.
 -0.020239952918795164,
 0.9696407297918527,
 1.064479355466651,
 -0.43102633401249074,
 0.3234367312145231.
 0.02606795235445944,
 0.2525608175326581,
 0.09544790103129135,
 0.30399471295861424,
 0.6638935631613432.
 2.095756590649309,
  -0.5383535092385583,
  -0.1523671776118538,
 -0.49733805370513506,
 1.0814777965289457.
 -0.5541810322110113,
 0.4702060218904802,
 0.1941018040115748,
 0.027389458133440587,
 -0.6339976476553459,
 0.824073822166477,
  -0.8904328829691108,
 0.5852778403101284,
 -0.37705413851354036,
 -0.20234246488211116,
 0.19390975159216547,
 -0.03854894368679599,
 -0.5885610444718222,
 0.2892174263372239,
 -0.7158388932188376,
  -0.03853087013753846,
 0.36228239756074476,
 0.06448164730191597,
 0.8103021451607575,
 0.04195704491201313,
 2.1946244272306323,
 1.1078290402756337,
 -0.0920096926231485.
 0.7957980849005134,
 0.10683086015182242,
 0.04139972880547422,
 1.068477454710041,
 1.5812878062267348,
 1.0292383703670558,
 1.5822631942162138],
[ 0.003375513600300809,
 0.4884127443235871,
 0.6719352108785641.
 0.9073170135093351,
 1.4946633690060278,
 1.5076957064847494,
 3.872917838142945,
 3.872917838142945,
 3.872917838142945,
 3.872917838142945,
 5.047622474508209,
 5.054336886650782,
 5.067626550795242,
 5.0733174878702085,
 5.094629387163461,
 5.749571576552799,
 5.7731554023304374,
 7.144946717661993,
 7.144946717661993,
 7.144946717661993,
 7.144946717661993.
 7.602314289267704,
```

7.602314289267704,

```
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832,
9.661071929582006.
0.2735947252101626,
2.471262065567802,
0.18954222370300397,
0.2633058348660961,
0.07494334922808346.
1.4980157261935538,
0.3538857424122425,
0.26341770410626436,
0.17174804107002956,
-0.22912718472194316.
0.11060714764109056,
-0.30804859927082595,
2.8406850614439736,
1.0823654569610508,
0.9668529413216363.
1.8727663516543385,
-0.0901659930896485,
0.05868560690604535,
0.24212775097742179,
1.0092515209898247,
-0.7556969386491817,
0.3279350524218167,
1.078117272505244,
0.10391815458190773,
-0.7434930272741371,
-1.6965388530236032,
-1.360748554100242,
0.34939560927302815,
0.03188634842980519,
-1.2447472675125983,
0.06092342743494014,
1.017082923902293,
-1.007905562333318,
-0.8576057837691866,
0.5321038189070756,
1.300652060018237,
-1.8122591145188616,
-1.247002191580596,
1.2529274198051785,
0.3750417535596218,
0.2898066740735119,
1.589675559301449,
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155.
-0.432249774596058,
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883.
0.2658818907332787,
-0.9372958671062981,
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732,
2.008892916411081,
0.15285666374274742,
-1.782425531898792,
0.07791440554206944,
-1.28397958204954,
-0.7247696039786395,
0.5612678373457747,
-0.004762916486662008,
0.4386089298525658,
```

0.010283368626678616,

```
0.8990610129088383,
 0.03840864905637026
 -1.2418081984826976,
 0.33190310279028407,
 0.3061008622829172,
 -0.06950158836023225,
 0.93859456058615,
 -0.02489786142317165,
 0.9927840878492759,
  -0.0709710381209458,
  -1.4546153026559692,
 -0.6707274766895803.
 1.0492831078613678,
 1.59883886587945,
 -0.7948795957139008,
 0.011914265512354442,
 0.29611851635537545,
 -0.026452865362460363,
 0.17911271593442915,
 -0.268102313362264,
 -0.31698956355176716,
 0.5150163737561883.
 -0.2617344493849528,
 -0.08207987775663798,
 -0.7031192006515304,
 0.10296103394319861,
 -1.3322481995457,
  -0.8096620548125795,
 0.22894179493051453,
 -0.6404807766018014,
 0.5981001234262467,
 0.6725836248662437,
 -0.24769451099401643,
 -1.5367942204876157,
 0.32496629998060117,
 0.8231756699235411,
 0.27229759145944715,
  -0.4283887626472357,
 0.6783210911797265,
 1.178917544999848,
 -0.48124012627536317,
 -0.23642700938756703,
 -0.22983768395119897,
 0.7841497681166887,
 0.5963513861028734.
 -0.8505831212819382,
 0.6516631671421783,
 0.6698405071431395,
 0.7826636181190869,
 -1.6023915303224998,
 0.6733061844063541,
 1.5755992624240989],
[ -5.647934061474703e-18,
 1.4787834906243755,
 1.478918229526628.
 1.478918229526628,
 2.0077351764243123,
  2.4302809101456218,
 2.4302809101456218,
 3.009709563144601.
 3.009709563144601,
 3.239471043198664,
 3.2405283031129133,
 3.2405283031129133,
 3.2656598154222434,
 3.5353392937639825,
 6.198713539858257,
 6.213604956994236,
 6.73397854893658.
 6.73397854893658,
 6.743547791194661,
 6.744609103740889,
 6.744609103740889,
 6.749543065628153,
```

6.749543065628153,

```
8.615256229309818,
8.635090640841518,
9.012323512360366.
9.012323512360366,
9.930483613907942,
9.930483613907942,
11.782061805135282.
0.6870051227789642,
0.5234095533264759,
0.11216801162302814,
0.044591843687496906,
-0.747159787599118.
1.5727279855217766,
-0.16958009141159439,
-0.7234855106318131,
0.45999589631996707,
1.3613822619347415.
0.5234464983029046,
0.18337466193510712,
1.0660408011194182,
1.2813123812864906,
0.34899885807903364.
1.2204971120849089,
0.37250493843195553,
0.3861568591798728,
-0.4881036169368887,
0.23720347697856276,
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716,
0.5103741134651811,
-0.48491784736765847,
-1.939727949979543,
0.5221979500550953,
-0.39618913325979604,
-0.5258671175956018,
0.08753210163723862,
1.3619602585721242,
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274,
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961.
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473.
0.4465655907565091,
-1.4308928069625704,
1.6254306194316424,
-0.16298810299835312,
-1.249293985363804.
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616,
-1.1357659634071433,
-0.5734897531715744.
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403,
0.06392732561319403,
0.7711512775812011,
-1.8472478314151175,
-0.46160141905881696,
1.8963279721150403,
-2.313663424814036,
0.060952702837845166,
-1.4971949982077863,
1.3040610818975555,
0.10605679464403613,
```

-1.138800572315487,

```
-0.03947636943653289,
 0.07839455865010819,
 -0.6470277815644087,
 0.946101637008616,
 -0.32144060478582315,
 -0.6371693991779968,
 0.30580409265523,
 -0.2617129381706641,
 0.4094287336545931,
 0.49837362733711055,
 -0.9058714721495094,
 0.6137893604415533,
 0.8546844695081749,
 -0.8205470722456557,
 -0.598852289145785,
 0.46823811794119646,
 1.2205247300232143,
 0.031629319060699435,
 1.1369587010491427,
 0.12298062775535874
 -0.016960252964031076,
 1.1127338626212067.
 0.37972118532018134,
 -0.1475616440844684,
 0.32749925367563326,
 0.030050642250761914,
 0.17169542743574548,
 -0.5825729547476518,
 0.7052714548722974,
 0.9884296874822006,
 -0.500384308215816,
 0.01722431287494931,
 0.40290712722731054,
 -0.029200452046427447,
 1.2704708243944813,
 2.3709704014259345,
 -2.0267551524865275,
 0.7347873374577798,
 -0.34767223966060473,
 0.009778943736386289,
 0.221000841842164,
 -0.010995780695540691,
 -0.481889271583797,
 0.7008500159073542,
 2.3944065221124076,
 -0.08320445199579081,
 2.02470278988152,
 0.02142760118000664,
 1.6794429086669174,
 1.6046551807968945,
 0.2831685070910348,
 1.5805135598594935],
[ 0.0019047787007362745,
 0.7201496918445128,
 0.7201496918445128.
 0.7201496918445127,
 0.7226708680142584,
 0.8068041864232433,
 1.3847174673528184,
 1.6031895944534578.
 2.458865333289775,
 2.458865333289775,
 2.721120236828938,
 2.721120236828938.
 3.554687304897056,
 3.554687304897056,
  4.537252190232355,
 4.537252190232355,
 5.239770593633025.
 5.242363659304797,
 5.566731623636481,
 5.566731623636481,
 5.566731623636481,
 5.566731623636481,
```

5.566731623636481,

```
7.6484324534494865,
7.6484324534494865,
8.96757120343865,
9.352637118466301,
9.381932224950582,
9.966925955531599,
9.966925955531599.
0.29840004251263574,
0.3207087147269936,
-0.22478909909228914,
-1.2242611593120782,
0.061748844824383295.
1.9931455249507801,
0.02449362327304914,
-0.23402928130657288,
0.3399922671860315,
0.2355005268966802.
0.7912945290539132,
-0.9147564287830934,
0.12280724330167514,
0.42016875545313104,
0.6183328009701774.
0.9098148543333162,
0.2439503202728901,
0.4941740976390827,
0.0721485641264495,
0.20051214721509877,
0.14273239312798908,
-0.03846070968482946,
0.11474641891065286,
0.1552743298359438,
-0.050455466832234855,
0.24385918138398863,
0.0646818550964626,
1.0379575003266166,
0.4438839418702803,
0.6652939620943935,
0.6574583263339632,
0.6386444070388955,
0.30923240052603657
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079,
0.25272330748816335,
-0.05865013289270936.
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059,
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593,
-0.15013660688285613.
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661,
0.256318263131488.
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428,
-0.007804627058269528,
-2.9100406031766375,
-0.17918863042787767,
-0.29620353111227854,
-0.2953351498676352,
0.4434234593316091,
0.0018987515325079429,
0.5290648024022053,
0.011057994967698829,
0.03103232328752182,
-0.21693206073792237,
```

```
-0.07883582131375938,
  -0.2554965378040217,
 1.978711034134111,
 -0.02822992907519939,
 1.110830733101554,
 0.04155227001102173,
 0.17370289874025888.
 -0.08435695708516765,
 0.38686640173882947,
 1.0727525781247964,
  -1.4871438236674412,
 0.1437881416009117,
 -0.15769165641037303,
 0.46096388290194723,
 0.3881288491041242,
 0.3113157866411551,
 -0.21237825892214532,
 1.3408904937177344,
 0.033287678968192874,
 -0.22654084728278404,
 0.09162287503278096,
 1.1250326534568733.
 0.670327239820091,
 -1.4911819217025961,
 0.8417198858779599,
 0.018685303562101165,
 -0.5955098452611822,
 1.37350461224772,
  -0.5503685346151788,
 0.07415629279393592,
 0.22396953453102358,
 -0.02219350017922496,
 2.5136787648879593,
 1.5560141766956836,
 -0.037039417521638966,
 -1.5578667717297374,
 -0.15174825264689498,
  -0.0075908588231686416,
  -0.1347910987366526,
 0.7535559035800633,
 2.9519825568174283,
 -0.8640992588734872,
 -0.486197602889753,
 -0.029079605859607876,
 0.1393557947212105,
 -0.03201203543340934,
  -0.17255788414719309,
  -0.6220837667998668,
 0.10441375911567917,
 0.7019930428559267,
 1.822960884928266,
 0.0010256621400676815],
[ 0.00030922277578629,
 0.881375055029912,
 0.881375055029912,
 0.8813750550299119,
 0.9803845151714838,
 0.9803845151714838,
 1.201629973822729,
 1.2441077564052723.
 1.8660677974280824,
 1.8660677974280824,
 2.651002314516478,
 2.651002314516478,
 3.233637461790533,
 4.36384995486056,
  4.36384995486056,
 4.975714528653046,
 4.975714528653046,
 6.591840750700408,
 6.591840750700408,
 8.234009055219385,
 8.238223602720305,
 8.238223602720305,
```

8.238223602720305,

```
8.903406631369169,
8.903406631369169,
8.903406631369169.
9.126449234760914,
9.126449234760914,
9.441918167657187,
9.441918167657187.
0.4384156956352651,
-0.017407483354635628,
-0.13579407977759564,
-0.08181457210659056,
-0.5635031413839604.
0.570197125887921,
-0.07389454022208618,
0.18950484918514415,
0.23442314823895152,
0.5187197914643009.
0.03760777637611914,
1.2080522066616035,
-0.006796933498365149,
0.7597395812711474,
0.3165595784185247.
0.09234381717322694,
-0.047116958459538144,
0.02161370846364295,
-0.3330735946096464,
-0.310519881157395,
-0.1321730433969341,
-0.32004747583182785,
0.38880240494533963,
0.5587916266845782,
-0.04068226055752174,
-0.04929253976644778,
0.7350044083650977,
-0.3347542084226466,
0.07994172439872818,
0.177027499128215,
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313,
-1.8841797053563085,
-0.39250057722196113,
0.0604718224769807,
-0.15658247224402194,
1.097732135880844,
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626,
0.5767878477607333,
0.4375958673531614,
0.017187174100509652.
-1.172587468420202,
0.736957937590481,
-1.8818047463381875
-0.29954118659750983,
-2.8240783717504883.
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
0.32920686175801595,
0.0470036094807545,
0.6942117349751494,
-0.24738597040458754,
-0.3530344251488351,
-0.7207866325012796,
0.6865004571010461,
-0.022934954570734595,
```

```
-0.4703523591474931,
                                                    0.00010065187353926284,
                                                    -0.25737840979321513,
                                                    -0.37927040299996573,
                                                    0.3323512575736423,
                                                    -0.7162822410895011,
                                                    -0.8849129065134153,
                                                    -0.02984860970928172,
                                                    0.9857401879405846,
                                                    0.13869536095324345,
                                                    -0.4901093246549395,
                                                    -0.15185390643388375,
                                                    -1.1107951730061545,
                                                    1.1255217267520845,
                                                    -0.36113008327046914,
                                                    0.12498769155032201,
                                                    1.105653484876161,
                                                    -0.0826241142760939,
                                                    -0.6079720837354008,
                                                    -0.4798331114275297,
                                                    -1.1230771992973987,
                                                    0.13634359721928585.
                                                    -1.0117198549615587,
                                                    0.0420371772323395,
                                                    0.4704689604818435,
                                                    -0.1136051809968673,
                                                    -0.4158299646895606,
                                                    0.7682233881623428,
                                                    -0.8567828943049521,
                                                    -1.0844985071567337,
                                                    0.8118563616911731,
                                                    -1.0011580890685694,
                                                    0.06773503500153778,
                                                    -0.9972068257582826,
                                                    0.22064841214728595,
                                                    1.015101892093672,
                                                    -0.023903188302909387,
                                                    -1.5448535965900865,
                                                    0.40727537812840897,
                                                    0.6273868528756265,
                                                    -0.06403282214251436,
                                                    0.1402221940396834,
                                                    0.011807494022614938,
                                                    0.19970219531306482,
                                                    -0.3159297567283321,
                                                    0.5243897804672414,
                                                    0.6302439365729751,
                                                    0.4184253509022523,
                                                    0.38422115408735924,
                                                    0.8610939738936156,
                                                    0.3457693810952046,
                                                    0.19105880264763628]],
                       'run_time_sec': 68892.59480500221}}],
'zne': [ { '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': [ 0.00030922277578629,
                                                   0.881375055029912,
                                                   0.881375055029912,
                                                   0.8813750550299119,
                                                   0.9803845151714838,
                                                   0.9803845151714838,
                                                   1.201629973822729,
                                                   1.2441077564052723,
                                                   1.8660677974280824,
                                                   1.8660677974280824,
                                                   2.651002314516478,
                                                   2.651002314516478,
                                                   3.233637461790533,
                                                   4.36384995486056,
                                                   4.36384995486056,
```

```
4.975714528653046,
4.975714528653046,
6.591840750700408.
6.591840750700408,
8.234009055219385,
8.238223602720305,
8.238223602720305.
8.238223602720305,
8.903406631369169,
8.903406631369169,
8.903406631369169,
9.126449234760914.
9.126449234760914,
9.441918167657187,
9.441918167657187,
0.4384156956352651,
-0.017407483354635628,
-0.13579407977759564,
-0.08181457210659056,
-0.5635031413839604,
0.570197125887921,
-0.07389454022208618.
0.18950484918514415,
0.23442314823895152,
0.5187197914643009,
0.03760777637611914,
1.2080522066616035,
-0.006796933498365149,
0.7597395812711474,
0.3165595784185247,
0.09234381717322694,
-0.047116958459538144,
0.02161370846364295,
-0.3330735946096464,
-0.310519881157395,
-0.1321730433969341,
-0.32004747583182785,
0.38880240494533963,
0.5587916266845782,
-0.04068226055752174
-0.04929253976644778,
0.7350044083650977,
-0.3347542084226466,
0.07994172439872818,
0.177027499128215,
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313.
-1.8841797053563085,
-0.39250057722196113,
0.0604718224769807,
-0.15658247224402194,
1.097732135880844.
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626.
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875,
-0.29954118659750983,
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
```

```
0.32920686175801595,
                           0.0470036094807545,
                           0.6942117349751494,
                           -0.24738597040458754,
                           -0.3530344251488351,
                           -0.7207866325012796,
                           0.6865004571010461,
                           -0.022934954570734595,
                           -0.4703523591474931,
                           0.00010065187353926284,
                           -0.25737840979321513,
                           -0.37927040299996573,
                           0.3323512575736423,
                           -0.7162822410895011,
                           -0.8849129065134153,
                           -0.02984860970928172,
                           0.9857401879405846,
                           0.13869536095324345,
                           -0.4901093246549395,
                           -0.15185390643388375,
                           -1.1107951730061545,
                           1.1255217267520845.
                           -0.36113008327046914,
                           0.12498769155032201,
                           1.105653484876161,
                           -0.0826241142760939,
                           -0.6079720837354008,
                           -0.4798331114275297,
                           -1.1230771992973987,
                           0.13634359721928585,
                           -1.0117198549615587,
                           0.0420371772323395,
                           0.4704689604818435,
                           -0.1136051809968673,
                           -0.4158299646895606,
                           0.7682233881623428,
                           -0.8567828943049521,
                           -1.0844985071567337,
                           0.8118563616911731,
                           -1.0011580890685694,
                           0.06773503500153778,
                           -0.9972068257582826,
                           0.22064841214728595,
                           1.015101892093672,
                           -0.023903188302909387.
                           -1.5448535965900865,
                           0.40727537812840897,
                           0.6273868528756265,
                           -0.06403282214251436,
                           0.1402221940396834,
                           0.011807494022614938,
                           0.19970219531306482,
                           -0.3159297567283321,
                           0.5243897804672414,
                           0.6302439365729751.
                           0.4184253509022523,
                           0.38422115408735924,
                           0.8610939738936156,
                           0.3457693810952046,
                           0.19105880264763628]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric3_sample#10'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0], [2, 2, 2, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
```

```
'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.5111758480272135],
                                        [12, 6, 21, 8, -3.513108400075424],
                                        [20, 10, 35, 16, -1.9256894730075684]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 3.981590270996094e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.03029257391366,
                              'others': { 'beta_coefficients': [ 1.6466262975778547,
                                                                   -0.9108996539792387,
                                                                   0.26427335640138405],
                                           'cost_richardson_zne': 3.6109567503981035,
                                           'sorted_expectation_vals': [ -6.5111758480272135,
                                                                        -3.513108400075424,
                                                                        -1.9256894730075684],
                                           'sorted_noise': [13, 47, 81]},
                              'sampled data': [ [4, 2, 7, 0, -6.5111758480272135],
                                                [12, 6, 21, 8, -3.513108400075424],
                                                [20, 10, 35, 16, -1.9256894730075684]],
                              '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': [ 0.0019047787007362745,
                                         0.7201496918445128,
                                         0.7201496918445128,
                                         0.7201496918445127,
                                         0.7226708680142584,
                                         0.8068041864232433,
                                         1.3847174673528184,
                                         1.6031895944534578,
                                         2.458865333289775,
                                         2.458865333289775,
                                         2.721120236828938,
                                         2.721120236828938,
                                         3.554687304897056,
                                         3.554687304897056,
                                         4.537252190232355,
                                         4.537252190232355,
                                         5.239770593633025,
                                         5.242363659304797,
                                         5.566731623636481,
                                         5.566731623636481,
                                         5.566731623636481,
                                         5.566731623636481,
                                         5.566731623636481,
                                         7.6484324534494865,
                                         7.6484324534494865,
                                         8.96757120343865,
                                         9.352637118466301,
                                         9.381932224950582.
                                         9.966925955531599,
                                         9.966925955531599,
                                         0.29840004251263574,
                                         0.3207087147269936,
                                         -0.22478909909228914,
                                         -1.2242611593120782,
                                         0.061748844824383295,
                                         1.9931455249507801,
                                         0.02449362327304914,
                                         -0.23402928130657288,
                                         0.3399922671860315,
                                         0.2355005268966802,
                                         0.7912945290539132,
                                         -0.9147564287830934,
                                         0.12280724330167514,
```

```
0.42016875545313104,
0.6183328009701774,
0.9098148543333162.
0.2439503202728901,
0.4941740976390827,
0.0721485641264495,
0.20051214721509877.
0.14273239312798908,
-0.03846070968482946,
0.11474641891065286,
0.1552743298359438,
-0.050455466832234855.
0.24385918138398863,
0.0646818550964626,
1.0379575003266166,
0.4438839418702803,
0.6652939620943935.
0.6574583263339632,
0.6386444070388955,
0.30923240052603657,
-0.34636230410321134,
0.23860747048870812.
-0.8837469955189079,
0.25272330748816335,
-0.05865013289270936,
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059,
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661,
0.256318263131488.
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428,
-0.007804627058269528.
-2.9100406031766375,
-0.17918863042787767,
-0.29620353111227854,
-0.2953351498676352,
0.4434234593316091,
0.0018987515325079429,
0.5290648024022053,
0.011057994967698829,
0.03103232328752182,
-0.21693206073792237.
-0.07883582131375938,
-0.2554965378040217,
1.978711034134111,
-0.02822992907519939,
1.110830733101554.
0.04155227001102173,
0.17370289874025888,
-0.08435695708516765,
0.38686640173882947,
1.0727525781247964,
-1.4871438236674412,
0.1437881416009117,
-0.15769165641037303
0.46096388290194723,
0.3881288491041242,
0.3113157866411551,
-0.21237825892214532,
1.3408904937177344,
0.033287678968192874,
```

-0.22654084728278404,

```
1.1250326534568733,
                                         0.670327239820091,
                                         -1.4911819217025961,
                                         0.8417198858779599,
                                         0.018685303562101165,
                                         -0.5955098452611822,
                                         1.37350461224772,
                                         -0.5503685346151788,
                                         0.07415629279393592,
                                         0.22396953453102358,
                                         -0.02219350017922496.
                                         2.5136787648879593,
                                         1.5560141766956836,
                                         -0.037039417521638966,
                                         -1.5578667717297374,
                                         -0.15174825264689498,
                                         -0.0075908588231686416,
                                         -0.1347910987366526,
                                         0.7535559035800633,
                                         2.9519825568174283,
                                         -0.8640992588734872.
                                         -0.486197602889753,
                                         -0.029079605859607876,
                                         0.1393557947212105,
                                         -0.03201203543340934,
                                         -0.17255788414719309,
                                         -0.6220837667998668,
                                         0.10441375911567917,
                                         0.7019930428559267,
                                         1.822960884928266,
                                         0.0010256621400676815]},
              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric3_sample#9'},
              'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0], [2, 2, 2, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.536182288327376],
                                        [12, 6, 21, 8, -3.450081350248876],
                                        [20, 10, 35, 16, -1.8650932993173606]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 0.00010824203491210938,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.112866199792863,
                              'others': { 'beta_coefficients': [ 1.6466262975778547,
                                                                   -0.9108996539792387,
                                                                   0.26427335640138405],
                                          'cost_richardson_zne': 3.6109567503981035,
                                           'sorted_expectation_vals': [ -6.536182288327376,
                                                                        -3.450081350248876,
                                                                        -1.8650932993173606],
                                          'sorted_noise': [13, 47, 81]},
                              'sampled data': [ [4, 2, 7, 0, -6.536182288327376],
                                                [12, 6, 21, 8, -3.450081350248876],
                                                [20, 10, 35, 16, -1.8650932993173606]],
                              'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
                          'layer': 30,
                          'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0],
```

0.09162287503278096,

```
'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': [ 0.3773346757087749,
                           0.5734233884194113,
                           0.5734233884194113,
                           1.2094818154974225,
                           1.2528672337957094,
                           1.3073966674132076,
                           4.193348178434801,
                           4.228670385547864.
                           4.228670385547864,
                           4.228670385547864,
                           4.228670385547864,
                           4.228670385547864,
                           4.274742575727675,
                           5.343872214974395,
                           5.354523589318104,
                           5.449133113124401,
                           5.449133113124401,
                           5.449133113124401.
                           5.449133113124401,
                           6.208341300319731,
                           6.208341300319731,
                           6.738723848778546,
                           6.7473872692498285,
                           8.515456463543387,
                           8.552181104315652,
                           8.552181104315652,
                           8.552181104315652,
                           9.363042150968939,
                           9.363042150968939,
                           11.478464454984158,
                           -0.2683676450988651,
                           -0.9370321768196137,
                           0.03790413469005285,
                           -0.3520989510779511,
                           0.5131804204688105,
                           0.767748989456867,
                           -1.1529933056041268,
                           1.0195402939041247,
                           -0.5189860890713169,
                           1.700377968800765,
                           0.48912124484584857,
                           1.506730848787325,
                           0.4485612726223177,
                           -1.6248073049289613,
                           0.10079320215400162,
                           1.7454590745233427,
                           1.474284546585253,
                           0.08837986403943651,
                           1.215839965531947,
                           -0.42666568442503866,
                           0.04298065245990749,
                           -1.495484471060033,
                           0.39055472334393304,
                           -0.06187227108331559,
                           1.0010296249342066,
                           -0.33745943355443286.
                           -0.19046242319241546,
                           -0.4884459619425607,
                           0.8930564792122229,
                           0.09947441181287657,
                           -1.4049039336860292,
                           1.0413688199593338,
                           0.027348986225077598,
                           1.5457890290583323,
                           0.8022774572900748,
                           -1.0377116853398,
                           0.5652694406258009,
                           0.9990396087940023,
                           -0.3409174955760714,
                           -0.8590373420111477,
```

0.3662952964918326,

```
0.6492392290096071,
-1.0735392409833318,
-0.620775369578654.
0.5064494688850749,
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054.
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637.
0.13897118193917846,
0.13192395570874205,
-0.560408177185694,
-0.7293430452459922,
1.2393938765994381.
0.16520016983754293,
-0.04218705839108043,
1.9844775109402493,
-0.40811731341033075,
0.40494641878472026,
0.44317505546879765,
-0.14541224425415586,
-1.3628454492957067,
0.35572573997739254,
-0.17363781014762678,
-0.21765464091811726,
0.25867396534698067,
-0.19299239511743832,
0.842583631219517,
0.01538577194684443,
-1.3780712180305699,
0.30168991607554185,
0.03816118508668757,
-0.6330896266111891,
-0.14462412237866193,
0.22751230177420415,
2.198362599080823,
0.5538971259685714.
1.6735676153080048,
0.01161307703421222,
0.15241612900647253,
-0.4114895408906573,
0.020024246948836234.
-0.361021382333633,
1.2366726872792735,
-0.8652479233612058,
-0.38157323774943186,
-1.2043495043519374.
0.03294448415473864,
1.864475600371399,
-0.048446953541905424,
1.483038428004856,
0.02119809714572118,
-0.20756566215919184,
1.2566509021622863,
0.4040298326697209,
0.0492062183426151,
0.3396501220758691.
0.09097515161528406,
-0.4545275805495163,
1.5327906096069877,
-0.47568898039994184,
0.7447654713950665,
0.7179833985093875,
-0.03692927531761856,
0.11509825242982577,
0.020898935398901888.
0.2387893529411216,
1.5195379458286031,
-0.5337205856413728,
-0.5741707032781822.
1.298358172715442,
-0.010829860462227588,
```

```
-1.9037204771139875,
                                         1.5774751765228583,
                                         -0.28550943128124906,
                                         1.5531884118568244]},
              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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': { 'fiq_dpi': 100, 'status': False, 'type': 'png'},
                          'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric3_sample#4'},
              'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0], [2, 2, 2, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.44845457619454],
                                        [12, 6, 21, 8, -3.24468946816992],
                                        [20, 10, 35, 16, -1.686607616211824]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 7.605552673339844e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.108333825740566,
                              'others': { 'beta_coefficients': [ 1.6466262975778547,
                                                                   -0.9108996539792387,
                                                                   0.26427335640138405],
                                          'cost_richardson_zne': 3.6109567503981035,
                                          'sorted_expectation_vals': [ -6.44845457619454,
                                                                        -3.24468946816992,
                                                                        -1.686607616211824],
                                          'sorted_noise': [13, 47, 81]},
                              'sampled data': [ [4, 2, 7, 0, -6.44845457619454],
                                                [12, 6, 21, 8, -3.24468946816992],
                                                [20, 10, 35, 16, -1.686607616211824]],
                              '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': [ 0.33528943002425843,
                                         0.8608925283648261,
                                         2.8309935233222867,
                                         2.8382233121900358,
                                         2.847558790018716,
                                         2.8477263794127468,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666.
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         5.127462455084763,
                                         5.128383696390232,
                                         5.132051241075024,
                                         5.132231848473024,
                                         5.132297186784173,
                                         5.132297186784173,
                                         5.132297186784173.
                                         5.132320898992942,
                                         5.134903164275234,
                                         5.734798022200061,
                                         5.734798022200061,
                                         5.734798022200061,
                                         6.71748919093495,
```

```
6.71748919093495,
9.773430860122208,
9.791656954875775,
9.791980525916317,
9.804782964874805,
9.947289619134542,
0.6818618664375632.
0.42253658736184846,
0.19067339209915313,
-2.314563573529872,
-1.7784854373672185,
-0.10945476580518654.
0.08980428543050965,
0.6265702304745648,
-0.12016219313034968,
0.005450784512528824,
0.9621316606784164,
-0.01940541263687908,
-1.2890091107885369,
-0.09216272929775945,
-0.8615487717558121,
0.021600758375482327.
1.1068545366678577,
-0.06436428812394061,
-1.8186253546793636,
-0.2455724158610742,
0.7444478114283775,
1.0647343146888184,
-1.6388802958603008,
-0.05032235091912311,
0.7589104637111997.
0.0934759886788552,
0.7280377617711271,
-0.10012682423470079,
-2.7917715562202794,
0.5843828201862561,
1.2003794612588048,
-0.2782652692858759,
1.253725179404932,
-0.831140674623039,
-1.3898002860152843,
1.7689493816619246,
-0.768539740515663,
-0.5265628815801298,
-0.8222194498348508.
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446,
0.06348552937029919,
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522,
-0.5743460857513,
0.873550995352649.
0.8797938271812764,
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805,
-0.4012501825920459.
-0.4763388197192611,
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537,
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616,
0.6716489600966955,
0.08900519900900147,
0.7708643633651343,
0.0944251249629154,
-0.053131619179539805,
```

-0.132883145931867,

```
0.44414428660563765,
                           -0.3164026614336652,
                           0.9835391768228284.
                           -0.49696354121947833,
                           0.3510514174127117,
                           -0.24991518010085176,
                           -0.7780713458689107.
                           1.3387260017849976,
                           0.712191280671364,
                           -0.4436070432657242,
                           1.090195713122469,
                           0.3876483875477464.
                           1.113683201871723,
                           0.09724940056823322,
                           -1.3265075307540413,
                           -1.8530581309545013,
                           0.335564434910613,
                           0.16061631243062188,
                           0.6994545842241634,
                           -0.0055568765936962455,
                           1.8148369905661879,
                           -0.9149620921846291.
                           -0.5341673651010566,
                           -0.6583203681162046,
                           -0.05148037848607484,
                           -0.1302834828824637,
                           -0.2083684341417298,
                           -0.7142637766159184,
                           0.4980789266978527,
                           -2.030263033934291,
                           -0.002330467371510849,
                           -0.7835259213136883,
                           -0.18712783689065152,
                           -0.271594041353006,
                           0.606962231033315,
                           0.19917323339650786,
                           0.581852597021436,
                           1.0547240409345577,
                           0.07111303544026976,
                           1.4877210254684077,
                           0.08669172360020491,
                           0.8024105605127613,
                           0.8315802366658298,
                           1.117305276662395,
                           -1.0742437197416552.
                           0.30921812342286065,
                           -0.06994991433225481,
                           1.0419800264617582,
                           1.4507701003592177,
                           0.2408413974211676,
                           1.6573761327725358]},
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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': { 'fiq_dpi': 100, 'status': False, 'type': 'png'},
            'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric3_sample#2'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0], [2, 2, 2, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 7, 0, -6.333005581610797],
                          [12, 6, 21, 8, -3.1651017858597426],
                          [20, 10, 35, 16, -1.6439583689682524]],
         'degree': 0,
         'method': 'richardson',
         'sampling': 'default'}},
```

```
'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.00543212890625e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -7.979457807790349,
                              'others': { 'beta_coeffiecients': [ 1.6466262975778547,
                                                                   -0.9108996539792387,
                                                                  0.26427335640138405],
                                          'cost_richardson_zne': 3.6109567503981035,
                                           'sorted_expectation_vals': [ -6.333005581610797,
                                                                        -3.1651017858597426,
                                                                        -1.6439583689682524],
                                          'sorted_noise': [13, 47, 81]},
                              'sampled data': [ [4, 2, 7, 0, -6.333005581610797],
                                                [12, 6, 21, 8, -3.1651017858597426],
                                                [20, 10, 35, 16, -1.6439583689682524]],
                              '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': [ 0.08591881204796584,
                                         1.5026023651616802,
                                         1.9179097588555833,
                                         1.9179097588555831,
                                         1.9179097588555831,
                                         1.9179097588555831,
                                         2.8800636946459592,
                                         2.9523818900173797,
                                         2.9523818900173797,
                                         2.954896407422686,
                                         3.0487820562708485,
                                         3.0487820562708485,
                                         3.9462134206000328,
                                         3.9462134206000328,
                                         5.170248653928018,
                                         5.170248653928018,
                                         6.5066905594049205,
                                         6.5066905594049205,
                                         6.5066905594049205,
                                         6.914119522580601,
                                         6.914119522580601,
                                         6.9842551957162815,
                                         7.300516913785898,
                                         8.782483894556266,
                                         8.782483894556266,
                                         8.999633503017922,
                                         8.999633503017922,
                                         8.999633503017922.
                                         9.414122362394847,
                                         9.414122362394847,
                                         0.09854676674938925,
                                         -0.05173289612974198,
                                         0.30094803169630163,
                                         -1.1984142138894447,
                                         0.08610670053567002,
                                         0.2851928692216035,
                                         0.26177875477440216.
                                         0.11764473243628538,
                                         0.3495067876706816,
                                         -0.9678438601279628,
                                         -0.08762050677252062,
                                         0.014826088936787857,
                                         -0.30347729159143555,
                                         -1.1730530788097624,
                                         -0.12550631929596553
                                         2.258056275075482,
                                         -0.5160508087356981,
                                         0.004541093619226378,
                                         -0.9345420797218197,
                                         0.47154522212338745,
                                         -0.9129446894819914,
                                         0.2768683391341781,
```

```
0.29975752794333804,
-0.16177915588279423,
0.6021148977823381.
0.35405737535162146,
0.8149645603473178,
-0.7074306860917636,
-0.8281028342440522.
-0.20840122350984505,
-0.19593362207831977,
1.2208184674045053,
-0.10408257731449277,
0.9878855326441833.
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756,
-0.44913621684685756,
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521,
0.5925479388494825,
0.1500100176310508.
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612,
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243,
-0.8246572495389679
-0.28480932751570914,
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
-0.035476380392734465,
0.9940259955458774,
-0.657126951929564,
-0.4786936406484008,
1.4564140457987391.
-1.062151832750044,
-0.01496017231630948,
0.16259290081999456,
0.601493806263198,
-0.20485253219607644.
-1.2421776762345744,
1.152288606322054,
1.1883019471730756,
0.9817659575699377,
0.9653429636905305,
0.5382122852444811,
0.722384759736696,
-0.13079560936986118,
-0.9638314109375934,
-0.13358671856975504.
-0.3949417844115237,
1.01780227278121,
0.6746960094686067,
0.14295933107831804,
-0.37974724013569766,
0.3641245559377578,
0.12972678280008856,
0.5949873255000262,
0.8499370211382984,
-0.0792654431528575,
1.9402087793428133,
-0.5583113020357903,
0.6535986429024293,
1.0008805619835928,
0.16556690201288055,
1.1071973338235597,
0.07194244573338314,
-0.9146859400815048,
-0.005186820541518637,
```

0.4795762978809806,

```
0.6475066336984044,
                                         0.11860845746693519,
                                         0.08044881503693782.
                                         0.5402817334108434,
                                         1.5532870492056725,
                                         0.36643388228039625,
                                         1.6150985923432208.
                                         0.22271977417212363,
                                         -0.04956133994172771,
                                         -0.6258533610916538,
                                         -0.6517224443292691,
                                         0.2594825887888975.
                                         -0.1286341552665023,
                                         0.48749759828242367,
                                         -0.009813928289633511,
                                         0.5249350004928881,
                                         -0.01015655683116892,
                                         -0.48671658518654837,
                                         -0.588311268126242,
                                         -0.25978871509233853,
                                         0.9039610340757382,
                                         1.5549616218831699.
                                         -0.05330158954092406]},
              'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric3_sample#3'},
              'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0], [2, 2, 2, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.4104927992121],
                                        [12, 6, 21, 8, -3.25771336700167],
                                        [20, 10, 35, 16, -1.674813432318219]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.363059997558594e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated value': -8.030844611955615,
                              'others': { 'beta_coefficients': [ 1.6466262975778547,
                                                                   -0.9108996539792387,
                                                                   0.26427335640138405],
                                          'cost_richardson_zne': 3.6109567503981035,
                                           'sorted_expectation_vals': [ -6.4104927992121,
                                                                        -3.25771336700167,
                                                                        -1.674813432318219],
                                          'sorted_noise': [13, 47, 81]},
                              'sampled data': [ [4, 2, 7, 0, -6.4104927992121],
                                                 [12, 6, 21, 8, -3.25771336700167],
                                                 [20, 10, 35, 16, -1.674813432318219]],
                              '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': [ -5.647934061474703e-18,
                                         1.4787834906243755,
                                         1.478918229526628.
                                         1.478918229526628,
                                         2.0077351764243123,
```

```
2.4302809101456218,
2.4302809101456218,
3.009709563144601,
3.009709563144601,
3.239471043198664,
3.2405283031129133,
3.2405283031129133.
3.2656598154222434,
3.5353392937639825,
6.198713539858257,
6.213604956994236,
6.73397854893658.
6.73397854893658,
6.743547791194661,
6.744609103740889,
6.744609103740889,
6.749543065628153.
6.749543065628153,
8.615256229309818,
8.635090640841518,
9.012323512360366,
9.012323512360366.
9.930483613907942,
9.930483613907942,
11.782061805135282,
0.6870051227789642,
0.5234095533264759,
0.11216801162302814,
0.044591843687496906,
-0.747159787599118,
1.5727279855217766,
-0.16958009141159439,
-0.7234855106318131,
0.45999589631996707,
1.3613822619347415,
0.5234464983029046,
0.18337466193510712,
1.0660408011194182,
1.2813123812864906,
0.34899885807903364.
1.2204971120849089,
0.37250493843195553,
0.3861568591798728,
-0.4881036169368887,
0.23720347697856276.
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716,
0.5103741134651811,
-0.48491784736765847.
-1.939727949979543,
0.5221979500550953,
-0.39618913325979604,
-0.5258671175956018,
0.08753210163723862.
1.3619602585721242,
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274,
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961,
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473,
0.4465655907565091.
-1.4308928069625704,
1.6254306194316424,
-0.16298810299835312,
-1.249293985363804.
-2.5283772945229797,
-1.0735775181393186,
```

```
-1.1357659634071433,
                           -0.5734897531715744,
                           -1.6096579963890296,
                           -0.8342055948126037,
                           -1.5447846874108708,
                           -1.1270394146554403.
                           0.06392732561319403,
                           0.7711512775812011,
                           -1.8472478314151175,
                           -0.46160141905881696,
                           1.8963279721150403,
                           -2.313663424814036,
                           0.060952702837845166,
                           -1.4971949982077863,
                           1.3040610818975555,
                           0.10605679464403613,
                           -1.138800572315487,
                           -0.03947636943653289,
                           0.07839455865010819,
                           -0.6470277815644087,
                           0.946101637008616.
                           -0.32144060478582315,
                           -0.6371693991779968,
                           0.30580409265523,
                           -0.2617129381706641,
                           0.4094287336545931,
                           0.49837362733711055,
                           -0.9058714721495094,
                           0.6137893604415533,
                           0.8546844695081749,
                           -0.8205470722456557,
                           -0.598852289145785,
                           0.46823811794119646,
                           1.2205247300232143,
                           0.031629319060699435,
                           1.1369587010491427,
                           0.12298062775535874,
                           -0.016960252964031076,
                           1.1127338626212067,
                           0.37972118532018134,
                           -0.1475616440844684,
                           0.32749925367563326,
                           0.030050642250761914,
                           0.17169542743574548,
                           -0.5825729547476518,
                           0.7052714548722974,
                           0.9884296874822006,
                           -0.500384308215816,
                           0.01722431287494931,
                           0.40290712722731054,
                           -0.029200452046427447,
                           1.2704708243944813,
                           2.3709704014259345,
                           -2.0267551524865275,
                           0.7347873374577798,
                           -0.34767223966060473,
                           0.009778943736386289,
                           0.221000841842164,
                           -0.010995780695540691.
                           -0.481889271583797,
                           0.7008500159073542,
                           2.3944065221124076,
                           -0.08320445199579081,
                           2.02470278988152,
                           0.02142760118000664,
                           1.6794429086669174,
                           1.6046551807968945,
                           0.2831685070910348,
                           1.5805135598594935]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
```

-0.628541665091616,

```
'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_noisy_time_evo_ric3_sample#8'},
              'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0], [2, 2, 2, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.429933051303131],
                                        [12, 6, 21, 8, -3.199071961215845],
                                        [20, 10, 35, 16, -1.635137691104089]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.38690185546875e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.10578663722104,
                              'others': { 'beta_coeffiecients': [ 1.6466262975778547,
                                                                   -0.9108996539792387,
                                                                   0.26427335640138405],
                                          'cost_richardson_zne': 3.6109567503981035,
                                          'sorted_expectation_vals': [ -6.429933051303131,
                                                                        -3.199071961215845,
                                                                        -1.635137691104089],
                                          'sorted_noise': [13, 47, 81]},
                              'sampled data': [ [4, 2, 7, 0, -6.429933051303131],
                                                 [12, 6, 21, 8, -3.199071961215845],
                                                [20, 10, 35, 16, -1.635137691104089]],
                              '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': [ 3.750846163374531e-05,
                                         0.22285241391868899,
                                         0.26252411232084344,
                                         0.26252411232084344,
                                         0.26252411232084344,
                                         1.459545906754556,
                                         1.4595459067545562,
                                         1.6094835194149661.
                                         2.5927782099427628,
                                         2.5927782099427628,
                                         2.5927782099427628,
                                         2.5927782099427623,
                                         3.3552499939702187,
                                         3.3552499939702187,
                                         5.033284106467877,
                                         5.033284106467877,
                                         5.056477210452712,
                                         6.768913439946703.
                                         6.768913439946703,
                                         7.2782492670747585,
                                         7.2782492670747585,
                                         7.2782492670747585.
                                         7.2782492670747585,
                                         7.2782492670747585,
                                         7.2782492670747585,
                                         8.934198246659292,
                                         8.937369801451712,
                                         9.544406408519471,
                                         9.544406408519471,
                                         10.23170722265548,
                                         -0.4501443853573418,
                                         0.06519513561037263,
                                         -0.13386490845883003,
```

```
-0.01542333988020039,
0.3988203537526196,
0.9163371790808124.
0.08159154039220383,
-0.11665429084087826,
-0.21130662780886203,
1.515236372470638.
0.4436142129357345,
-0.28780404896369716,
0.3681425383234808,
0.648176841676201,
0.3046875502986337.
0.05897820457762899,
0.09316951897603123,
1.5277657654344678,
-0.655141628591867,
0.073084468489131.
-0.11423944001370272,
0.3986898081963471,
1.0974832156349317,
1.8462557861113,
0.5998463368708868.
-0.0014214294560794885,
0.4026665434776887,
-0.03860309342262787,
0.3728818533964108,
1.7322816292529104,
0.42156018976657544,
0.9872712539907578,
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974,
0.4324416138472369,
0.7909276553155474,
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866,
-0.0743310361925915,
1.1363109745761366.
0.32003332101567866,
0.08535303128967886,
1.1165485958252095,
0.476282782575683,
0.11414859665640108.
0.8927652783900955,
0.027791184984770272,
0.8970588198442948,
-0.04579755391586939
0.10596016247070955.
0.4721342517962854,
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702.
0.2928189752635581,
-0.4120973709154422,
-0.16251962266938982,
-0.928532755338732,
0.13709877636127538,
0.09386847134985479,
-0.9415336108192559,
-1.3861285848764584,
0.5116476525314603,
-1.5694556777668651,
0.31948518026769196,
-0.0136576069296156,
0.8752899744519326,
-0.448175539102687.
-0.8567162669878051,
0.737642795798484,
-0.5233142967805873,
-0.020239952918795164
0.9696407297918527,
1.064479355466651,
```

```
-0.43102633401249074,
                                       0.3234367312145231,
                                       0.02606795235445944.
                                       0.2525608175326581,
                                       0.09544790103129135,
                                       0.30399471295861424,
                                       0.6638935631613432.
                                       2.095756590649309,
                                       -0.5383535092385583,
                                       -0.1523671776118538,
                                       -0.49733805370513506
                                       1.0814777965289457,
                                       -0.5541810322110113,
                                       0.4702060218904802,
                                       0.1941018040115748,
                                       0.027389458133440587,
                                       -0.6339976476553459,
                                       0.824073822166477,
                                       -0.8904328829691108,
                                       0.5852778403101284,
                                       -0.37705413851354036
                                       -0.20234246488211116.
                                       0.19390975159216547,
                                       -0.03854894368679599,
                                       -0.5885610444718222,
                                       0.2892174263372239.
                                       -0.7158388932188376,
                                       -0.03853087013753846,
                                       0.36228239756074476,
                                       0.06448164730191597,
                                       0.8103021451607575,
                                       0.04195704491201313,
                                       2.1946244272306323,
                                       1.1078290402756337,
                                       -0.0920096926231485,
                                       0.7957980849005134.
                                       0.10683086015182242,
                                       0.04139972880547422,
                                       1.068477454710041,
                                       1.5812878062267348,
                                       1.0292383703670558,
                                       1.5822631942162138]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric3_sample#6'},
            'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0], [2, 2, 2, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                       'constraint': True,
                                       'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.4606782650454075],
                                      [12, 6, 21, 8, -3.273885460810631],
                                      [20, 10, 35, 16, -1.6974907774474755]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.124641418457031e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.104743183209813,
                            'others': { 'beta_coeffiecients': [ 1.6466262975778547,
                                                                 -0.9108996539792387,
                                                                 0.26427335640138405],
                                        'cost_richardson_zne': 3.6109567503981035,
                                        'sorted_expectation_vals': [ -6.4606782650454075,
```

```
-3.273885460810631,
                                                                        -1.69749077744747551,
                                          'sorted_noise': [13, 47, 81]},
                              'sampled data': [ [4, 2, 7, 0, -6.4606782650454075],
                                                 [12, 6, 21, 8, -3.273885460810631],
                                                 [20, 10, 35, 16, -1.6974907774474755]],
                              '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': [ 1.5680106786222674e-17,
                                         1.0238650999177359,
                                         1.0238650999177359,
                                         1.0238650999177359,
                                         1.7041550191762513,
                                         2.070931805530806,
                                         2.586234954306046,
                                         2.6265616878606783.
                                         2.7566136785306155,
                                         2.7689271757054255,
                                         4.271831894498143,
                                         4.271831894498143,
                                         4.271831894498143,
                                         5.004110362344359,
                                         5.004110362344359,
                                         5.529689350278954,
                                         5.529689350278954,
                                         5.529689350278954,
                                         5.5493166460873375,
                                         7.855838962179162,
                                         7.855838962179162,
                                         8.508023697610218,
                                         8.540796404638465,
                                         8.940056981382925,
                                         8.940056981382925,
                                         8.940056981382925,
                                         8.940056981382925,
                                         9.524293982069336,
                                         9.524293982069336,
                                         9.815045396471412,
                                         0.717685470636315,
                                         0.29125971197830336,
                                         0.013619559122678915,
                                         -0.46174394022911175,
                                          -0.7802589318548062,
                                         1.8785332138943256,
                                         -0.07718385116900997,
                                         -0.4181315830102034,
                                         0.3859499067718677,
                                         0.7218523694763775,
                                         0.16350787496293626.
                                         -0.06274337543165032,
                                         1.048639096314506,
                                         0.9454500907927006,
                                         -0.18328208251477485,
                                         0.5336296017995852.
                                         0.7047960543548563,
                                         -0.4717130073686535,
                                         -0.14327049451726778,
                                         0.5646728024946054,
                                         0.1377201649736573,
                                         1.0845662084088512,
                                         0.7117671017527167,
                                         1.8562916393289055,
                                         -1.0958742208007046,
                                         0.314756410152813,
                                         1.0055290931424188,
                                         -1.2653176839886926,
                                         -0.6435463058390287,
                                         -0.13689785210195535,
```

0.5185042269644529,

```
-0.07994120596020922,
-1.3394312085309903,
-0.01354724643952521,
-0.8508707890759795,
-0.7258020036409927,
-0.1513648764845159,
-0.5702686618598916.
-0.20804467461705725,
-0.059043388294177074,
0.9724468840137966,
1.6889388278999584,
0.19460354666786345.
1.52688995899303,
0.40690710189505636,
0.054839646577847824,
-1.9384169999074634,
-0.8955556931339368,
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788,
-0.008629533947631484,
1.3318794505555018.
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042,
0.6437292330207226,
0.02590432636550948,
0.44592066957482307,
-0.0809779454755679,
-1.1390483539597829,
0.4898473400025203,
0.11381426982162568,
0.6089836387514223,
0.17594570893388972.
0.012948010393531988,
-0.547404644839424,
0.028969189369927453,
1.1006601522977721.
-0.6406183594181203,
-0.12562720825840668,
2.0392738219317867,
0.9906966768182601,
0.03179376057566713.
1.5460159269414353,
-0.01674613470972367,
-1.1841027420803907,
0.24496917335434354,
-0.07332300856328518.
0.25897293698241475,
0.35918978324443196,
-0.007942172382781155,
0.4618323110818234,
-0.08547471514820712,
-0.5115221242285567,
0.4563488682048878,
-1.2086759202201718,
0.14282176979415442,
0.48263581465206523.
0.09855500655515351,
0.5327824526475502,
-0.19110982084320108,
-0.775795154813047,
-0.31907838177549175,
0.03477100089693282,
0.7436201132387485,
-0.022209896476399357,
-0.14741027177548285,
-0.10110024079398225,
0.20359400710495562,
-0.15623022021775929,
0.1964090589605299.
0.18042072654891128,
0.8910666012551952,
```

```
0.03518277211157266,
                                         0.11858050209575345,
                                         0.6912090997145024.
                                         0.05142750966379351,
                                         1.2523961498884204,
                                         -1.1477698487953947,
                                         -0.16063831357643202.
                                         -1.0074319345942784,
                                         0.29535289246662044,
                                         -0.002280412475169233,
                                         0.45599081133710123,
                                         -1.6715207166067523.
                                         0.3320227490012926,
                                         1.5421306314740455]},
              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric3_sample#1'},
              'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0], [2, 2, 2, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                         'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.515742960091852],
                                        [12, 6, 21, 8, -3.36492111003702],
                                        [20, 10, 35, 16, -1.7545658776574033]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.1484832763671875e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.127573245060722,
                              'others': { 'beta_coeffiecients': [ 1.6466262975778547,
                                                                   -0.9108996539792387,
                                                                   0.26427335640138405],
                                          'cost_richardson_zne': 3.6109567503981035,
                                           'sorted_expectation_vals': [ -6.515742960091852,
                                                                        -3.36492111003702,
                                                                        -1.7545658776574033],
                                          'sorted_noise': [13, 47, 81]},
                              'sampled data': [ [4, 2, 7, 0, -6.515742960091852],
                                                 [12, 6, 21, 8, -3.36492111003702],
                                                 [20, 10, 35, 16, -1.7545658776574033]],
                              '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': [ 0.003375513600300809,
                                         0.4884127443235871,
                                         0.6719352108785641,
                                         0.9073170135093351,
                                         1.4946633690060278,
                                         1.5076957064847494,
                                         3.872917838142945,
                                         3.872917838142945,
                                         3.872917838142945,
                                         3.872917838142945,
                                         5.047622474508209,
                                         5.054336886650782,
                                         5.067626550795242,
                                         5.0733174878702085,
```

```
5.094629387163461,
5.749571576552799,
5.7731554023304374,
7.144946717661993,
7.144946717661993,
7.144946717661993,
7.144946717661993.
7.602314289267704,
7.602314289267704,
8.018775147517832,
8.018775147517832,
8.018775147517832.
8.018775147517832,
8.018775147517832,
8.018775147517832,
9.661071929582006,
0.2735947252101626.
2.471262065567802,
0.18954222370300397,
0.2633058348660961,
0.07494334922808346,
1.4980157261935538.
0.3538857424122425,
0.26341770410626436,
0.17174804107002956,
-0.22912718472194316,
0.11060714764109056,
-0.30804859927082595,
2.8406850614439736,
1.0823654569610508,
0.9668529413216363,
1.8727663516543385,
-0.0901659930896485,
0.05868560690604535,
0.24212775097742179,
1.0092515209898247,
-0.7556969386491817,
0.3279350524218167,
1.078117272505244,
0.10391815458190773,
-0.7434930272741371,
-1.6965388530236032,
-1.360748554100242,
0.34939560927302815,
0.03188634842980519.
-1.2447472675125983,
0.06092342743494014,
1.017082923902293,
-1.007905562333318,
-0.8576057837691866.
0.5321038189070756,
1.300652060018237,
-1.8122591145188616,
-1.247002191580596,
1.2529274198051785.
0.3750417535596218,
0.2898066740735119,
1.589675559301449,
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365
-2.2650870540994883.
0.2658818907332787,
-0.9372958671062981,
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732,
```

2.008892916411081,

```
-1.782425531898792,
                           0.07791440554206944.
                           -1.28397958204954,
                           -0.7247696039786395,
                           0.5612678373457747,
                           -0.004762916486662008.
                           0.4386089298525658,
                           0.010283368626678616,
                           0.8990610129088383,
                           0.03840864905637026,
                           -1.2418081984826976.
                           0.33190310279028407,
                           0.3061008622829172,
                           -0.06950158836023225,
                           0.93859456058615,
                           -0.02489786142317165,
                           0.9927840878492759,
                           -0.0709710381209458,
                           -1.4546153026559692,
                           -0.6707274766895803,
                           1.0492831078613678.
                           1.59883886587945,
                           -0.7948795957139008,
                           0.011914265512354442,
                           0.29611851635537545,
                           -0.026452865362460363,
                           0.17911271593442915,
                           -0.268102313362264,
                           -0.31698956355176716,
                           0.5150163737561883,
                           -0.2617344493849528,
                           -0.08207987775663798,
                           -0.7031192006515304,
                           0.10296103394319861,
                           -1.3322481995457,
                           -0.8096620548125795,
                           0.22894179493051453,
                           -0.6404807766018014,
                           0.5981001234262467.
                           0.6725836248662437,
                           -0.24769451099401643,
                           -1.5367942204876157,
                           0.32496629998060117,
                           0.8231756699235411,
                           0.27229759145944715,
                           -0.4283887626472357,
                           0.6783210911797265,
                           1.178917544999848,
                           -0.48124012627536317.
                           -0.23642700938756703,
                           -0.22983768395119897,
                           0.7841497681166887,
                           0.5963513861028734,
                           -0.8505831212819382,
                           0.6516631671421783,
                           0.6698405071431395,
                           0.7826636181190869,
                           -1.6023915303224998,
                           0.6733061844063541.
                           1.5755992624240989]},
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric3_sample#7'},
'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0], [2, 2, 2, 0]]},
'run': 'zne',
'state': 'dmatrix',
```

0.15285666374274742,

```
'vqe': { 'iteration': 1,
                        'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.397817460329862],
                                         [12, 6, 21, 8, -3.2115716730808748],
                                         [20, 10, 35, 16, -1.641958817033255]],
                        'degree': 0,
                        'method': 'richardson',
                        'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 8.606910705566406e-05,
              'zne_values': { 'degree': 0,
                               'extrapolated_value': -8.043320919193246,
                               'others': { 'beta_coeffiecients': [ 1.6466262975778547,
                                                                    -0.9108996539792387,
                                                                    0.26427335640138405],
                                           'cost richardson zne': 3.6109567503981035,
                                           'sorted_expectation_vals': [ -6.397817460329862,
                                                                          -3.2115716730808748,
                                                                         -1.641958817033255],
                                           'sorted_noise': [13, 47, 81]},
                               'sampled data': [ [4, 2, 7, 0, -6.397817460329862],
                                                 [12, 6, 21, 8, -3.2115716730808748],
                                                 [20, 10, 35, 16, -1.641958817033255]],
                              'sampling': 'default'}}},
\{ \text{'config': } \{ \text{'ansatz': } \{ \text{'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': [ -6.331146189926128e-17,
                                          0.7069927066774304,
                                          0.7069927066774304,
                                          0.7069927066774305,
                                          0.7069927066774304,
                                          1.0044153364322925,
                                          1.0092418692996383,
                                          2.470333794214341,
                                          2.478143749866421,
                                          3.5776564981759003,
                                          3.5776564981759003,
                                          3.5776564981759003,
                                          3.61745967653339,
                                          3.6981780389472076,
                                          3.755720232685741,
                                          3.9712286023902594,
                                          3.9712286023902594.
                                          4.519037432417192,
                                          4.519037432417193,
                                          4.519037432417193,
                                          5.280953883299406,
                                          5.280953883299406.
                                          6.620356980277175,
                                          6.620356980277175,
                                          6.620356980277175,
                                          6.620356980277176,
                                          8.214004051881032.
                                          8.214004051881032,
                                          9.105951544537387,
                                          10.829366164164977,
                                          1.4490195266558639,
                                          1.145329650589643,
                                          -0.9374272684957279,
                                          -1.2910248872233119,
                                          0.9701069453007352,
                                          2.0238893871034924,
                                          -0.6731600678051081,
                                          -0.7305037462514778,
                                          0.6743483023845589,
                                          1.611766624162738,
                                          -0.162446688913207,
                                          -0.2464021583836281,
```

```
1.3073653685111934,
1.560629053845934,
-0.09768282308379246,
-0.31393750682085847,
0.1625705045557987,
-0.1344649185634244,
-0.03516682581352061.
0.15934568227883428,
1.4484389719925783,
0.31346340320241645,
-1.5406853809043388,
0.3831701903776482.
0.07255447956326048,
-0.4619144712511035,
0.6220101497739178,
-0.08645510294766677,
-0.036774035023737585,
-0.02433291891195538,
1.2745777688613118,
0.806643386980706,
-0.1734465019831428,
-1.474099767063678.
-1.2534035864969235,
0.024086803725753666,
-0.5946515656594247,
3.047855036387052,
0.561263952510902,
-0.27353577574812815,
0.476385213099692,
-0.4183083264972014,
-0.07584344603997495,
-0.04004176630390785,
0.6379867024754904,
3.306912023625799,
0.6758488609505069,
-0.49379826249780634,
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808,
0.043470303912556706,
0.2301819741695647,
1.9247102260310271,
0.19401136489510468,
0.17784496580796996.
-0.12037519976757159,
0.10596613899479704,
0.02480260398862852,
0.33616247382037256,
-0.2960626605489573.
1.2038327046358004,
-0.4266046665751028,
-0.14331073423696536,
0.33240571018120446,
0.13743208352564132.
0.21308235615415505,
-0.8816113951868988,
-0.03958129872975694,
1.7385124490728345,
1.3953860705003918.
0.7193393529381484,
-0.5890148767931709,
1.6845229617798814,
-0.04059142172715042,
-0.6588344885662398,
-1.5492107393137406,
0.9886630320432893,
1.3955090248591298,
-1.7521400718196618,
-0.02012078102450614,
1.5598528019020075,
-0.041272015671692544,
0.6659176073691222.
-0.10884895615623923,
```

-0.8860283635501729,

```
-0.5241060846215897,
                                                                -0.049429521011899694,
                                                                -1.6158837397685775,
                                                                -0.29703279066650246,
                                                               0.6940812648197017,
                                                                -1.0869617874060826.
                                                                -1.1891726572683667,
                                                                0.03935191545498333,
                                                                -1.7727595774952096,
                                                                -0.0005664350349098603,
                                                                -1.2288438066739866.
                                                               2.182693040857262,
                                                               1.2648198022740724,
                                                               0.636776362006322,
                                                               -1.1418938134635428,
                                                                0.04892386539982865,
                                                                -0.6595482134655696,
                                                                -0.016038133219537475,
                                                                -1.53365152672916,
                                                                -0.5818287115590742,
                                                               -0.8537662908823758.
                                                               1.3418170063691075,
                                                                -0.32888813707646736,
                                                                -0.018460135902194714,
                                                                -0.8323242421777916,
                                                                1.5026664500941838.
                                                                1.809610363246633,
                                                                -1.5283405786971713,
                                                                0.5470095670143573,
                                                                -1.4753657998350065,
                                                               0.8122840148585063,
                                                               1.5317878779716176]},
                                    'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                        'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                        '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_noisy_time_evo_ric3_sample#5'},
                                    'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 1, 0], [2, 2, 2, 0]]},
                                    'run': 'zne',
                                     'state': 'dmatrix',
                                     'vqe': { 'iteration': 1,
                                              'optimization': { 'algorithm': 'SLSQP',
                                                                'constraint': True,
                                                                'status': False}},
                                    'zne': { 'data_points': [ [4, 2, 7, 0, -6.311563719128683],
                                                               [12, 6, 21, 8, -3.2712898811023576],
                                                               [20, 10, 35, 16, -1.7533390824025292]],
                                              'degree': 0,
                                              'method': 'richardson',
                                              'sampling': 'default'}},
                        'output': { 'exact_sol': -8.566772233505624,
                                    'run_time_sec': 4.029273986816406e-05,
                                    'zne_values': { 'degree': 0,
                                                     'extrapolated_value': -7.876330782209895,
                                                     'others': { 'beta_coefficients': [ 1.6466262975778547,
                                                                                         -0.9108996539792387,
                                                                                         0.26427335640138405],
                                                                 'cost_richardson_zne': 3.6109567503981035,
                                                                 'sorted_expectation_vals': [ -6.311563719128683,
                                                                                               -3.2712898811023576
                                                                                              -1.7533390824025292],
                                                                 'sorted_noise': [13, 47, 81]},
                                                     'sampled data': [ [4, 2, 7, 0, -6.311563719128683],
                                                                       [12, 6, 21, 8, -3.2712898811023576],
                                                                       [20, 10, 35, 16, -1.7533390824025292]],
                                                     'sampling': 'default'}}}],
'xy-ric4': { 'noiseoff': [ { 'config': { 'ansatz': { 'gateset': 1,
                                                      'layer': 30,
```

-0.042494102069769425,

```
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0],
                                                      'cn': [ 0.5,
                                                              0.5.
                                                              0.5,
                                                              0.5,
                                                              0.5,
                                                              0.51,
                                                      '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': 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':
                                                                             '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,
```

False,

```
-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,
  1.0900003904895101,
 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,
-0.17185617277774212,
-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],
                                                                       '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': [ 1.5680106786222674e-17,
                                                         1.0238650999177359,
                                                         1.0238650999177359,
                                                         1.0238650999177359,
                                                         1.7041550191762513,
                                                         2.070931805530806,
                                                         2.586234954306046,
                                                         2.6265616878606783.
                                                         2.7566136785306155,
                                                         2.7689271757054255,
                                                         4.271831894498143,
                                                         4.271831894498143,
                                                         4.271831894498143,
                                                         5.004110362344359,
                                                         5.004110362344359,
                                                         5.529689350278954,
                                                         5.529689350278954,
                                                         5.529689350278954,
                                                         5.5493166460873375,
                                                         7.855838962179162,
                                                         7.855838962179162,
                                                         8.508023697610218,
                                                         8.540796404638465,
                                                         8.940056981382925,
                                                         8.940056981382925,
                                                         8.940056981382925,
                                                         8.940056981382925,
                                                         9.524293982069336,
                                                         9.524293982069336,
                                                         9.815045396471412,
                                                         0.717685470636315,
                                                         0.29125971197830336,
                                                         0.013619559122678915,
                                                         -0.46174394022911175,
                                                         -0.7802589318548062,
                                                         1.8785332138943256,
                                                         -0.07718385116900997,
                                                         -0.4181315830102034,
                                                         0.3859499067718677,
                                                         0.7218523694763775,
                                                         0.16350787496293626,
                                                         -0.06274337543165032,
                                                         1.048639096314506,
                                                         0.9454500907927006
                                                         -0.18328208251477485,
                                                         0.5336296017995852.
                                                         0.7047960543548563,
                                                         -0.4717130073686535,
                                                         -0.14327049451726778,
                                                         0.5646728024946054,
                                                         0.1377201649736573,
                                                         1.0845662084088512,
                                                         0.7117671017527167,
                                                         1.8562916393289055,
                                                         -1.0958742208007046,
                                                         0.314756410152813,
                                                         1.0055290931424188,
                                                         -1.2653176839886926,
                                                         -0.6435463058390287,
                                                         -0.13689785210195535,
                                                         0.5185042269644529,
```

```
-0.07994120596020922,
-1.3394312085309903,
-0.01354724643952521.
-0.8508707890759795,
-0.7258020036409927,
-0.1513648764845159,
-0.5702686618598916.
-0.20804467461705725,
-0.059043388294177074,
0.9724468840137966,
1.6889388278999584,
0.19460354666786345.
1.52688995899303,
0.40690710189505636,
0.054839646577847824,
-1.9384169999074634,
-0.8955556931339368,
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788,
-0.008629533947631484,
1.3318794505555018.
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042,
0.6437292330207226,
0.02590432636550948,
0.44592066957482307,
-0.0809779454755679,
-1.1390483539597829,
0.4898473400025203,
0.11381426982162568,
0.6089836387514223,
0.17594570893388972.
0.012948010393531988,
-0.547404644839424,
0.028969189369927453,
1.1006601522977721.
-0.6406183594181203,
-0.12562720825840668,
2.0392738219317867,
0.9906966768182601,
0.03179376057566713.
1.5460159269414353,
-0.01674613470972367,
-1.1841027420803907,
0.24496917335434354,
-0.07332300856328518.
0.25897293698241475,
0.35918978324443196,
-0.007942172382781155,
0.4618323110818234,
-0.08547471514820712,
-0.5115221242285567,
0.4563488682048878,
-1.2086759202201718,
0.14282176979415442,
0.48263581465206523.
0.09855500655515351,
0.5327824526475502,
-0.19110982084320108,
-0.775795154813047,
-0.31907838177549175,
0.03477100089693282,
0.7436201132387485,
-0.022209896476399357,
-0.14741027177548285,
-0.10110024079398225,
0.20359400710495562,
-0.15623022021775929,
0.1964090589605299.
0.18042072654891128,
```

0.8910666012551952,

```
0.6912090997145024.
                                                                         0.05142750966379351,
                                                                         1.2523961498884204,
                                                                         -1.1477698487953947,
                                                                         -0.16063831357643202.
                                                                         -1.0074319345942784,
                                                                         0.29535289246662044,
                                                                         -0.002280412475169233,
                                                                         0.45599081133710123,
                                                                         -1.6715207166067523.
                                                                         0.3320227490012926,
                                                                         1.5421306314740455]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric4_sample#1'},
                                             'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                    [1, 1, 1, 0],
                                                                                    [2, 2, 2, 0],
                                                                                    [3, 3, 3, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.515742960091851],
                                                               [12, 6, 21, 8, -3.36492111003702],
                                                               [20, 10, 35, 16, -1.7545658776574033],
                                                               [28, 14, 49, 24, -0.9139478342631158]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
```

0.03518277211157266, 0.11858050209575345,

```
0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 28.50358009338379}},
                               { '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': [ -6.331146189926128e-17,
                                                                         0.7069927066774304,
                                                                         0.7069927066774304,
                                                                         0.7069927066774305,
                                                                         0.7069927066774304,
                                                                         1.0044153364322925,
                                                                         1.0092418692996383,
                                                                         2.470333794214341,
                                                                         2.478143749866421,
                                                                         3.5776564981759003,
                                                                         3.5776564981759003,
                                                                         3.5776564981759003,
                                                                         3.61745967653339,
                                                                         3.6981780389472076,
                                                                         3.755720232685741,
                                                                         3.9712286023902594,
                                                                         3.9712286023902594,
                                                                         4.519037432417192,
                                                                         4.519037432417193,
                                                                         4.519037432417193,
                                                                         5.280953883299406,
                                                                         5.280953883299406,
                                                                         6.620356980277175,
                                                                         6.620356980277175,
                                                                         6.620356980277175,
                                                                         6.620356980277176,
                                                                         8.214004051881032,
                                                                         8.214004051881032,
```

9.105951544537387,

```
10.829366164164977,
1.4490195266558639,
1.145329650589643,
-0.9374272684957279,
-1.2910248872233119,
0.9701069453007352,
2.0238893871034924.
-0.6731600678051081,
-0.7305037462514778,
0.6743483023845589,
1.611766624162738,
-0.162446688913207.
-0.2464021583836281,
1.3073653685111934,
1.560629053845934,
-0.09768282308379246,
-0.31393750682085847,
0.1625705045557987,
-0.1344649185634244,
-0.03516682581352061,
0.15934568227883428,
1.4484389719925783.
0.31346340320241645,
-1.5406853809043388,
0.3831701903776482,
0.07255447956326048,
-0.4619144712511035,
0.6220101497739178,
-0.08645510294766677,
-0.036774035023737585,
-0.02433291891195538,
1.2745777688613118,
0.806643386980706,
-0.1734465019831428,
-1.474099767063678,
-1.2534035864969235,
0.024086803725753666,
-0.5946515656594247,
3.047855036387052,
0.561263952510902.
-0.27353577574812815,
0.476385213099692,
-0.4183083264972014,
-0.07584344603997495,
-0.04004176630390785,
0.6379867024754904,
3.306912023625799,
0.6758488609505069,
-0.49379826249780634,
0.04089533617940984.
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808,
0.043470303912556706,
0.2301819741695647.
1.9247102260310271,
0.19401136489510468,
0.17784496580796996,
-0.12037519976757159,
0.10596613899479704.
0.02480260398862852,
0.33616247382037256,
-0.2960626605489573,
1.2038327046358004,
-0.4266046665751028,
-0.14331073423696536,
0.33240571018120446,
0.13743208352564132,
0.21308235615415505,
-0.8816113951868988,
-0.03958129872975694,
1.7385124490728345,
1.3953860705003918.
0.7193393529381484,
```

-0.5890148767931709,

```
-0.04059142172715042,
                                       -0.6588344885662398.
                                       -1.5492107393137406,
                                       0.9886630320432893,
                                       1.3955090248591298,
                                       -1.7521400718196618,
                                       -0.02012078102450614,
                                       1.5598528019020075,
                                       -0.041272015671692544,
                                       0.6659176073691222,
                                       -0.10884895615623923,
                                       -0.8860283635501729,
                                       -0.042494102069769425,
                                       -0.5241060846215897,
                                       -0.049429521011899694,
                                       -1.6158837397685775,
                                       -0.29703279066650246,
                                       0.6940812648197017,
                                       -1.0869617874060826,
                                       -1.1891726572683667,
                                       0.03935191545498333.
                                       -1.7727595774952096,
                                       -0.0005664350349098603,
                                       -1.2288438066739866,
                                       2.182693040857262,
                                       1.2648198022740724,
                                       0.636776362006322,
                                       -1.1418938134635428,
                                       0.04892386539982865,
                                       -0.6595482134655696,
                                       -0.016038133219537475,
                                       -1.53365152672916,
                                       -0.5818287115590742,
                                       -0.8537662908823758,
                                       1.3418170063691075,
                                       -0.32888813707646736,
                                       -0.018460135902194714,
                                       -0.8323242421777916,
                                       1.5026664500941838.
                                       1.809610363246633,
                                       -1.5283405786971713,
                                       0.5470095670143573,
                                       -1.4753657998350065,
                                       0.8122840148585063,
                                       1.5317878779716176]},
            'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric4_sample#5'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                 [2, 2, 2, 0],
                                                 [3, 3, 3, 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 + '
```

1.6845229617798814,

```
^{\circ}0.5 X 1 X 2 + 0.5 Z 1 Z 2 + ^{\circ}
                                                                                            '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, 7, 0, -6.3115637191286815],
                                                                [12, 6, 21, 8, -3.2712898811023576],
                                                                [20, 10, 35, 16, -1.7533390824025292],
                                                                [28, 14, 49, 24, -0.9662277022700592]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [28, 7, 7, 24],
                                                                    'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4}],
                                              'run_time_sec': 30.27655553817749}},
                               { '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': [ 0.3773346757087749,
                           0.5734233884194113,
                           0.5734233884194113,
                           1.2094818154974225,
                           1.2528672337957094,
                           1.3073966674132076,
                           4.193348178434801,
                           4.228670385547864,
                           4.228670385547864,
                           4.228670385547864,
                           4.228670385547864,
                           4.228670385547864,
                           4.274742575727675,
                           5.343872214974395,
                           5.354523589318104,
                           5.449133113124401,
                           5.449133113124401,
                           5.449133113124401,
                           5.449133113124401.
                           6.208341300319731,
                           6.208341300319731,
                           6.738723848778546,
                           6.7473872692498285,
                           8.515456463543387,
                           8.552181104315652,
                           8.552181104315652,
                           8.552181104315652,
                           9.363042150968939,
                           9.363042150968939,
                           11.478464454984158,
                           -0.2683676450988651,
                           -0.9370321768196137,
                           0.03790413469005285,
                           -0.3520989510779511,
                           0.5131804204688105,
                           0.767748989456867,
                           -1.1529933056041268,
                           1.0195402939041247,
                           -0.5189860890713169,
                           1.700377968800765,
                           0.48912124484584857,
                           1.506730848787325,
                           0.4485612726223177,
                           -1.6248073049289613,
                           0.10079320215400162,
                           1.7454590745233427,
                           1.474284546585253,
                           0.08837986403943651,
                           1.215839965531947,
                           -0.42666568442503866,
                           0.04298065245990749,
                           -1.495484471060033,
                           0.39055472334393304,
                           -0.06187227108331559,
                           1.0010296249342066,
                           -0.33745943355443286,
                           -0.19046242319241546.
                           -0.4884459619425607,
                           0.8930564792122229,
                           0.09947441181287657,
                           -1.4049039336860292,
                           1.0413688199593338,
                           0.027348986225077598,
                           1.5457890290583323,
                           0.8022774572900748,
                           -1.0377116853398,
                           0.5652694406258009,
                           0.9990396087940023,
                           -0.3409174955760714,
                           -0.8590373420111477,
                           0.3662952964918326,
                           0.6492392290096071,
```

```
-1.0735392409833318,
-0.620775369578654,
0.5064494688850749,
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695.
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637,
0.13897118193917846.
0.13192395570874205,
-0.560408177185694,
-0.7293430452459922,
1.2393938765994381,
0.16520016983754293.
-0.04218705839108043,
1.9844775109402493,
-0.40811731341033075,
0.40494641878472026,
0.44317505546879765,
-0.14541224425415586,
-1.3628454492957067,
0.35572573997739254,
-0.17363781014762678,
-0.21765464091811726,
0.25867396534698067,
-0.19299239511743832,
0.842583631219517,
0.01538577194684443,
-1.3780712180305699,
0.30168991607554185,
0.03816118508668757,
-0.6330896266111891,
-0.14462412237866193,
0.22751230177420415,
2.198362599080823,
0.5538971259685714,
1.6735676153080048,
0.01161307703421222,
0.15241612900647253,
-0.4114895408906573,
0.020024246948836234,
-0.361021382333633.
1.2366726872792735,
-0.8652479233612058,
-0.38157323774943186,
-1.2043495043519374,
0.03294448415473864,
1.864475600371399,
-0.048446953541905424,
1.483038428004856,
0.02119809714572118,
-0.20756566215919184.
1.2566509021622863,
0.4040298326697209,
0.0492062183426151,
0.3396501220758691,
0.09097515161528406,
-0.4545275805495163,
1.5327906096069877,
-0.47568898039994184,
0.7447654713950665,
0.7179833985093875,
-0.03692927531761856,
0.11509825242982577,
0.020898935398901888,
0.2387893529411216,
1.5195379458286031,
-0.5337205856413728,
-0.5741707032781822,
1.298358172715442.
-0.010829860462227588,
```

-1.9037204771139875,

```
-0.28550943128124906,
                                                                         1.5531884118568244]},
                                              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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': { 'fiq_dpi': 100, 'status': False, 'type': 'png'},
                                                          'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric4_sample#4'},
                                              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                   [1, 1, 1, 0],
                                                                                   [2, 2, 2, 0],
                                                                                   [3, 3, 3, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.44845457619454],
                                                               [12, 6, 21, 8, -3.2446894681699203],
                                                               [20, 10, 35, 16, -1.6866076162118238],
                                                               [28, 14, 49, 24, -0.8984323471828195]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.0011,
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
```

1.5774751765228583,

```
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001.
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0},
                                                                                      'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 31.118547201156616}},
                               { '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': [ 0.0019047787007362745,
                                                                         0.7201496918445128,
                                                                         0.7201496918445128,
                                                                         0.7201496918445127,
                                                                         0.7226708680142584,
                                                                         0.8068041864232433,
                                                                         1.3847174673528184,
                                                                         1.6031895944534578,
                                                                         2.458865333289775,
                                                                         2.458865333289775,
                                                                         2.721120236828938,
                                                                         2.721120236828938,
                                                                         3.554687304897056,
                                                                         3.554687304897056,
                                                                         4.537252190232355,
                                                                         4.537252190232355,
                                                                         5.239770593633025,
                                                                         5.242363659304797,
                                                                         5.566731623636481,
                                                                         5.566731623636481,
                                                                         5.566731623636481,
                                                                         5.566731623636481,
                                                                         5.566731623636481,
                                                                         7.6484324534494865,
                                                                         7.6484324534494865.
                                                                         8.96757120343865,
                                                                         9.352637118466301,
                                                                         9.381932224950582,
                                                                         9.966925955531599,
                                                                         9.966925955531599,
                                                                         0.29840004251263574,
                                                                         0.3207087147269936,
                                                                         -0.22478909909228914,
                                                                         -1.2242611593120782,
                                                                         0.061748844824383295,
                                                                         1.9931455249507801,
                                                                         0.02449362327304914,
                                                                         -0.23402928130657288,
                                                                         0.3399922671860315,
                                                                         0.2355005268966802,
```

```
0.7912945290539132,
-0.9147564287830934,
0.12280724330167514.
0.42016875545313104,
0.6183328009701774,
0.9098148543333162,
0.2439503202728901.
0.4941740976390827,
0.0721485641264495,
0.20051214721509877,
0.14273239312798908,
-0.03846070968482946.
0.11474641891065286,
0.1552743298359438,
-0.050455466832234855,
0.24385918138398863,
0.0646818550964626.
1.0379575003266166,
0.4438839418702803,
0.6652939620943935,
0.6574583263339632,
0.6386444070388955.
0.30923240052603657,
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079,
0.25272330748816335,
-0.05865013289270936,
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059,
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072.
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661,
0.256318263131488,
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428,
-0.007804627058269528,
-2.9100406031766375,
-0.17918863042787767.
-0.29620353111227854,
-0.2953351498676352,
0.4434234593316091,
0.0018987515325079429,
0.5290648024022053.
0.011057994967698829,
0.03103232328752182,
-0.21693206073792237,
-0.07883582131375938,
-0.2554965378040217,
1.978711034134111,
-0.02822992907519939,
1.110830733101554,
0.04155227001102173,
0.17370289874025888,
-0.08435695708516765,
0.38686640173882947,
1.0727525781247964,
-1.4871438236674412,
0.1437881416009117,
-0.15769165641037303,
0.46096388290194723,
0.3881288491041242.
0.3113157866411551,
-0.21237825892214532,
```

```
1.3408904937177344,
                                        0.033287678968192874,
                                        -0.22654084728278404.
                                        0.09162287503278096,
                                        1.1250326534568733,
                                        0.670327239820091,
                                        -1.4911819217025961.
                                        0.8417198858779599,
                                        0.018685303562101165,
                                        -0.5955098452611822,
                                        1.37350461224772,
                                        -0.5503685346151788.
                                        0.07415629279393592,
                                        0.22396953453102358,
                                        -0.02219350017922496,
                                        2.5136787648879593,
                                        1.5560141766956836,
                                        -0.037039417521638966,
                                        -1.5578667717297374,
                                        -0.15174825264689498,
                                        -0.0075908588231686416,
                                        -0.1347910987366526.
                                        0.7535559035800633,
                                        2.9519825568174283,
                                        -0.8640992588734872,
                                        -0.486197602889753,
                                        -0.029079605859607876,
                                        0.1393557947212105,
                                        -0.03201203543340934,
                                        -0.17255788414719309,
                                        -0.6220837667998668,
                                        0.10441375911567917,
                                        0.7019930428559267,
                                        1.822960884928266,
                                        0.0010256621400676815]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                '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],
                                               'r': 1},
                             'def': 'ising'},
            'output': { 'draw': { 'fig_dpi': 100, 'status': False, 'type': 'png'},
                        'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric4_sample#9'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                  [2, 2, 2, 0],
                                                  [3, 3, 3, 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 + '
                                                          ^{\circ}0.5 X 1 X 2 + 0.5 Z 1 Z 2 + ^{\circ}
                                                          '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 \times 5 \times 6 + 0.5 \times 5 \times 6
'output': { 'data_points': [ [4, 2, 7, 0, -6.536182288327376],
                             [12, 6, 21, 8, -3.450081350248876],
                             [20, 10, 35, 16, -1.8650932993173606],
                             [28, 14, 49, 24, -1.0247351729167147]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                  'identity_factors': [0, 0, 0, 0],
```

```
'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                              'run_time_sec': 32.254499673843384}},
                               { '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': [ 0.00030922277578629,
                                                                         0.881375055029912,
                                                                         0.881375055029912,
                                                                         0.8813750550299119,
                                                                         0.9803845151714838,
                                                                         0.9803845151714838,
                                                                         1.201629973822729,
                                                                         1.2441077564052723,
```

```
1.8660677974280824,
1.8660677974280824,
2.651002314516478,
2.651002314516478,
3.233637461790533,
4.36384995486056,
4.36384995486056.
4.975714528653046,
4.975714528653046,
6.591840750700408,
6.591840750700408,
8.234009055219385.
8.238223602720305,
8.238223602720305,
8.238223602720305,
8.903406631369169,
8.903406631369169.
8.903406631369169,
9.126449234760914,
9.126449234760914,
9.441918167657187,
9.441918167657187.
0.4384156956352651,
-0.017407483354635628,
-0.13579407977759564,
-0.08181457210659056,
-0.5635031413839604,
0.570197125887921,
-0.07389454022208618,
0.18950484918514415,
0.23442314823895152,
0.5187197914643009,
0.03760777637611914,
1.2080522066616035,
-0.006796933498365149,
0.7597395812711474,
0.3165595784185247,
0.09234381717322694,
-0.047116958459538144,
0.02161370846364295,
-0.3330735946096464,
-0.310519881157395,
-0.1321730433969341,
-0.32004747583182785,
0.38880240494533963.
0.5587916266845782,
-0.04068226055752174,
-0.04929253976644778,
0.7350044083650977,
-0.3347542084226466,
0.07994172439872818,
0.177027499128215,
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313,
-1.8841797053563085,
-0.39250057722196113,
0.0604718224769807.
-0.15658247224402194,
1.097732135880844,
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626,
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875,
-0.29954118659750983,
-2.8240783717504883,
```

```
-0.0009188056875444823,
                           -0.014480253731157836,
                           0.8344869723837732,
                           -0.235921407746533,
                           -0.2726490308679638,
                           -0.4874528967327087,
                           0.05731267695545898,
                           0.32920686175801595,
                           0.0470036094807545,
                           0.6942117349751494,
                           -0.24738597040458754,
                           -0.3530344251488351,
                           -0.7207866325012796,
                           0.6865004571010461,
                           -0.022934954570734595,
                           -0.4703523591474931,
                           0.00010065187353926284,
                           -0.25737840979321513,
                           -0.37927040299996573,
                           0.3323512575736423,
                           -0.7162822410895011,
                           -0.8849129065134153.
                           -0.02984860970928172,
                           0.9857401879405846,
                           0.13869536095324345,
                           -0.4901093246549395,
                           -0.15185390643388375,
                           -1.1107951730061545,
                           1.1255217267520845,
                           -0.36113008327046914,
                           0.12498769155032201,
                           1.105653484876161,
                           -0.0826241142760939,
                           -0.6079720837354008,
                           -0.4798331114275297,
                           -1.1230771992973987,
                           0.13634359721928585,
                           -1.0117198549615587,
                           0.0420371772323395,
                           0.4704689604818435,
                           -0.1136051809968673,
                           -0.4158299646895606,
                           0.7682233881623428,
                           -0.8567828943049521,
                           -1.0844985071567337,
                           0.8118563616911731,
                           -1.0011580890685694,
                           0.06773503500153778,
                           -0.9972068257582826,
                           0.22064841214728595,
                           1.015101892093672,
                           -0.023903188302909387,
                           -1.5448535965900865,
                           0.40727537812840897,
                           0.6273868528756265,
                           -0.06403282214251436,
                           0.1402221940396834,
                           0.011807494022614938,
                           0.19970219531306482,
                           -0.3159297567283321,
                           0.5243897804672414,
                           0.6302439365729751,
                           0.4184253509022523,
                           0.38422115408735924,
                           0.8610939738936156,
                           0.3457693810952046,
                           0.19105880264763628]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric4_sample#10'},
                                              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                   [1, 1, 1, 0],
                                                                                   [2, 2, 2, 0],
                                                                                   [3, 3, 3, 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, 7, 0, -6.511175848027214],
                                                               [12, 6, 21, 8, -3.5131084000754242],
                                                               [20, 10, 35, 16, -1.9256894730075684],
                                                               [28, 14, 49, 24, -1.064810006156379]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001.
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
```

```
'noise_level': [28, 14, 49, 24],
                                    'noise_profile': { 'noise_on_init_param': { 'status':
                                                                                 'value':
                                                       'noise_prob': [ 0.001,
                                                                        0.001,
                                                                        0.001,
                                                                        0.001],
                                                       'status': True,
                                                       'type': 'depolarizing'},
                                    'odd_wires': 4}],
              'run_time_sec': 36.53622078895569}},
{ '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': [ 0.08591881204796584,
                                         1.5026023651616802,
                                         1.9179097588555833,
                                          1.9179097588555831,
                                         1.9179097588555831,
                                         1.9179097588555831,
                                         2.8800636946459592,
                                          2.9523818900173797,
                                          2.9523818900173797,
                                         2.954896407422686,
                                         3.0487820562708485,
                                          3.0487820562708485,
                                          3.9462134206000328,
                                          3.9462134206000328,
                                          5.170248653928018,
                                         5.170248653928018,
                                          6.5066905594049205,
                                          6.5066905594049205,
                                         6.5066905594049205,
                                         6.914119522580601,
                                          6.914119522580601,
                                          6.9842551957162815,
                                          7.300516913785898,
                                          8.782483894556266,
                                         8.782483894556266,
                                         8.999633503017922,
                                          8.999633503017922,
                                         8.999633503017922,
                                         9.414122362394847,
                                         9.414122362394847,
                                          0.09854676674938925,
                                          -0.05173289612974198,
                                          0.30094803169630163,
                                         -1.1984142138894447,
                                         0.08610670053567002,
                                         0.2851928692216035,
                                         0.26177875477440216,
                                         0.11764473243628538,
                                          0.3495067876706816,
                                          -0.9678438601279628,
                                          -0.08762050677252062,
                                          0.014826088936787857,
                                         -0.30347729159143555,
                                         -1.1730530788097624,
                                          -0.12550631929596553,
                                          2.258056275075482,
                                         -0.5160508087356981,
                                          0.004541093619226378,
```

-0.9345420797218197, 0.47154522212338745,

False,

0},

```
-0.9129446894819914,
0.2768683391341781,
0.29975752794333804.
-0.16177915588279423,
0.6021148977823381,
0.35405737535162146,
0.8149645603473178.
-0.7074306860917636,
-0.8281028342440522,
-0.20840122350984505,
-0.19593362207831977,
1.2208184674045053.
-0.10408257731449277,
0.9878855326441833,
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756,
-0.44913621684685756,
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521.
0.5925479388494825,
0.1500100176310508,
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612,
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243,
-0.8246572495389679,
-0.28480932751570914,
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
-0.035476380392734465,
0.9940259955458774,
-0.657126951929564,
-0.4786936406484008,
1.4564140457987391,
-1.062151832750044,
-0.01496017231630948,
0.16259290081999456,
0.601493806263198,
-0.20485253219607644,
-1.2421776762345744,
1.152288606322054,
1.1883019471730756.
0.9817659575699377,
0.9653429636905305,
0.5382122852444811,
0.722384759736696,
-0.13079560936986118.
-0.9638314109375934,
-0.13358671856975504,
-0.3949417844115237,
1.01780227278121,
0.6746960094686067,
0.14295933107831804,
-0.37974724013569766,
0.3641245559377578,
0.12972678280008856.
0.5949873255000262,
0.8499370211382984,
-0.0792654431528575,
1.9402087793428133,
-0.5583113020357903,
0.6535986429024293,
1.0008805619835928,
0.16556690201288055,
1.1071973338235597.
0.07194244573338314,
```

-0.9146859400815048,

```
-0.005186820541518637,
                                         0.4795762978809806,
                                         0.6475066336984044.
                                         0.11860845746693519,
                                         0.08044881503693782,
                                        0.5402817334108434,
                                        1.5532870492056725.
                                        0.36643388228039625,
                                         1.6150985923432208,
                                         0.22271977417212363,
                                         -0.04956133994172771,
                                        -0.6258533610916538,
                                         -0.6517224443292691,
                                         0.2594825887888975,
                                        -0.1286341552665023,
                                         0.48749759828242367,
                                        -0.009813928289633511.
                                         0.5249350004928881,
                                         -0.01015655683116892,
                                         -0.48671658518654837,
                                         -0.588311268126242,
                                        -0.25978871509233853,
                                        0.9039610340757382,
                                        1.5549616218831699,
                                         -0.05330158954092406]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                '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_noisy_time_evo_ric4_sample#3'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                   [1, 1, 1, 0],
                                                   [2, 2, 2, 0],
                                                   [3, 3, 3, 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 + '
                                                           ^{\circ} 0.5 ^{\circ} X 4 ^{\circ} X 5 + 0.5 ^{\circ} Z 4 ^{\circ} Z 5 + ^{\circ}
                                                           0.5 \times 5 \times 6 + 0.5 \times 5 \times 6
'output': { 'data_points': [ [4, 2, 7, 0, -6.410492799212099],
                              [12, 6, 21, 8, -3.2577133670016694],
                              [20, 10, 35, 16, -1.674813432318219],
                              [28, 14, 49, 24, -0.8591076530612253]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                   'identity_factors': [0, 0, 0, 0],
                                   'noise_level': [4, 2, 7, 0],
                                   'noise_profile': { 'noise_on_init_param': { 'status':
                                                                                 'value':
                                                       'noise_prob': [ 0.001,
                                                                       0.001,
                                                                       0.001,
                                                                       0.001],
                                                       'status': True,
```

False,

0},

```
'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.0011,
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.0011,
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 31.50432777404785}},
                               { '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': [ -5.647934061474703e-18,
                                                                         1.4787834906243755,
                                                                         1.478918229526628,
                                                                         1.478918229526628,
                                                                         2.0077351764243123,
                                                                         2.4302809101456218,
                                                                         2.4302809101456218,
                                                                         3.009709563144601,
                                                                         3.009709563144601,
                                                                         3.239471043198664,
                                                                         3.2405283031129133,
                                                                         3.2405283031129133,
                                                                         3.2656598154222434,
                                                                         3.5353392937639825,
                                                                         6.198713539858257,
                                                                         6.213604956994236,
                                                                         6.73397854893658,
                                                                         6.73397854893658,
```

```
6.743547791194661,
6.744609103740889,
6.744609103740889,
6.749543065628153,
6.749543065628153,
8.615256229309818,
8.635090640841518.
9.012323512360366,
9.012323512360366,
9.930483613907942,
9.930483613907942,
11.782061805135282.
0.6870051227789642,
0.5234095533264759,
0.11216801162302814,
0.044591843687496906,
-0.747159787599118,
1.5727279855217766,
-0.16958009141159439,
-0.7234855106318131,
0.45999589631996707,
1.3613822619347415.
0.5234464983029046,
0.18337466193510712,
1.0660408011194182,
1.2813123812864906,
0.34899885807903364,
1.2204971120849089,
0.37250493843195553,
0.3861568591798728,
-0.4881036169368887,
0.23720347697856276,
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716,
0.5103741134651811,
-0.48491784736765847,
-1.939727949979543,
0.5221979500550953,
-0.39618913325979604,
-0.5258671175956018,
0.08753210163723862,
1.3619602585721242,
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274,
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961,
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473,
0.4465655907565091,
-1.4308928069625704,
1.6254306194316424,
-0.16298810299835312,
-1.249293985363804.
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616,
-1.1357659634071433,
-0.5734897531715744,
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403,
0.06392732561319403,
0.7711512775812011,
-1.8472478314151175,
-0.46160141905881696,
1.8963279721150403,
-2.313663424814036,
```

```
0.060952702837845166,
                           -1.4971949982077863,
                           1.3040610818975555.
                           0.10605679464403613,
                           -1.138800572315487,
                           -0.03947636943653289,
                           0.07839455865010819,
                           -0.6470277815644087,
                           0.946101637008616,
                           -0.32144060478582315,
                           -0.6371693991779968,
                           0.30580409265523,
                           -0.2617129381706641,
                           0.4094287336545931,
                           0.49837362733711055,
                           -0.9058714721495094,
                           0.6137893604415533,
                           0.8546844695081749,
                           -0.8205470722456557,
                           -0.598852289145785,
                           0.46823811794119646,
                           1.2205247300232143,
                           0.031629319060699435,
                           1.1369587010491427,
                           0.12298062775535874,
                           -0.016960252964031076,
                           1.1127338626212067,
                           0.37972118532018134,
                           -0.1475616440844684,
                           0.32749925367563326,
                           0.030050642250761914,
                           0.17169542743574548,
                           -0.5825729547476518,
                           0.7052714548722974,
                           0.9884296874822006,
                           -0.500384308215816,
                           0.01722431287494931,
                           0.40290712722731054,
                           -0.029200452046427447,
                           1.2704708243944813,
                           2.3709704014259345,
                           -2.0267551524865275,
                           0.7347873374577798,
                           -0.34767223966060473,
                           0.009778943736386289,
                           0.221000841842164,
                           -0.010995780695540691,
                           -0.481889271583797,
                           0.7008500159073542,
                           2.3944065221124076,
                           -0.08320445199579081,
                           2.02470278988152,
                           0.02142760118000664,
                           1.6794429086669174,
                           1.6046551807968945,
                           0.2831685070910348,
                           1.5805135598594935]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric4_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 0],
                                     [3, 3, 3, 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 \times 0 \times 1 + 0.5 \times 0 \times 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, 7, 0, -6.429933051303131],
                                                                 [12, 6, 21, 8, -3.199071961215845],
                                                                 [20, 10, 35, 16, -1.6351376911040885],
[28, 14, 49, 24, -0.8526977600673815]],
                                               'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                     'identity_factors': [0, 0, 0, 0],
                                                                     'noise_level': [4, 2, 7, 0],
                                                                     'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                     'value':
0 } ,
                                                                                          'noise_prob': [ 0.001,
                                                                                                           0.001,
                                                                                                           0.001,
                                                                                                           0.001],
                                                                                          'status': True,
                                                                                          'type': 'depolarizing'},
                                                                     'odd_wires': 4},
                                                                   { 'gates_num': [12, 3, 3, 8],
                                                                      'identity_factors': [1, 1, 1, 0],
                                                                     'noise_level': [12, 6, 21, 8],
                                                                      'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                     'value':
0 } ,
                                                                                          'noise_prob': [ 0.001,
                                                                                                           0.001,
                                                                                                           0.001,
                                                                                                           0.001],
                                                                                          'status': True,
                                                                                          'type': 'depolarizing'},
                                                                      'odd_wires': 4},
                                                                   { 'gates_num': [20, 5, 5, 16],
                                                                     'identity_factors': [2, 2, 2, 0],
                                                                     'noise_level': [20, 10, 35, 16],
                                                                     'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                     'value':
0},
                                                                                          'noise_prob': [ 0.001,
                                                                                                           0.001,
                                                                                                           0.001,
                                                                                                           0.001],
                                                                                          'status': True,
                                                                                          'type': 'depolarizing'},
                                                                     'odd_wires': 4},
                                                                   { 'gates_num': [28, 7, 7, 24],
                                                                     'identity_factors': [3, 3, 3, 0],
                                                                     'noise_level': [28, 14, 49, 24],
                                                                      'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                     'value':
0},
                                                                                          'noise_prob': [ 0.001,
                                                                                                           0.001,
                                                                                                           0.001,
                                                                                                           0.001],
                                                                                          'status': True,
                                                                                          'type': 'depolarizing'},
```

```
'odd_wires': 4}],
              'run_time_sec': 31.051584482192993}},
{ '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': [ 0.33528943002425843,
                                         0.8608925283648261,
                                         2.8309935233222867,
                                         2.8382233121900358,
                                          2.847558790018716,
                                          2.8477263794127468,
                                          3.9337993695450666,
                                          3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         5.127462455084763,
                                         5.128383696390232,
                                          5.132051241075024,
                                          5.132231848473024,
                                          5.132297186784173,
                                         5.132297186784173,
                                         5.132297186784173,
                                         5.132320898992942,
                                          5.134903164275234,
                                         5.734798022200061,
                                         5.734798022200061,
                                         5.734798022200061,
                                          6.71748919093495,
                                          6.71748919093495,
                                          9.773430860122208,
                                         9.791656954875775,
                                         9.791980525916317,
                                          9.804782964874805,
                                         9.947289619134542,
                                         0.6818618664375632,
                                         0.42253658736184846,
                                          0.19067339209915313,
                                          -2.314563573529872,
                                          -1.7784854373672185,
                                         -0.10945476580518654,
                                         0.08980428543050965,
                                         0.6265702304745648,
                                         -0.12016219313034968,
                                         0.005450784512528824,
                                          0.9621316606784164,
                                          -0.01940541263687908,
                                          -1.2890091107885369,
                                          -0.09216272929775945,
                                         -0.8615487717558121,
                                         0.021600758375482327.
                                         1.1068545366678577,
                                          -0.06436428812394061,
                                         -1.8186253546793636,
                                         -0.2455724158610742,
                                         0.7444478114283775,
                                         1.0647343146888184,
                                          -1.6388802958603008,
                                          -0.05032235091912311,
                                         0.7589104637111997,
                                         0.0934759886788552,
                                         0.7280377617711271,
                                         -0.10012682423470079,
                                         -2.7917715562202794,
                                         0.5843828201862561,
                                         1.2003794612588048,
```

```
-0.2782652692858759,
1.253725179404932,
-0.831140674623039.
-1.3898002860152843,
1.7689493816619246,
-0.768539740515663,
-0.5265628815801298.
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446,
0.06348552937029919.
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522,
-0.5743460857513.
0.873550995352649,
0.8797938271812764,
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805.
-0.4012501825920459,
-0.4763388197192611,
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537,
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616,
0.6716489600966955,
0.08900519900900147,
0.7708643633651343,
0.0944251249629154,
-0.053131619179539805,
-0.132883145931867,
0.44414428660563765,
-0.3164026614336652.
0.9835391768228284,
-0.49696354121947833,
0.3510514174127117,
-0.24991518010085176,
-0.7780713458689107,
1.3387260017849976,
0.712191280671364,
-0.4436070432657242,
1.090195713122469,
0.3876483875477464.
1.113683201871723,
0.09724940056823322,
-1.3265075307540413,
-1.8530581309545013,
0.335564434910613.
0.16061631243062188,
0.6994545842241634,
-0.0055568765936962455,
1.8148369905661879,
-0.9149620921846291,
-0.5341673651010566,
-0.6583203681162046,
-0.05148037848607484,
-0.1302834828824637,
-0.2083684341417298,
-0.7142637766159184,
0.4980789266978527,
-2.030263033934291,
-0.002330467371510849,
-0.7835259213136883,
-0.18712783689065152,
-0.271594041353006,
0.606962231033315.
0.19917323339650786,
```

0.581852597021436,

```
1.4877210254684077.
                                                                         0.08669172360020491,
                                                                         0.8024105605127613,
                                                                         0.8315802366658298,
                                                                         1.117305276662395.
                                                                         -1.0742437197416552,
                                                                         0.30921812342286065,
                                                                         -0.06994991433225481,
                                                                         1.0419800264617582,
                                                                         1.4507701003592177,
                                                                         0.2408413974211676,
                                                                         1.6573761327725358]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric4_sample#2'},
                                             'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                    [1, 1, 1, 0],
                                                                                    [2, 2, 2, 0],
                                                                                    [3, 3, 3, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.333005581610795],
                                                               [12, 6, 21, 8, -3.1651017858597426],
                                                               [20, 10, 35, 16, -1.6439583689682524],
                                                               [28, 14, 49, 24, -0.8813072530521873]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
```

1.0547240409345577, 0.07111303544026976,

```
0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 33.18718099594116}},
                               { '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': [ 3.750846163374531e-05,
                                                                         0.22285241391868899,
                                                                         0.26252411232084344,
                                                                         0.26252411232084344,
                                                                         0.26252411232084344,
                                                                         1.459545906754556,
                                                                         1.4595459067545562,
                                                                         1.6094835194149661,
                                                                         2.5927782099427628,
                                                                         2.5927782099427628,
                                                                         2.5927782099427628,
                                                                         2.5927782099427623,
                                                                         3.3552499939702187,
                                                                         3.3552499939702187.
                                                                         5.033284106467877,
                                                                         5.033284106467877,
                                                                         5.056477210452712,
                                                                         6.768913439946703,
                                                                         6.768913439946703,
                                                                         7.2782492670747585,
                                                                         7.2782492670747585,
                                                                         7.2782492670747585,
                                                                         7.2782492670747585,
                                                                         7.2782492670747585,
                                                                         7.2782492670747585,
                                                                         8.934198246659292,
                                                                         8.937369801451712,
                                                                         9.544406408519471,
```

9.544406408519471,

```
10.23170722265548,
-0.4501443853573418,
0.06519513561037263,
-0.13386490845883003,
-0.01542333988020039,
0.3988203537526196,
0.9163371790808124.
0.08159154039220383,
-0.11665429084087826,
-0.21130662780886203,
1.515236372470638,
0.4436142129357345,
-0.28780404896369716,
0.3681425383234808,
0.648176841676201,
0.3046875502986337,
0.05897820457762899,
0.09316951897603123,
1.5277657654344678,
-0.655141628591867,
0.073084468489131,
-0.11423944001370272.
0.3986898081963471,
1.0974832156349317,
1.8462557861113,
0.5998463368708868,
-0.0014214294560794885,
0.4026665434776887,
-0.03860309342262787,
0.3728818533964108,
1.7322816292529104,
0.42156018976657544,
0.9872712539907578,
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974,
0.4324416138472369,
0.7909276553155474,
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866,
-0.0743310361925915,
1.1363109745761366,
0.32003332101567866.
0.08535303128967886,
1.1165485958252095,
0.476282782575683,
0.11414859665640108,
0.8927652783900955,
0.027791184984770272,
0.8970588198442948,
-0.04579755391586939,
0.10596016247070955,
0.4721342517962854.
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702,
0.2928189752635581.
-0.4120973709154422,
-0.16251962266938982,
-0.928532755338732,
0.13709877636127538,
0.09386847134985479,
-0.9415336108192559,
-1.3861285848764584,
0.5116476525314603,
-1.5694556777668651,
0.31948518026769196,
-0.0136576069296156,
0.8752899744519326,
-0.448175539102687.
-0.8567162669878051,
0.737642795798484,
```

```
-0.020239952918795164,
                                       0.9696407297918527.
                                       1.064479355466651,
                                       -0.43102633401249074,
                                       0.3234367312145231,
                                       0.02606795235445944,
                                       0.2525608175326581,
                                       0.09544790103129135,
                                       0.30399471295861424,
                                       0.6638935631613432,
                                       2.095756590649309.
                                       -0.5383535092385583,
                                       -0.1523671776118538,
                                       -0.49733805370513506,
                                       1.0814777965289457,
                                       -0.5541810322110113,
                                       0.4702060218904802,
                                       0.1941018040115748,
                                       0.027389458133440587,
                                       -0.6339976476553459,
                                       0.824073822166477,
                                       -0.8904328829691108,
                                       0.5852778403101284,
                                       -0.37705413851354036,
                                       -0.20234246488211116,
                                       0.19390975159216547,
                                       -0.03854894368679599,
                                       -0.5885610444718222,
                                       0.2892174263372239,
                                       -0.7158388932188376.
                                       -0.03853087013753846,
                                       0.36228239756074476,
                                       0.06448164730191597,
                                       0.8103021451607575,
                                       0.04195704491201313.
                                       2.1946244272306323,
                                       1.1078290402756337,
                                       -0.0920096926231485,
                                       0.7957980849005134.
                                       0.10683086015182242,
                                       0.04139972880547422,
                                       1.068477454710041,
                                       1.5812878062267348,
                                       1.0292383703670558,
                                       1.5822631942162138]},
            'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric4_sample#6'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                 [2, 2, 2, 0],
                                                 [3, 3, 3, 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 + '
```

-0.5233142967805873,

```
^{\circ}0.5 X 1 X 2 + 0.5 Z 1 Z 2 + ^{\circ}
                                                                                            '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, 7, 0, -6.4606782650454075],
                                                                [12, 6, 21, 8, -3.2738854608106305],
                                                                [20, 10, 35, 16, -1.6974907774474755],
                                                                [28, 14, 49, 24, -0.8939947022135477]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [28, 7, 7, 24],
                                                                    'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4}],
                                              'run_time_sec': 30.62218952178955}},
                               { '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': [ 0.003375513600300809,
                           0.4884127443235871,
                           0.6719352108785641,
                           0.9073170135093351,
                           1.4946633690060278,
                           1.5076957064847494,
                           3.872917838142945,
                           3.872917838142945,
                           3.872917838142945,
                           3.872917838142945,
                           5.047622474508209,
                           5.054336886650782,
                           5.067626550795242,
                           5.0733174878702085,
                           5.094629387163461,
                           5.749571576552799,
                           5.7731554023304374,
                           7.144946717661993,
                           7.144946717661993,
                           7.144946717661993,
                           7.144946717661993,
                           7.602314289267704,
                           7.602314289267704,
                           8.018775147517832,
                           8.018775147517832,
                           8.018775147517832,
                           8.018775147517832,
                           8.018775147517832,
                           8.018775147517832,
                           9.661071929582006,
                           0.2735947252101626,
                           2.471262065567802,
                           0.18954222370300397,
                           0.2633058348660961,
                           0.07494334922808346,
                           1.4980157261935538,
                           0.3538857424122425,
                           0.26341770410626436,
                           0.17174804107002956,
                           -0.22912718472194316,
                           0.11060714764109056,
                           -0.30804859927082595,
                           2.8406850614439736,
                           1.0823654569610508,
                           0.9668529413216363,
                           1.8727663516543385,
                           -0.0901659930896485,
                           0.05868560690604535,
                           0.24212775097742179,
                           1.0092515209898247,
                           -0.7556969386491817,
                           0.3279350524218167,
                           1.078117272505244,
                           0.10391815458190773,
                           -0.7434930272741371,
                           -1.6965388530236032,
                           -1.360748554100242.
                           0.34939560927302815,
                           0.03188634842980519,
                           -1.2447472675125983,
                           0.06092342743494014,
                           1.017082923902293,
                           -1.007905562333318,
                           -0.8576057837691866,
                           0.5321038189070756,
                           1.300652060018237,
                           -1.8122591145188616,
                           -1.247002191580596,
                           1.2529274198051785,
                           0.3750417535596218,
                           0.2898066740735119,
                           1.589675559301449,
```

```
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058.
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883,
0.2658818907332787,
-0.9372958671062981,
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732,
2.008892916411081.
0.15285666374274742,
-1.782425531898792,
0.07791440554206944,
-1.28397958204954,
-0.7247696039786395.
0.5612678373457747,
-0.004762916486662008,
0.4386089298525658,
0.010283368626678616,
0.8990610129088383,
0.03840864905637026,
-1.2418081984826976,
0.33190310279028407,
0.3061008622829172,
-0.06950158836023225,
0.93859456058615,
-0.02489786142317165,
0.9927840878492759,
-0.0709710381209458,
-1.4546153026559692,
-0.6707274766895803,
1.0492831078613678,
1.59883886587945.
-0.7948795957139008,
0.011914265512354442,
0.29611851635537545,
-0.026452865362460363,
0.17911271593442915.
-0.268102313362264,
-0.31698956355176716,
0.5150163737561883,
-0.2617344493849528,
-0.08207987775663798,
-0.7031192006515304,
0.10296103394319861,
-1.3322481995457,
-0.8096620548125795,
0.22894179493051453,
-0.6404807766018014,
0.5981001234262467,
0.6725836248662437,
-0.24769451099401643,
-1.5367942204876157,
0.32496629998060117,
0.8231756699235411,
0.27229759145944715,
-0.4283887626472357,
0.6783210911797265,
1.178917544999848,
-0.48124012627536317,
-0.23642700938756703,
-0.22983768395119897,
0.7841497681166887,
0.5963513861028734,
-0.8505831212819382,
0.6516631671421783,
0.6698405071431395,
```

0.7826636181190869,

```
0.6733061844063541,
                                                                        1.5755992624240989]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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': { 'fiq_dpi': 100, 'status': False, 'type': 'png'},
                                                         'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric4_sample#7'},
                                             'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                   [1, 1, 1, 0],
                                                                                   [2, 2, 2, 0],
                                                                                   [3, 3, 3, 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, 7, 0, -6.397817460329862],
                                                               [12, 6, 21, 8, -3.2115716730808748],
                                                              [20, 10, 35, 16, -1.641958817033255],
                                                              [28, 14, 49, 24, -0.8464644349040011]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0 } ,
                                                                                      'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.0011,
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                'value':
0 } ,
                                                                                      'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
```

-1.6023915303224998,

```
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001.
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [28, 7, 7, 24],
                                                                    'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001.
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4}],
                                              'run_time_sec': 32.358261823654175}}],
                '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': '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': 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_noisey_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 '
                                                             ^{\prime}+ 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X 6 + 1 Z ^{\prime}
                                                             '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 \times 5 \times 6 + 0.5 \times 5 \times 6"]
                           'output': { 'exact_sol': -8.56677223350563,
                                       'initial_cost_history': [ 3.5476707600867368,
                                                                  2.3562053879970173.
                                                                   1.7833099820235232,
                                                                   2.4654982864165467,
                                                                  3.6613143494662093,
                                                                  3.6462371631182062,
                                                                  3.2935768662401737,
                                                                  3.7145398712422657,
                                                                  2.5227446974102397,
                                                                  2.4756634278387035],
                                       'noise_details': { 'gates_num': [4, 1, 1, 0],
                                                            'identity_factors': [0, 0, 0, 0],
                                                           'noise_level': [4, 2, 7, 0],
```

```
'noise_profile': { 'noise_on_init_param': { 'status': False,
                                                                 'value': 0},
                                       'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                       'status': True,
                                      'type': 'depolarizing'},
                   'odd_wires': 4},
'optimized_minimum_cost': [ -6.515742960091897,
                            -6.3330055816107915,
                            -6.410492799212151,
                            -6.4484545761945915,
                            -6.311563719128753,
                            -6.46067826504545,
                            -6.397817460329919,
                            -6.429933051303193,
                            -6.536182288327426,
                            -6.511175848027232],
'optimized_parameters': [ [ 1.5680106786222674e-17,
                            1.0238650999177359,
                            1.0238650999177359,
                            1.0238650999177359,
                            1.7041550191762513,
                            2.070931805530806.
                            2.586234954306046,
                            2.6265616878606783,
                            2.7566136785306155,
                            2.7689271757054255,
                            4.271831894498143.
                            4.271831894498143,
                            4.271831894498143,
                            5.004110362344359,
                            5.004110362344359,
                            5.529689350278954,
                            5.529689350278954,
                            5.529689350278954,
                            5.5493166460873375,
                            7.855838962179162,
                            7.855838962179162,
                            8.508023697610218,
                            8.540796404638465,
                            8.940056981382925,
                            8.940056981382925,
                            8.940056981382925,
                            8.940056981382925,
                            9.524293982069336,
                            9.524293982069336,
                            9.815045396471412,
                            0.717685470636315,
                            0.29125971197830336,
                            0.013619559122678915,
                            -0.46174394022911175,
                            -0.7802589318548062,
                            1.8785332138943256,
                            -0.07718385116900997,
                            -0.4181315830102034,
                            0.3859499067718677,
                            0.7218523694763775,
                            0.16350787496293626,
                            -0.06274337543165032,
                            1.048639096314506,
                            0.9454500907927006.
                            -0.18328208251477485,
                            0.5336296017995852,
                            0.7047960543548563,
                            -0.4717130073686535,
                            -0.14327049451726778,
                            0.5646728024946054,
                            0.1377201649736573,
                            1.0845662084088512,
                            0.7117671017527167,
                            1.8562916393289055,
                            -1.0958742208007046,
                            0.314756410152813,
                            1.0055290931424188,
                            -1.2653176839886926,
```

-0.6435463058390287,

```
-0.13689785210195535,
0.5185042269644529,
-0.07994120596020922.
-1.3394312085309903,
-0.01354724643952521,
-0.8508707890759795,
-0.7258020036409927
-0.1513648764845159,
-0.5702686618598916,
-0.20804467461705725,
-0.059043388294177074,
0.9724468840137966.
1.6889388278999584,
0.19460354666786345,
1.52688995899303,
0.40690710189505636
0.054839646577847824.
-1.9384169999074634,
-0.8955556931339368,
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788.
-0.008629533947631484,
1.3318794505555018,
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042,
0.6437292330207226,
0.02590432636550948,
0.44592066957482307,
-0.0809779454755679,
-1.1390483539597829,
0.4898473400025203,
0.11381426982162568,
0.6089836387514223,
0.17594570893388972,
0.012948010393531988,
-0.547404644839424,
0.028969189369927453,
1.1006601522977721,
-0.6406183594181203,
-0.12562720825840668,
2.0392738219317867.
0.9906966768182601,
0.03179376057566713,
1.5460159269414353,
-0.01674613470972367,
-1.1841027420803907,
0.24496917335434354,
-0.07332300856328518,
0.25897293698241475,
0.35918978324443196,
-0.007942172382781155.
0.4618323110818234,
-0.08547471514820712,
-0.5115221242285567,
0.4563488682048878,
-1.2086759202201718,
0.14282176979415442,
0.48263581465206523,
0.09855500655515351,
0.5327824526475502,
-0.19110982084320108,
-0.775795154813047,
-0.31907838177549175,
0.03477100089693282,
0.7436201132387485,
-0.022209896476399357,
-0.14741027177548285,
-0.10110024079398225,
0.20359400710495562,
-0.15623022021775929,
```

0.1964090589605299,

```
0.18042072654891128,
  0.8910666012551952,
  0.03518277211157266.
  0.11858050209575345,
  0.6912090997145024,
  0.05142750966379351,
 1.2523961498884204.
  -1.1477698487953947,
  -0.16063831357643202,
  -1.0074319345942784,
  0.29535289246662044,
 -0.002280412475169233.
 0.45599081133710123,
  -1.6715207166067523,
  0.3320227490012926,
 1.54213063147404551,
[ 0.33528943002425843,
  0.8608925283648261,
  2.8309935233222867,
  2.8382233121900358,
  2.847558790018716,
  2.8477263794127468.
  3.9337993695450666,
  3.9337993695450666,
  3.9337993695450666,
  3.9337993695450666,
  3.9337993695450666,
  5.127462455084763,
  5.128383696390232,
  5.132051241075024,
  5.132231848473024,
  5.132297186784173,
  5.132297186784173,
  5.132297186784173,
  5.132320898992942,
  5.134903164275234,
  5.734798022200061,
  5.734798022200061,
  5.734798022200061,
  6.71748919093495.
  6.71748919093495,
  9.773430860122208,
  9.791656954875775,
  9.791980525916317,
  9.804782964874805.
  9.947289619134542,
  0.6818618664375632,
  0.42253658736184846,
  0.19067339209915313,
 -2.314563573529872.
  -1.7784854373672185,
  -0.10945476580518654,
  0.08980428543050965,
  0.6265702304745648,
 -0.12016219313034968.
  0.005450784512528824,
  0.9621316606784164,
  -0.01940541263687908,
  -1.2890091107885369,
  -0.09216272929775945.
  -0.8615487717558121,
  0.021600758375482327,
 1.1068545366678577,
  -0.06436428812394061,
  -1.8186253546793636,
  -0.2455724158610742,
  0.7444478114283775,
  1.0647343146888184,
 -1.6388802958603008.
  -0.05032235091912311,
  0.7589104637111997,
  0.0934759886788552,
  0.7280377617711271.
  -0.10012682423470079,
```

-2.7917715562202794,

```
0.5843828201862561,
1.2003794612588048,
-0.2782652692858759.
1.253725179404932,
-0.831140674623039,
-1.3898002860152843,
1.7689493816619246.
-0.768539740515663,
-0.5265628815801298,
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446,
0.06348552937029919,
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997.
0.5948349944294522,
-0.5743460857513,
0.873550995352649,
0.8797938271812764,
-0.37270941226617715.
0.20553479070949218,
0.6188766136751805,
-0.4012501825920459,
-0.4763388197192611,
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537,
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616,
0.6716489600966955,
0.08900519900900147.
0.7708643633651343,
0.0944251249629154,
-0.053131619179539805,
-0.132883145931867,
0.44414428660563765,
-0.3164026614336652,
0.9835391768228284,
-0.49696354121947833,
0.3510514174127117.
-0.24991518010085176,
-0.7780713458689107,
1.3387260017849976,
0.712191280671364,
-0.4436070432657242.
1.090195713122469,
0.3876483875477464,
1.113683201871723,
0.09724940056823322,
-1.3265075307540413.
-1.8530581309545013,
0.335564434910613,
0.16061631243062188,
0.6994545842241634,
-0.0055568765936962455.
1.8148369905661879,
-0.9149620921846291,
-0.5341673651010566,
-0.6583203681162046,
-0.05148037848607484,
-0.1302834828824637,
-0.2083684341417298,
-0.7142637766159184,
0.4980789266978527,
-2.030263033934291,
-0.002330467371510849,
-0.7835259213136883,
-0.18712783689065152,
-0.271594041353006,
```

0.606962231033315,

```
0.19917323339650786,
  0.581852597021436,
  1.0547240409345577.
  0.07111303544026976,
  1.4877210254684077,
  0.08669172360020491,
  0.8024105605127613.
 0.8315802366658298,
 1.117305276662395,
  -1.0742437197416552,
  0.30921812342286065,
 -0.06994991433225481.
 1.0419800264617582,
 1.4507701003592177,
  0.2408413974211676,
 1.65737613277253581,
[ 0.08591881204796584,
  1.5026023651616802,
  1.9179097588555833,
  1.9179097588555831,
  1.9179097588555831,
 1.9179097588555831.
  2.8800636946459592,
  2.9523818900173797,
  2.9523818900173797,
  2.954896407422686,
  3.0487820562708485,
  3.0487820562708485,
  3.9462134206000328,
  3.9462134206000328,
  5.170248653928018,
  5.170248653928018,
  6.5066905594049205,
  6.5066905594049205,
 6.5066905594049205,
  6.914119522580601,
  6.914119522580601,
  6.9842551957162815,
  7.300516913785898,
  8.782483894556266.
  8.782483894556266,
  8.999633503017922,
  8.999633503017922,
  8.999633503017922,
  9.414122362394847.
  9.414122362394847,
  0.09854676674938925,
  -0.05173289612974198,
  0.30094803169630163,
 -1.1984142138894447.
 0.08610670053567002,
  0.2851928692216035,
  0.26177875477440216,
  0.11764473243628538,
  0.3495067876706816.
  -0.9678438601279628,
  -0.08762050677252062,
  0.014826088936787857,
 -0.30347729159143555,
  -1.1730530788097624.
  -0.12550631929596553,
  2.258056275075482,
 -0.5160508087356981,
  0.004541093619226378,
  -0.9345420797218197,
  0.47154522212338745,
  -0.9129446894819914,
  0.2768683391341781,
  0.29975752794333804.
  -0.16177915588279423,
  0.6021148977823381,
  0.35405737535162146,
  0.8149645603473178,
  -0.7074306860917636,
```

-0.8281028342440522,

```
-0.20840122350984505,
-0.19593362207831977,
1.2208184674045053,
-0.10408257731449277,
0.9878855326441833,
0.6508295623732647,
-0.31520021014255994.
-1.502007043998756,
-0.44913621684685756,
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521,
0.5925479388494825,
0.1500100176310508,
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612,
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243.
-0.8246572495389679,
-0.28480932751570914,
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
-0.035476380392734465,
0.9940259955458774,
-0.657126951929564,
-0.4786936406484008,
1.4564140457987391,
-1.062151832750044,
-0.01496017231630948,
0.16259290081999456,
0.601493806263198,
-0.20485253219607644,
-1.2421776762345744,
1.152288606322054,
1.1883019471730756,
0.9817659575699377,
0.9653429636905305,
0.5382122852444811,
0.722384759736696,
-0.13079560936986118,
-0.9638314109375934,
-0.13358671856975504,
-0.3949417844115237,
1.01780227278121,
0.6746960094686067,
0.14295933107831804,
-0.37974724013569766,
0.3641245559377578,
0.12972678280008856.
0.5949873255000262,
0.8499370211382984,
-0.0792654431528575,
1.9402087793428133,
-0.5583113020357903.
0.6535986429024293,
1.0008805619835928,
0.16556690201288055,
1.1071973338235597,
0.07194244573338314,
-0.9146859400815048,
-0.005186820541518637,
0.4795762978809806,
0.6475066336984044,
0.11860845746693519,
0.08044881503693782,
0.5402817334108434,
1.5532870492056725,
0.36643388228039625,
```

1.6150985923432208,

```
0.22271977417212363,
 -0.04956133994172771,
 -0.6258533610916538,
 -0.6517224443292691,
 0.2594825887888975,
 -0.1286341552665023,
 0.48749759828242367.
 -0.009813928289633511,
 0.5249350004928881,
  -0.01015655683116892,
 -0.48671658518654837,
 -0.588311268126242,
 -0.25978871509233853,
 0.9039610340757382,
 1.5549616218831699,
 -0.05330158954092406],
[ 0.3773346757087749,
 0.5734233884194113,
 0.5734233884194113,
 1.2094818154974225,
 1.2528672337957094,
 1.3073966674132076.
 4.193348178434801,
 4.228670385547864,
 4.228670385547864,
 4.228670385547864,
 4.228670385547864,
 4.228670385547864,
 4.274742575727675,
 5.343872214974395,
 5.354523589318104,
 5.449133113124401,
 5.449133113124401,
 5.449133113124401,
 5.449133113124401,
 6.208341300319731,
 6.208341300319731,
 6.738723848778546,
 6.7473872692498285,
 8.515456463543387.
 8.552181104315652,
 8.552181104315652,
 8.552181104315652,
 9.363042150968939,
 9.363042150968939.
 11.478464454984158,
 -0.2683676450988651,
  -0.9370321768196137,
 0.03790413469005285,
 -0.3520989510779511.
 0.5131804204688105,
 0.767748989456867,
 -1.1529933056041268,
 1.0195402939041247,
 -0.5189860890713169.
 1.700377968800765,
 0.48912124484584857,
 1.506730848787325,
 0.4485612726223177,
 -1.6248073049289613,
 0.10079320215400162,
 1.7454590745233427,
 1.474284546585253,
 0.08837986403943651,
 1.215839965531947,
  -0.42666568442503866,
 0.04298065245990749,
 -1.495484471060033,
 0.39055472334393304.
 -0.06187227108331559,
 1.0010296249342066,
 -0.33745943355443286,
 -0.19046242319241546,
 -0.4884459619425607,
```

0.8930564792122229,

```
0.09947441181287657,
-1.4049039336860292,
1.0413688199593338,
0.027348986225077598,
1.5457890290583323,
0.8022774572900748,
-1.0377116853398.
0.5652694406258009,
0.9990396087940023,
-0.3409174955760714,
-0.8590373420111477,
0.3662952964918326.
0.6492392290096071,
-1.0735392409833318,
-0.620775369578654,
0.5064494688850749,
0.6065178361322348.
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065.
0.40348292639904854,
0.7429600006983637,
0.13897118193917846,
0.13192395570874205,
-0.560408177185694,
-0.7293430452459922,
1.2393938765994381,
0.16520016983754293,
-0.04218705839108043,
1.9844775109402493,
-0.40811731341033075,
0.40494641878472026,
0.44317505546879765,
-0.14541224425415586,
-1.3628454492957067,
0.35572573997739254,
-0.17363781014762678,
-0.21765464091811726,
0.25867396534698067,
-0.19299239511743832,
0.842583631219517,
0.01538577194684443,
-1.3780712180305699.
0.30168991607554185,
0.03816118508668757,
-0.6330896266111891,
-0.14462412237866193,
0.22751230177420415.
2.198362599080823,
0.5538971259685714,
1.6735676153080048,
0.01161307703421222,
0.15241612900647253.
-0.4114895408906573,
0.020024246948836234,
-0.361021382333633,
1.2366726872792735,
-0.8652479233612058.
-0.38157323774943186,
-1.2043495043519374,
0.03294448415473864,
1.864475600371399,
-0.048446953541905424,
1.483038428004856,
0.02119809714572118,
-0.20756566215919184,
1.2566509021622863,
0.4040298326697209,
0.0492062183426151,
0.3396501220758691,
0.09097515161528406,
-0.4545275805495163,
```

1.5327906096069877,

```
-0.47568898039994184,
 0.7447654713950665,
 0.7179833985093875,
 -0.03692927531761856,
 0.11509825242982577,
 0.020898935398901888,
 0.2387893529411216.
 1.5195379458286031,
 -0.5337205856413728,
  -0.5741707032781822,
 1.298358172715442,
 -0.010829860462227588,
 -1.9037204771139875,
 1.5774751765228583,
 -0.28550943128124906,
 1.5531884118568244],
[ -6.331146189926128e-17,
 0.7069927066774304,
 0.7069927066774304,
 0.7069927066774305,
 0.7069927066774304,
 1.0044153364322925.
 1.0092418692996383,
 2.470333794214341,
 2.478143749866421,
 3.5776564981759003,
 3.5776564981759003,
 3.5776564981759003,
 3.61745967653339,
 3.6981780389472076,
 3.755720232685741,
 3.9712286023902594,
 3.9712286023902594,
 4.519037432417192,
 4.519037432417193,
 4.519037432417193,
 5.280953883299406,
 5.280953883299406,
 6.620356980277175,
 6.620356980277175,
 6.620356980277175,
 6.620356980277176,
 8.214004051881032,
 8.214004051881032,
 9.105951544537387.
 10.829366164164977,
 1.4490195266558639,
 1.145329650589643,
 -0.9374272684957279,
 -1.2910248872233119,
 0.9701069453007352,
 2.0238893871034924,
 -0.6731600678051081,
 -0.7305037462514778,
 0.6743483023845589.
 1.611766624162738,
  -0.162446688913207,
  -0.2464021583836281,
 1.3073653685111934,
 1.560629053845934.
 -0.09768282308379246,
 -0.31393750682085847,
 0.1625705045557987,
 -0.1344649185634244,
 -0.03516682581352061,
 0.15934568227883428,
 1.4484389719925783,
 0.31346340320241645
 -1.5406853809043388.
 0.3831701903776482,
 0.07255447956326048,
 -0.4619144712511035,
 0.6220101497739178,
 -0.08645510294766677,
  -0.036774035023737585,
```

```
-0.02433291891195538,
1.2745777688613118,
0.806643386980706,
-0.1734465019831428,
-1.474099767063678,
-1.2534035864969235,
0.024086803725753666.
-0.5946515656594247,
3.047855036387052,
0.561263952510902,
-0.27353577574812815,
0.476385213099692,
-0.4183083264972014,
-0.07584344603997495,
-0.04004176630390785,
0.6379867024754904,
3.306912023625799.
0.6758488609505069,
-0.49379826249780634,
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994.
0.1974729438666808,
0.043470303912556706,
0.2301819741695647,
1.9247102260310271,
0.19401136489510468,
0.17784496580796996,
-0.12037519976757159,
0.10596613899479704,
0.02480260398862852,
0.33616247382037256,
-0.2960626605489573,
1.2038327046358004,
-0.4266046665751028,
-0.14331073423696536,
0.33240571018120446,
0.13743208352564132,
0.21308235615415505,
-0.8816113951868988,
-0.03958129872975694,
1.7385124490728345,
1.3953860705003918,
0.7193393529381484,
-0.5890148767931709.
1.6845229617798814,
-0.04059142172715042,
-0.6588344885662398,
-1.5492107393137406,
0.9886630320432893,
1.3955090248591298,
-1.7521400718196618,
-0.02012078102450614,
1.5598528019020075,
-0.041272015671692544.
0.6659176073691222,
-0.10884895615623923,
-0.8860283635501729,
-0.042494102069769425,
-0.5241060846215897.
-0.049429521011899694,
-1.6158837397685775,
-0.29703279066650246,
0.6940812648197017,
-1.0869617874060826,
-1.1891726572683667,
0.03935191545498333,
-1.7727595774952096,
-0.0005664350349098603,
-1.2288438066739866,
2.182693040857262,
1.2648198022740724,
0.636776362006322.
-1.1418938134635428,
```

0.04892386539982865,

```
-0.6595482134655696,
 -0.016038133219537475,
 -1.53365152672916,
 -0.5818287115590742,
 -0.8537662908823758,
 1.3418170063691075,
 -0.32888813707646736.
 -0.018460135902194714,
 -0.8323242421777916,
 1.5026664500941838,
 1.809610363246633,
 -1.5283405786971713,
 0.5470095670143573,
 -1.4753657998350065,
 0.8122840148585063,
 1.53178787797161761
[ 3.750846163374531e-05,
 0.22285241391868899,
 0.26252411232084344,
 0.26252411232084344,
 0.26252411232084344,
 1.459545906754556.
 1.4595459067545562,
 1.6094835194149661,
 2.5927782099427628,
 2.5927782099427628,
 2.5927782099427628,
 2.5927782099427623,
 3.3552499939702187,
 3.3552499939702187,
 5.033284106467877,
 5.033284106467877,
 5.056477210452712,
 6.768913439946703,
 6.768913439946703,
 7.2782492670747585,
 7.2782492670747585,
 7.2782492670747585,
 7.2782492670747585,
 7.2782492670747585.
 7.2782492670747585,
 8.934198246659292,
 8.937369801451712,
 9.544406408519471,
 9.544406408519471.
 10.23170722265548,
  -0.4501443853573418,
 0.06519513561037263,
 -0.13386490845883003,
 -0.01542333988020039,
 0.3988203537526196,
 0.9163371790808124,
 0.08159154039220383,
 -0.11665429084087826,
 -0.21130662780886203.
 1.515236372470638,
 0.4436142129357345,
 -0.28780404896369716,
 0.3681425383234808,
 0.648176841676201.
 0.3046875502986337,
 0.05897820457762899,
 0.09316951897603123,
 1.5277657654344678,
 -0.655141628591867,
 0.073084468489131,
  -0.11423944001370272,
 0.3986898081963471,
 1.0974832156349317,
 1.8462557861113,
 0.5998463368708868,
 -0.0014214294560794885,
 0.4026665434776887,
 -0.03860309342262787,
 0.3728818533964108,
```

```
1.7322816292529104,
0.42156018976657544
0.9872712539907578.
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974
0.4324416138472369,
0.7909276553155474,
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866.
-0.0743310361925915,
1.1363109745761366,
0.32003332101567866,
0.08535303128967886,
1.1165485958252095.
0.476282782575683,
0.11414859665640108,
0.8927652783900955,
0.027791184984770272,
0.8970588198442948.
-0.04579755391586939,
0.10596016247070955,
0.4721342517962854,
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702,
0.2928189752635581,
-0.4120973709154422,
-0.16251962266938982,
-0.928532755338732,
0.13709877636127538,
0.09386847134985479,
-0.9415336108192559,
-1.3861285848764584,
0.5116476525314603,
-1.5694556777668651,
0.31948518026769196.
-0.0136576069296156,
0.8752899744519326,
-0.448175539102687,
-0.8567162669878051,
0.737642795798484,
-0.5233142967805873,
-0.020239952918795164,
0.9696407297918527,
1.064479355466651,
-0.43102633401249074.
0.3234367312145231,
0.02606795235445944,
0.2525608175326581,
0.09544790103129135,
0.30399471295861424,
0.6638935631613432,
2.095756590649309,
-0.5383535092385583,
-0.1523671776118538,
-0.49733805370513506.
1.0814777965289457,
-0.5541810322110113,
0.4702060218904802,
0.1941018040115748.
0.027389458133440587,
-0.6339976476553459,
0.824073822166477,
-0.8904328829691108
0.5852778403101284,
-0.37705413851354036,
-0.20234246488211116,
0.19390975159216547,
-0.03854894368679599,
-0.5885610444718222,
```

0.2892174263372239,

```
-0.7158388932188376,
  -0.03853087013753846,
  0.36228239756074476.
  0.06448164730191597,
  0.8103021451607575,
  0.04195704491201313,
  2.1946244272306323.
 1.1078290402756337,
  -0.0920096926231485,
  0.7957980849005134,
  0.10683086015182242,
  0.04139972880547422.
 1.068477454710041,
 1.5812878062267348,
 1.0292383703670558,
 1.5822631942162138],
[ 0.003375513600300809,
  0.4884127443235871,
  0.6719352108785641,
  0.9073170135093351,
  1.4946633690060278,
 1.5076957064847494.
  3.872917838142945,
  3.872917838142945,
  3.872917838142945,
  3.872917838142945,
  5.047622474508209,
  5.054336886650782,
  5.067626550795242,
  5.0733174878702085,
  5.094629387163461,
  5.749571576552799,
  5.7731554023304374,
  7.144946717661993,
 7.144946717661993,
 7.144946717661993,
  7.144946717661993,
  7.602314289267704,
  7.602314289267704,
  8.018775147517832.
 8.018775147517832,
  8.018775147517832,
  8.018775147517832,
  8.018775147517832,
  8.018775147517832.
  9.661071929582006,
  0.2735947252101626,
  2.471262065567802,
  0.18954222370300397,
  0.2633058348660961,
 0.07494334922808346,
 1.4980157261935538,
  0.3538857424122425,
  0.26341770410626436,
  0.17174804107002956,
  -0.22912718472194316,
  0.11060714764109056,
  -0.30804859927082595,
  2.8406850614439736,
 1.0823654569610508.
  0.9668529413216363,
 1.8727663516543385,
 -0.0901659930896485,
  0.05868560690604535,
  0.24212775097742179,
  1.0092515209898247,
  -0.7556969386491817,
  0.3279350524218167,
 1.078117272505244,
  0.10391815458190773,
  -0.7434930272741371,
  -1.6965388530236032,
  -1.360748554100242.
  0.34939560927302815,
```

0.03188634842980519,

```
-1.2447472675125983,
0.06092342743494014,
1.017082923902293.
-1.007905562333318,
-0.8576057837691866,
0.5321038189070756,
1.300652060018237.
-1.8122591145188616,
-1.247002191580596,
1.2529274198051785,
0.3750417535596218,
0.2898066740735119.
1.589675559301449,
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217,
0.6791516075394335.
-0.10885247153326365,
-2.2650870540994883,
0.2658818907332787,
-0.9372958671062981,
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732,
2.008892916411081,
0.15285666374274742,
-1.782425531898792,
0.07791440554206944,
-1.28397958204954,
-0.7247696039786395,
0.5612678373457747,
-0.004762916486662008,
0.4386089298525658,
0.010283368626678616,
0.8990610129088383.
0.03840864905637026,
-1.2418081984826976,
0.33190310279028407,
0.3061008622829172,
-0.06950158836023225.
0.93859456058615,
-0.02489786142317165,
0.9927840878492759,
-0.0709710381209458,
-1.4546153026559692,
-0.6707274766895803,
1.0492831078613678,
1.59883886587945,
-0.7948795957139008,
0.011914265512354442,
0.29611851635537545,
-0.026452865362460363,
0.17911271593442915,
-0.268102313362264,
-0.31698956355176716.
0.5150163737561883,
-0.2617344493849528,
-0.08207987775663798,
-0.7031192006515304,
0.10296103394319861,
-1.3322481995457,
-0.8096620548125795,
0.22894179493051453,
-0.6404807766018014.
0.5981001234262467,
0.6725836248662437,
-0.24769451099401643,
-1.5367942204876157,
0.32496629998060117,
```

0.8231756699235411,

```
0.27229759145944715,
 -0.4283887626472357
 0.6783210911797265,
 1.178917544999848,
 -0.48124012627536317,
 -0.23642700938756703,
 -0.22983768395119897.
 0.7841497681166887,
 0.5963513861028734,
  -0.8505831212819382,
 0.6516631671421783,
 0.6698405071431395.
 0.7826636181190869,
 -1.6023915303224998,
 0.6733061844063541,
 1.5755992624240989],
[ -5.647934061474703e-18,
 1.4787834906243755,
 1.478918229526628,
 1.478918229526628,
 2.0077351764243123,
 2.4302809101456218.
 2.4302809101456218,
 3.009709563144601,
 3.009709563144601,
 3.239471043198664,
 3.2405283031129133,
 3.2405283031129133,
 3.2656598154222434,
 3.5353392937639825,
 6.198713539858257,
 6.213604956994236,
 6.73397854893658,
 6.73397854893658,
 6.743547791194661,
 6.744609103740889,
 6.744609103740889,
 6.749543065628153,
 6.749543065628153,
 8.615256229309818,
 8.635090640841518,
 9.012323512360366,
 9.012323512360366,
 9.930483613907942,
 9.930483613907942.
 11.782061805135282,
 0.6870051227789642,
 0.5234095533264759,
 0.11216801162302814,
 0.044591843687496906,
 -0.747159787599118,
 1.5727279855217766,
 -0.16958009141159439,
 -0.7234855106318131,
 0.45999589631996707.
 1.3613822619347415,
 0.5234464983029046,
 0.18337466193510712,
 1.0660408011194182,
 1.2813123812864906.
 0.34899885807903364,
 1.2204971120849089,
 0.37250493843195553,
 0.3861568591798728,
 -0.4881036169368887,
 0.23720347697856276,
 0.8136369801063428,
 -0.8595161765585049,
 0.6710512785075716,
 0.5103741134651811,
 -0.48491784736765847,
 -1.939727949979543,
 0.5221979500550953,
 -0.39618913325979604,
```

-0.5258671175956018,

```
0.08753210163723862,
1.3619602585721242,
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274,
-0.7045257843816373.
-0.4468310259761979,
0.6091022847926961,
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473,
0.4465655907565091,
-1.4308928069625704,
1.6254306194316424.
-0.16298810299835312,
-1.249293985363804,
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616.
-1.1357659634071433,
-0.5734897531715744,
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403,
0.06392732561319403,
0.7711512775812011,
-1.8472478314151175
-0.46160141905881696,
1.8963279721150403,
-2.313663424814036,
0.060952702837845166,
-1.4971949982077863,
1.3040610818975555,
0.10605679464403613,
-1.138800572315487,
-0.03947636943653289,
0.07839455865010819,
-0.6470277815644087,
0.946101637008616,
-0.32144060478582315,
-0.6371693991779968.
0.30580409265523,
-0.2617129381706641,
0.4094287336545931,
0.49837362733711055,
-0.9058714721495094,
0.6137893604415533,
0.8546844695081749,
-0.8205470722456557,
-0.598852289145785,
0.46823811794119646,
1.2205247300232143,
0.031629319060699435,
1.1369587010491427,
0.12298062775535874
-0.016960252964031076.
1.1127338626212067,
0.37972118532018134,
-0.1475616440844684,
0.32749925367563326,
0.030050642250761914,
0.17169542743574548,
-0.5825729547476518,
0.7052714548722974,
0.9884296874822006,
-0.500384308215816,
0.01722431287494931,
0.40290712722731054,
-0.029200452046427447,
1.2704708243944813,
2.3709704014259345,
```

```
-2.0267551524865275,
  0.7347873374577798,
 -0.34767223966060473,
  0.009778943736386289,
  0.221000841842164,
 -0.010995780695540691,
  -0.481889271583797,
  0.7008500159073542,
  2.3944065221124076,
  -0.08320445199579081,
  2.02470278988152,
  0.02142760118000664,
 1.6794429086669174,
 1.6046551807968945,
  0.2831685070910348,
 1.5805135598594935],
[ 0.0019047787007362745,
  0.7201496918445128,
  0.7201496918445128,
  0.7201496918445127,
  0.7226708680142584,
  0.8068041864232433.
 1.3847174673528184,
 1.6031895944534578,
  2.458865333289775,
  2.458865333289775,
  2.721120236828938,
  2.721120236828938,
  3.554687304897056,
  3.554687304897056,
  4.537252190232355,
  4.537252190232355,
  5.239770593633025,
  5.242363659304797,
 5.566731623636481,
  5.566731623636481,
  5.566731623636481,
  5.566731623636481,
  5.566731623636481,
  7.6484324534494865,
 7.6484324534494865,
  8.96757120343865,
  9.352637118466301,
  9.381932224950582,
 9.966925955531599.
  9.966925955531599,
  0.29840004251263574,
  0.3207087147269936,
  -0.22478909909228914,
  -1.2242611593120782.
 0.061748844824383295,
 1.9931455249507801,
  0.02449362327304914,
 -0.23402928130657288,
  0.3399922671860315,
  0.2355005268966802,
  0.7912945290539132,
  -0.9147564287830934,
  0.12280724330167514,
  0.42016875545313104.
  0.6183328009701774,
  0.9098148543333162,
  0.2439503202728901,
  0.4941740976390827,
  0.0721485641264495,
  0.20051214721509877,
  0.14273239312798908,
  -0.03846070968482946,
  0.11474641891065286,
  0.1552743298359438,
  -0.050455466832234855,
  0.24385918138398863,
  0.0646818550964626,
  1.0379575003266166,
```

0.4438839418702803,

```
0.6652939620943935,
0.6574583263339632,
0.6386444070388955.
0.30923240052603657,
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079.
0.25272330748816335,
-0.05865013289270936,
0.324900593333006,
0.14494577696571714,
-0.2063591527406891.
0.03616506891850059,
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941.
-0.20002766061477661,
0.256318263131488,
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686.
0.685008095432428,
-0.007804627058269528,
-2.9100406031766375,
-0.17918863042787767,
-0.29620353111227854,
-0.2953351498676352,
0.4434234593316091,
0.0018987515325079429,
0.5290648024022053,
0.011057994967698829,
0.03103232328752182,
-0.21693206073792237,
-0.07883582131375938,
-0.2554965378040217,
1.978711034134111,
-0.02822992907519939,
1.110830733101554,
0.04155227001102173,
0.17370289874025888,
-0.08435695708516765,
0.38686640173882947,
1.0727525781247964,
-1.4871438236674412,
0.1437881416009117,
-0.15769165641037303,
0.46096388290194723,
0.3881288491041242,
0.3113157866411551.
-0.21237825892214532,
1.3408904937177344,
0.033287678968192874,
-0.22654084728278404,
0.09162287503278096.
1.1250326534568733,
0.670327239820091,
-1.4911819217025961,
0.8417198858779599,
0.018685303562101165,
-0.5955098452611822,
1.37350461224772,
-0.5503685346151788
0.07415629279393592,
0.22396953453102358,
-0.02219350017922496,
2.5136787648879593,
1.5560141766956836,
-0.037039417521638966,
-1.5578667717297374,
```

```
-0.15174825264689498,
 -0.0075908588231686416,
 -0.1347910987366526.
 0.7535559035800633,
  2.9519825568174283,
 -0.8640992588734872,
 -0.486197602889753.
 -0.029079605859607876,
 0.1393557947212105,
  -0.03201203543340934,
  -0.17255788414719309,
 -0.6220837667998668.
 0.10441375911567917,
 0.7019930428559267,
 1.822960884928266,
 0.0010256621400676815],
[ 0.00030922277578629,
 0.881375055029912,
 0.881375055029912,
 0.8813750550299119,
 0.9803845151714838,
 0.9803845151714838.
 1.201629973822729,
 1.2441077564052723,
 1.8660677974280824,
 1.8660677974280824,
 2.651002314516478,
 2.651002314516478,
  3.233637461790533,
 4.36384995486056,
 4.36384995486056,
 4.975714528653046,
 4.975714528653046,
 6.591840750700408,
 6.591840750700408,
 8.234009055219385.
 8.238223602720305,
 8.238223602720305,
 8.238223602720305,
 8.903406631369169.
 8.903406631369169,
 8.903406631369169,
 9.126449234760914,
 9.126449234760914,
 9.441918167657187.
 9.441918167657187,
 0.4384156956352651,
  -0.017407483354635628,
  -0.13579407977759564,
 -0.08181457210659056.
 -0.5635031413839604,
 0.570197125887921,
 -0.07389454022208618,
 0.18950484918514415,
 0.23442314823895152.
 0.5187197914643009,
 0.03760777637611914,
 1.2080522066616035,
 -0.006796933498365149,
 0.7597395812711474.
 0.3165595784185247,
 0.09234381717322694,
 -0.047116958459538144,
 0.02161370846364295.
 -0.3330735946096464,
  -0.310519881157395,
  -0.1321730433969341,
 -0.32004747583182785,
 0.38880240494533963,
 0.5587916266845782,
  -0.04068226055752174,
 -0.04929253976644778,
 0.7350044083650977,
  -0.3347542084226466,
 0.07994172439872818,
```

```
0.177027499128215,
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313,
-1.8841797053563085.
-0.39250057722196113,
0.0604718224769807,
-0.15658247224402194,
1.097732135880844,
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626,
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875.
-0.29954118659750983,
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
0.32920686175801595,
0.0470036094807545,
0.6942117349751494,
-0.24738597040458754,
-0.3530344251488351,
-0.7207866325012796,
0.6865004571010461,
-0.022934954570734595,
-0.4703523591474931,
0.00010065187353926284,
-0.25737840979321513,
-0.37927040299996573,
0.3323512575736423,
-0.7162822410895011.
-0.8849129065134153,
-0.02984860970928172,
0.9857401879405846,
0.13869536095324345,
-0.4901093246549395,
-0.15185390643388375,
-1.1107951730061545,
1.1255217267520845,
-0.36113008327046914,
0.12498769155032201.
1.105653484876161,
-0.0826241142760939,
-0.6079720837354008,
-0.4798331114275297,
-1.1230771992973987.
0.13634359721928585,
-1.0117198549615587,
0.0420371772323395,
0.4704689604818435,
-0.1136051809968673,
-0.4158299646895606,
0.7682233881623428,
-0.8567828943049521
-1.0844985071567337,
0.8118563616911731,
-1.0011580890685694,
0.06773503500153778,
-0.9972068257582826,
0.22064841214728595,
```

1.015101892093672,

```
-0.023903188302909387,
                                                    -1.5448535965900865,
                                                    0.40727537812840897.
                                                    0.6273868528756265,
                                                    -0.06403282214251436,
                                                    0.1402221940396834,
                                                    0.011807494022614938,
                                                    0.19970219531306482,
                                                    -0.3159297567283321,
                                                    0.5243897804672414,
                                                    0.6302439365729751,
                                                    0.4184253509022523,
                                                    0.38422115408735924,
                                                    0.8610939738936156,
                                                    0.3457693810952046,
                                                    0.19105880264763628]],
                       'run_time_sec': 68892.59480500221}}],
'zne': [ { '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': [ 0.3773346757087749,
                                                   0.5734233884194113,
                                                   0.5734233884194113,
                                                   1.2094818154974225,
                                                   1.2528672337957094,
                                                   1.3073966674132076,
                                                   4.193348178434801,
                                                   4.228670385547864,
                                                   4.228670385547864,
                                                   4.228670385547864,
                                                   4.228670385547864,
                                                   4.228670385547864,
                                                   4.274742575727675,
                                                   5.343872214974395,
                                                   5.354523589318104,
                                                   5.449133113124401,
                                                   5.449133113124401,
                                                   5.449133113124401,
                                                   5.449133113124401,
                                                   6.208341300319731,
                                                   6.208341300319731.
                                                   6.738723848778546,
                                                   6.7473872692498285,
                                                   8.515456463543387,
                                                   8.552181104315652,
                                                   8.552181104315652,
                                                   8.552181104315652,
                                                   9.363042150968939,
                                                   9.363042150968939,
                                                   11.478464454984158,
                                                   -0.2683676450988651,
                                                   -0.9370321768196137,
                                                   0.03790413469005285,
                                                   -0.3520989510779511,
                                                   0.5131804204688105,
                                                   0.767748989456867.
                                                   -1.1529933056041268,
                                                   1.0195402939041247,
                                                   -0.5189860890713169,
                                                   1.700377968800765,
                                                   0.48912124484584857,
                                                   1.506730848787325,
                                                   0.4485612726223177,
                                                   -1.6248073049289613,
                                                   0.10079320215400162,
                                                   1.7454590745233427,
                                                   1.474284546585253,
                                                   0.08837986403943651,
                                                   1.215839965531947,
                                                   -0.42666568442503866,
                                                   0.04298065245990749,
```

```
-1.495484471060033,
0.39055472334393304,
-0.06187227108331559,
1.0010296249342066,
-0.33745943355443286,
-0.19046242319241546,
-0.4884459619425607.
0.8930564792122229,
0.09947441181287657,
-1.4049039336860292,
1.0413688199593338,
0.027348986225077598.
1.5457890290583323,
0.8022774572900748,
-1.0377116853398,
0.5652694406258009,
0.9990396087940023.
-0.3409174955760714,
-0.8590373420111477,
0.3662952964918326,
0.6492392290096071,
-1.0735392409833318.
-0.620775369578654,
0.5064494688850749,
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637,
0.13897118193917846,
0.13192395570874205,
-0.560408177185694,
-0.7293430452459922,
1.2393938765994381,
0.16520016983754293,
-0.04218705839108043,
1.9844775109402493,
-0.40811731341033075,
0.40494641878472026,
0.44317505546879765,
-0.14541224425415586,
-1.3628454492957067.
0.35572573997739254,
-0.17363781014762678,
-0.21765464091811726,
0.25867396534698067,
-0.19299239511743832,
0.842583631219517,
0.01538577194684443,
-1.3780712180305699,
0.30168991607554185,
0.03816118508668757.
-0.6330896266111891,
-0.14462412237866193,
0.22751230177420415,
2.198362599080823,
0.5538971259685714,
1.6735676153080048,
0.01161307703421222,
0.15241612900647253,
-0.4114895408906573,
0.020024246948836234,
-0.361021382333633,
1.2366726872792735,
-0.8652479233612058,
-0.38157323774943186,
-1.2043495043519374,
0.03294448415473864,
1.864475600371399,
-0.048446953541905424.
1.483038428004856,
```

0.02119809714572118,

```
1.2566509021622863.
                                         0.4040298326697209.
                                         0.0492062183426151,
                                         0.3396501220758691,
                                         0.09097515161528406,
                                         -0.4545275805495163,
                                         1.5327906096069877,
                                         -0.47568898039994184,
                                         0.7447654713950665,
                                         0.7179833985093875,
                                         -0.03692927531761856,
                                         0.11509825242982577,
                                         0.020898935398901888,
                                         0.2387893529411216,
                                         1.5195379458286031,
                                         -0.5337205856413728,
                                         -0.5741707032781822,
                                         1.298358172715442,
                                         -0.010829860462227588,
                                         -1.9037204771139875,
                                         1.5774751765228583.
                                         -0.28550943128124906,
                                         1.5531884118568244]},
              'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric4_sample#4'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                    [1, 1, 1, 0],
                                                    [2, 2, 2, 0],
                                                   [3, 3, 3, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                         'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.44845457619454],
                                        [12, 6, 21, 8, -3.2446894681699203],
                                        [20, 10, 35, 16, -1.6866076162118238],
                                        [28, 14, 49, 24, -0.8984323471828195]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.100799560546875e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.292127940547555,
                              'others': { 'beta_coefficcients': [ 1.856490433543659,
                                                                   -1.5404920618766529,
                                                                   0.8938657642987985,
                                                                   -0.209864135965804921.
                                          'cost_richardson_zne': 6.662711482694253,
                                          'sorted_expectation_vals': [ -6.44845457619454,
                                                                        -3.2446894681699203,
                                                                        -1.6866076162118238.
                                                                        -0.8984323471828195],
                                           'sorted_noise': [13, 47, 81, 115]},
                              'sampled data': [ [4, 2, 7, 0, -6.44845457619454],
                                                [12, 6, 21, 8, -3.2446894681699203],
                                                [20, 10, 35, 16, -1.6866076162118238],
                                                [28, 14, 49, 24, -0.8984323471828195]],
                              '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],
```

-0.20756566215919184,

```
'r': 0},
                       'time': {'max': 10.0, 'min': 0.0},
                       'type': 'xy-iss'}},
'init_param': { 'value': [ 3.750846163374531e-05,
                           0.22285241391868899,
                           0.26252411232084344,
                           0.26252411232084344,
                           0.26252411232084344,
                           1.459545906754556,
                           1.4595459067545562,
                           1.6094835194149661,
                           2.5927782099427628.
                           2.5927782099427628,
                           2.5927782099427628,
                           2.5927782099427623,
                           3.3552499939702187,
                           3.3552499939702187,
                           5.033284106467877,
                           5.033284106467877,
                           5.056477210452712,
                           6.768913439946703,
                           6.768913439946703.
                           7.2782492670747585,
                           7.2782492670747585,
                           7.2782492670747585,
                           7.2782492670747585,
                           7.2782492670747585,
                           7.2782492670747585,
                           8.934198246659292,
                           8.937369801451712,
                           9.544406408519471,
                           9.544406408519471,
                           10.23170722265548,
                           -0.4501443853573418,
                           0.06519513561037263,
                           -0.13386490845883003,
                           -0.01542333988020039,
                           0.3988203537526196,
                           0.9163371790808124,
                           0.08159154039220383,
                           -0.11665429084087826,
                           -0.21130662780886203,
                           1.515236372470638,
                           0.4436142129357345,
                           -0.28780404896369716,
                           0.3681425383234808,
                           0.648176841676201,
                           0.3046875502986337,
                           0.05897820457762899,
                           0.09316951897603123,
                           1.5277657654344678,
                           -0.655141628591867,
                           0.073084468489131,
                           -0.11423944001370272,
                           0.3986898081963471,
                           1.0974832156349317,
                           1.8462557861113,
                           0.5998463368708868,
                           -0.0014214294560794885,
                           0.4026665434776887.
                           -0.03860309342262787,
                           0.3728818533964108,
                           1.7322816292529104,
                           0.42156018976657544,
                           0.9872712539907578,
                           0.5749190583224287,
                           0.1654949387796794,
                           1.0577776390475342,
                           -0.5892377479966974,
                           0.4324416138472369,
                           0.7909276553155474,
                           1.0132171075838867,
                           0.008626434202972095,
                           -1.4776636473003866,
                           -0.0743310361925915,
```

```
1.1363109745761366,
0.32003332101567866,
0.08535303128967886.
1.1165485958252095,
0.476282782575683,
0.11414859665640108,
0.8927652783900955.
0.027791184984770272,
0.8970588198442948,
-0.04579755391586939,
0.10596016247070955,
0.4721342517962854.
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702,
0.2928189752635581,
-0.4120973709154422,
-0.16251962266938982,
-0.928532755338732,
0.13709877636127538,
0.09386847134985479.
-0.9415336108192559,
-1.3861285848764584,
0.5116476525314603,
-1.5694556777668651,
0.31948518026769196,
-0.0136576069296156,
0.8752899744519326,
-0.448175539102687,
-0.8567162669878051,
0.737642795798484,
-0.5233142967805873,
-0.020239952918795164,
0.9696407297918527,
1.064479355466651.
-0.43102633401249074,
0.3234367312145231,
0.02606795235445944,
0.2525608175326581.
0.09544790103129135,
0.30399471295861424,
0.6638935631613432,
2.095756590649309,
-0.5383535092385583,
-0.1523671776118538,
-0.49733805370513506,
1.0814777965289457,
-0.5541810322110113,
0.4702060218904802.
0.1941018040115748,
0.027389458133440587,
-0.6339976476553459,
0.824073822166477,
-0.8904328829691108.
0.5852778403101284,
-0.37705413851354036,
-0.20234246488211116,
0.19390975159216547,
-0.03854894368679599.
-0.5885610444718222,
0.2892174263372239,
-0.7158388932188376,
-0.03853087013753846,
0.36228239756074476,
0.06448164730191597,
0.8103021451607575,
0.04195704491201313,
2.1946244272306323,
1.1078290402756337,
-0.0920096926231485,
0.7957980849005134,
0.10683086015182242.
0.04139972880547422,
```

1.068477454710041,

```
1.5812878062267348,
                                         1.0292383703670558,
                                         1.5822631942162138]},
              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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': { 'fiq_dpi': 100, 'status': False, 'type': 'png'},
                          'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric4_sample#6'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                   [1, 1, 1, 0],
                                                   [2, 2, 2, 0],
                                                   [3, 3, 3, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                         'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.4606782650454075],
                                        [12, 6, 21, 8, -3.2738854608106305],
                                        [20, 10, 35, 16, -1.6974907774474755],
                                        [28, 14, 49, 24, -0.8939947022135477]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.291534423828125e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.280504294823274,
                              'others': { 'beta_coefficients': [ 1.856490433543659,
                                                                   -1.5404920618766529,
                                                                   0.8938657642987985,
                                                                   -0.20986413596580492],
                                          'cost_richardson_zne': 6.662711482694253,
                                          'sorted_expectation_vals': [ -6.4606782650454075,
                                                                        -3.2738854608106305,
                                                                        -1.6974907774474755,
                                                                        -0.89399470221354771,
                                          'sorted_noise': [13, 47, 81, 115]},
                              'sampled data': [ [4, 2, 7, 0, -6.4606782650454075],
                                                 [12, 6, 21, 8, -3.2738854608106305],
                                                 [20, 10, 35, 16, -1.6974907774474755],
                                                [28, 14, 49, 24, -0.8939947022135477]],
                              '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': [ 0.08591881204796584,
                                         1.5026023651616802,
                                         1.9179097588555833.
                                         1.9179097588555831,
                                         1.9179097588555831,
                                         1.9179097588555831,
                                         2.8800636946459592,
                                         2.9523818900173797,
                                         2.9523818900173797,
                                         2.954896407422686,
                                         3.0487820562708485,
                                         3.0487820562708485.
                                         3.9462134206000328,
                                         3.9462134206000328,
                                         5.170248653928018,
                                         5.170248653928018,
                                         6.5066905594049205,
                                         6.5066905594049205,
```

```
6.5066905594049205,
6.914119522580601,
6.914119522580601,
6.9842551957162815,
7.300516913785898,
8.782483894556266,
8.782483894556266.
8.999633503017922,
8.999633503017922,
8.999633503017922,
9.414122362394847,
9.414122362394847,
0.09854676674938925,
-0.05173289612974198,
0.30094803169630163,
-1.1984142138894447,
0.08610670053567002,
0.2851928692216035,
0.26177875477440216,
0.11764473243628538,
0.3495067876706816,
-0.9678438601279628.
-0.08762050677252062,
0.014826088936787857,
-0.30347729159143555,
-1.1730530788097624,
-0.12550631929596553,
2.258056275075482,
-0.5160508087356981,
0.004541093619226378,
-0.9345420797218197,
0.47154522212338745,
-0.9129446894819914,
0.2768683391341781,
0.29975752794333804,
-0.16177915588279423,
0.6021148977823381,
0.35405737535162146,
0.8149645603473178,
-0.7074306860917636,
-0.8281028342440522,
-0.20840122350984505,
-0.19593362207831977,
1.2208184674045053,
-0.10408257731449277.
0.9878855326441833,
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756,
-0.44913621684685756,
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521,
0.5925479388494825,
0.1500100176310508,
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612.
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243,
-0.8246572495389679,
-0.28480932751570914,
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
-0.035476380392734465,
0.9940259955458774,
-0.657126951929564,
-0.4786936406484008,
1.4564140457987391,
-1.062151832750044,
```

```
-0.01496017231630948,
                           0.16259290081999456,
                           0.601493806263198.
                           -0.20485253219607644,
                           -1.2421776762345744,
                           1.152288606322054,
                           1.1883019471730756,
                           0.9817659575699377,
                           0.9653429636905305,
                           0.5382122852444811,
                           0.722384759736696,
                           -0.13079560936986118.
                           -0.9638314109375934,
                           -0.13358671856975504,
                           -0.3949417844115237,
                           1.01780227278121,
                           0.6746960094686067,
                           0.14295933107831804,
                           -0.37974724013569766,
                           0.3641245559377578,
                           0.12972678280008856,
                           0.5949873255000262,
                           0.8499370211382984,
                           -0.0792654431528575,
                           1.9402087793428133,
                           -0.5583113020357903,
                           0.6535986429024293,
                           1.0008805619835928,
                           0.16556690201288055,
                           1.1071973338235597,
                           0.07194244573338314,
                           -0.9146859400815048,
                           -0.005186820541518637,
                           0.4795762978809806,
                           0.6475066336984044,
                           0.11860845746693519.
                           0.08044881503693782,
                           0.5402817334108434,
                           1.5532870492056725,
                           0.36643388228039625.
                           1.6150985923432208,
                           0.22271977417212363,
                           -0.04956133994172771,
                           -0.6258533610916538,
                           -0.6517224443292691,
                           0.2594825887888975,
                           -0.1286341552665023,
                           0.48749759828242367,
                           -0.009813928289633511,
                           0.5249350004928881,
                           -0.01015655683116892,
                           -0.48671658518654837,
                           -0.588311268126242,
                           -0.25978871509233853,
                           0.9039610340757382,
                           1.5549616218831699,
                           -0.05330158954092406]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric4_sample#3'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 0],
                                     [3, 3, 3, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
```

```
'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.410492799212099],
                                        [12, 6, 21, 8, -3.2577133670016694],
                                        [20, 10, 35, 16, -1.674813432318219],
                                        [28, 14, 49, 24, -0.8591076530612253]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.0531158447265625e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.199299477727953,
                              'others': { 'beta_coeffiecients': [ 1.856490433543659,
                                                                   -1.5404920618766529,
                                                                   0.8938657642987985,
                                                                   -0.20986413596580492],
                                           'cost_richardson_zne': 6.662711482694253,
                                           'sorted_expectation_vals': [ -6.410492799212099,
                                                                        -3.2577133670016694,
                                                                        -1.674813432318219.
                                                                        -0.8591076530612253],
                                          'sorted_noise': [13, 47, 81, 115]},
                              'sampled data': [ [4, 2, 7, 0, -6.410492799212099],
                                                 [12, 6, 21, 8, -3.2577133670016694],
                                                 [20, 10, 35, 16, -1.674813432318219],
                                                 [28, 14, 49, 24, -0.8591076530612253]],
                              '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': [ 0.33528943002425843,
                                         0.8608925283648261,
                                         2.8309935233222867,
                                         2.8382233121900358,
                                         2.847558790018716,
                                         2.8477263794127468,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666.
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         5.127462455084763,
                                         5.128383696390232,
                                         5.132051241075024.
                                         5.132231848473024,
                                         5.132297186784173,
                                         5.132297186784173,
                                         5.132297186784173,
                                         5.132320898992942.
                                         5.134903164275234,
                                         5.734798022200061,
                                         5.734798022200061,
                                         5.734798022200061,
                                         6.71748919093495.
                                         6.71748919093495,
                                         9.773430860122208,
                                         9.791656954875775,
                                         9.791980525916317,
                                         9.804782964874805,
                                         9.947289619134542,
                                         0.6818618664375632,
                                         0.42253658736184846,
                                         0.19067339209915313,
                                         -2.314563573529872,
                                         -1.7784854373672185,
                                         -0.10945476580518654,
                                         0.08980428543050965,
                                         0.6265702304745648,
                                         -0.12016219313034968,
```

```
0.005450784512528824,
0.9621316606784164,
-0.01940541263687908,
-1.2890091107885369,
-0.09216272929775945,
-0.8615487717558121,
0.021600758375482327,
1.1068545366678577,
-0.06436428812394061,
-1.8186253546793636,
-0.2455724158610742,
0.7444478114283775,
1.0647343146888184,
-1.6388802958603008,
-0.05032235091912311,
0.7589104637111997.
0.0934759886788552.
0.7280377617711271,
-0.10012682423470079,
-2.7917715562202794,
0.5843828201862561,
1.2003794612588048.
-0.2782652692858759,
1.253725179404932,
-0.831140674623039,
-1.3898002860152843,
1.7689493816619246,
-0.768539740515663,
-0.5265628815801298,
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446,
0.06348552937029919,
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522,
-0.5743460857513,
0.873550995352649,
0.8797938271812764,
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805,
-0.4012501825920459.
-0.4763388197192611,
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537.
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616,
0.6716489600966955.
0.08900519900900147,
0.7708643633651343,
0.0944251249629154,
-0.053131619179539805,
-0.132883145931867.
0.44414428660563765,
-0.3164026614336652,
0.9835391768228284,
-0.49696354121947833,
0.3510514174127117,
-0.24991518010085176,
-0.7780713458689107,
1.3387260017849976,
0.712191280671364.
-0.4436070432657242,
1.090195713122469,
0.3876483875477464,
1.113683201871723.
0.09724940056823322,
```

-1.3265075307540413,

```
-1.8530581309545013,
                                       0.335564434910613,
                                       0.16061631243062188.
                                       0.6994545842241634,
                                       -0.0055568765936962455,
                                       1.8148369905661879,
                                       -0.9149620921846291.
                                       -0.5341673651010566,
                                       -0.6583203681162046,
                                       -0.05148037848607484,
                                       -0.1302834828824637,
                                       -0.2083684341417298,
                                       -0.7142637766159184,
                                       0.4980789266978527,
                                       -2.030263033934291,
                                       -0.002330467371510849,
                                       -0.7835259213136883,
                                       -0.18712783689065152,
                                       -0.271594041353006,
                                       0.606962231033315,
                                       0.19917323339650786,
                                       0.581852597021436.
                                       1.0547240409345577,
                                       0.07111303544026976,
                                       1.4877210254684077,
                                       0.08669172360020491,
                                       0.8024105605127613,
                                       0.8315802366658298,
                                       1.117305276662395,
                                       -1.0742437197416552,
                                       0.30921812342286065,
                                       -0.06994991433225481,
                                       1.0419800264617582,
                                       1.4507701003592177,
                                       0.2408413974211676,
                                       1.6573761327725358]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric4_sample#2'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                 [1, 1, 1, 0],
                                                 [2, 2, 2, 0],
                                                 [3, 3, 3, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                       'constraint': True,
                                       'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.333005581610795],
                                      [12, 6, 21, 8, -3.1651017858597426],
                                      [20, 10, 35, 16, -1.6439583689682524],
                                      [28, 14, 49, 24, -0.8813072530521873]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 3.9577484130859375e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.165873420461505,
                            'others': { 'beta_coefficients': [ 1.856490433543659,
                                                                 -1.5404920618766529,
                                                                 0.8938657642987985,
                                                                 -0.20986413596580492],
                                        'cost_richardson_zne': 6.662711482694253,
                                        'sorted_expectation_vals': [ -6.333005581610795,
                                                                      -3.1651017858597426,
```

```
-1.6439583689682524,
                                                                        -0.88130725305218731,
                                           'sorted_noise': [13, 47, 81, 115]},
                              'sampled data': [ [4, 2, 7, 0, -6.333005581610795],
                                                 [12, 6, 21, 8, -3.1651017858597426],
                                                 [20, 10, 35, 16, -1.6439583689682524],
                                                [28, 14, 49, 24, -0.8813072530521873]],
                              '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': [ -6.331146189926128e-17,
                                         0.7069927066774304,
                                         0.7069927066774304,
                                         0.7069927066774305,
                                         0.7069927066774304,
                                         1.0044153364322925,
                                         1.0092418692996383.
                                         2.470333794214341,
                                         2.478143749866421,
                                         3.5776564981759003,
                                         3.5776564981759003,
                                         3.5776564981759003,
                                         3.61745967653339,
                                         3.6981780389472076,
                                         3.755720232685741,
                                         3.9712286023902594,
                                         3.9712286023902594,
                                         4.519037432417192,
                                         4.519037432417193,
                                         4.519037432417193,
                                         5.280953883299406,
                                         5.280953883299406,
                                         6.620356980277175,
                                         6.620356980277175,
                                         6.620356980277175,
                                         6.620356980277176,
                                         8.214004051881032,
                                         8.214004051881032,
                                         9.105951544537387,
                                         10.829366164164977,
                                         1.4490195266558639,
                                         1.145329650589643,
                                         -0.9374272684957279,
                                         -1.2910248872233119,
                                         0.9701069453007352,
                                         2.0238893871034924,
                                         -0.6731600678051081,
                                         -0.7305037462514778,
                                         0.6743483023845589,
                                         1.611766624162738,
                                         -0.162446688913207,
                                         -0.2464021583836281,
                                         1.3073653685111934,
                                         1.560629053845934,
                                         -0.09768282308379246.
                                         -0.31393750682085847,
                                         0.1625705045557987,
                                         -0.1344649185634244,
                                         -0.03516682581352061,
                                         0.15934568227883428,
                                         1.4484389719925783,
                                         0.31346340320241645,
                                         -1.5406853809043388,
                                         0.3831701903776482,
                                         0.07255447956326048,
                                         -0.4619144712511035,
                                         0.6220101497739178,
                                         -0.08645510294766677,
                                         -0.036774035023737585,
                                         -0.02433291891195538,
```

```
1.2745777688613118,
0.806643386980706,
-0.1734465019831428,
-1.474099767063678,
-1.2534035864969235,
0.024086803725753666,
-0.5946515656594247.
3.047855036387052,
0.561263952510902,
-0.27353577574812815,
0.476385213099692,
-0.4183083264972014.
-0.07584344603997495,
-0.04004176630390785,
0.6379867024754904,
3.306912023625799,
0.6758488609505069.
-0.49379826249780634,
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808.
0.043470303912556706,
0.2301819741695647,
1.9247102260310271,
0.19401136489510468,
0.17784496580796996,
-0.12037519976757159,
0.10596613899479704,
0.02480260398862852,
0.33616247382037256,
-0.2960626605489573,
1.2038327046358004,
-0.4266046665751028,
-0.14331073423696536,
0.33240571018120446,
0.13743208352564132,
0.21308235615415505,
-0.8816113951868988,
-0.03958129872975694
1.7385124490728345,
1.3953860705003918,
0.7193393529381484,
-0.5890148767931709,
1.6845229617798814,
-0.04059142172715042,
-0.6588344885662398,
-1.5492107393137406,
0.9886630320432893,
1.3955090248591298,
-1.7521400718196618,
-0.02012078102450614,
1.5598528019020075,
-0.041272015671692544,
0.6659176073691222.
-0.10884895615623923,
-0.8860283635501729,
-0.042494102069769425,
-0.5241060846215897,
-0.049429521011899694.
-1.6158837397685775,
-0.29703279066650246,
0.6940812648197017,
-1.0869617874060826.
-1.1891726572683667,
0.03935191545498333,
-1.7727595774952096,
-0.0005664350349098603,
-1.2288438066739866,
2.182693040857262,
1.2648198022740724,
0.636776362006322,
-1.1418938134635428.
0.04892386539982865,
-0.6595482134655696,
```

```
-0.016038133219537475,
                                         -1.53365152672916,
                                         -0.5818287115590742.
                                         -0.8537662908823758,
                                         1.3418170063691075,
                                         -0.32888813707646736,
                                         -0.018460135902194714,
                                         -0.8323242421777916,
                                         1.5026664500941838,
                                         1.809610363246633,
                                         -1.5283405786971713,
                                         0.5470095670143573,
                                         -1.4753657998350065,
                                         0.8122840148585063,
                                         1.5317878779716176]},
              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric4_sample#5'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                    [1, 1, 1, 0],
                                                    [2, 2, 2, 0],
                                                   [3, 3, 3, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                         'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.3115637191286815],
                                        [12, 6, 21, 8, -3.2712898811023576],
                                         [20, 10, 35, 16, -1.7533390824025292],
                                        [28, 14, 49, 24, -0.9662277022700592]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 6.437301635742188e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.042434808411594,
                              'others': { 'beta_coeffiecients': [ 1.856490433543659,
                                                                   -1.5404920618766529,
                                                                   0.8938657642987985.
                                                                   -0.20986413596580492],
                                          'cost_richardson_zne': 6.662711482694253,
                                          'sorted_expectation_vals': [ -6.3115637191286815,
                                                                        -3.2712898811023576,
                                                                        -1.7533390824025292.
                                                                        -0.9662277022700592],
                                           'sorted_noise': [13, 47, 81, 115]},
                              'sampled data': [ [4, 2, 7, 0, -6.3115637191286815],
                                                 [12, 6, 21, 8, -3.2712898811023576],
                                                 [20, 10, 35, 16, -1.7533390824025292],
                                                [28, 14, 49, 24, -0.9662277022700592]],
                              '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': [ 0.0019047787007362745,
                                         0.7201496918445128,
                                         0.7201496918445128,
                                         0.7201496918445127.
                                         0.7226708680142584,
                                         0.8068041864232433,
```

```
1.3847174673528184,
1.6031895944534578,
2.458865333289775,
2.458865333289775,
2.721120236828938,
2.721120236828938,
3.554687304897056.
3.554687304897056,
4.537252190232355,
4.537252190232355,
5.239770593633025,
5.242363659304797.
5.566731623636481,
5.566731623636481,
5.566731623636481,
5.566731623636481,
5.566731623636481.
7.6484324534494865,
7.6484324534494865,
8.96757120343865,
9.352637118466301,
9.381932224950582.
9.966925955531599,
9.966925955531599,
0.29840004251263574,
0.3207087147269936,
-0.22478909909228914,
-1.2242611593120782,
0.061748844824383295,
1.9931455249507801,
0.02449362327304914,
-0.23402928130657288,
0.3399922671860315,
0.2355005268966802,
0.7912945290539132,
-0.9147564287830934,
0.12280724330167514,
0.42016875545313104,
0.6183328009701774,
0.9098148543333162,
0.2439503202728901,
0.4941740976390827,
0.0721485641264495,
0.20051214721509877,
0.14273239312798908.
-0.03846070968482946,
0.11474641891065286,
0.1552743298359438,
-0.050455466832234855,
0.24385918138398863,
0.0646818550964626,
1.0379575003266166,
0.4438839418702803,
0.6652939620943935,
0.6574583263339632.
0.6386444070388955,
0.30923240052603657,
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079.
0.25272330748816335,
-0.05865013289270936,
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059,
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
```

-0.7141485635922941,

```
0.256318263131488,
                           1.811390397828268,
                           -0.4480297381108074,
                           -0.0031154151062657686,
                           0.685008095432428,
                           -0.007804627058269528,
                           -2.9100406031766375,
                           -0.17918863042787767,
                           -0.29620353111227854,
                           -0.2953351498676352,
                           0.4434234593316091.
                           0.0018987515325079429,
                           0.5290648024022053,
                           0.011057994967698829,
                           0.03103232328752182,
                           -0.21693206073792237,
                           -0.07883582131375938,
                           -0.2554965378040217,
                           1.978711034134111,
                           -0.02822992907519939,
                           1.110830733101554.
                           0.04155227001102173,
                           0.17370289874025888,
                           -0.08435695708516765,
                           0.38686640173882947,
                           1.0727525781247964,
                           -1.4871438236674412,
                           0.1437881416009117,
                           -0.15769165641037303,
                           0.46096388290194723,
                           0.3881288491041242,
                           0.3113157866411551,
                           -0.21237825892214532,
                           1.3408904937177344,
                           0.033287678968192874,
                           -0.22654084728278404,
                           0.09162287503278096,
                           1.1250326534568733,
                           0.670327239820091,
                           -1.4911819217025961,
                           0.8417198858779599,
                           0.018685303562101165,
                           -0.5955098452611822,
                           1.37350461224772,
                           -0.5503685346151788,
                           0.07415629279393592,
                           0.22396953453102358,
                           -0.02219350017922496,
                           2.5136787648879593,
                           1.5560141766956836,
                           -0.037039417521638966,
                           -1.5578667717297374,
                           -0.15174825264689498,
                           -0.0075908588231686416,
                           -0.1347910987366526,
                           0.7535559035800633,
                           2.9519825568174283,
                           -0.8640992588734872,
                           -0.486197602889753.
                           -0.029079605859607876,
                           0.1393557947212105,
                           -0.03201203543340934,
                           -0.17255788414719309,
                           -0.6220837667998668,
                           0.10441375911567917,
                           0.7019930428559267,
                           1.822960884928266,
                           0.0010256621400676815]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
```

-0.20002766061477661,

```
'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_noisy_time_evo_ric4_sample#9'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                    [1, 1, 1, 0],
                                                    [2, 2, 2, 0],
                                                    [3, 3, 3, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.536182288327376],
                                        [12, 6, 21, 8, -3.450081350248876],
                                        [20, 10, 35, 16, -1.8650932993173606],
                                        [28, 14, 49, 24, -1.0247351729167147]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 5.054473876953125e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.271624843115143,
                              'others': { 'beta_coefficcients': [ 1.856490433543659,
                                                                   -1.5404920618766529,
                                                                   0.8938657642987985,
                                                                   -0.20986413596580492],
                                           'cost_richardson_zne': 6.662711482694253,
                                           'sorted_expectation_vals': [ -6.536182288327376,
                                                                        -3.450081350248876,
                                                                        -1.8650932993173606,
                                                                        -1.02473517291671471,
                                           'sorted_noise': [13, 47, 81, 115]},
                              'sampled data': [ [4, 2, 7, 0, -6.536182288327376],
                                                 [12, 6, 21, 8, -3.450081350248876],
                                                 [20, 10, 35, 16, -1.8650932993173606],
                                                [28, 14, 49, 24, -1.0247351729167147]],
                              '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': [ -5.647934061474703e-18,
                                         1.4787834906243755,
                                         1.478918229526628,
                                         1.478918229526628,
                                         2.0077351764243123,
                                         2.4302809101456218,
                                         2.4302809101456218,
                                         3.009709563144601,
                                         3.009709563144601,
                                         3.239471043198664,
                                         3.2405283031129133,
                                         3.2405283031129133.
                                         3.2656598154222434,
                                         3.5353392937639825,
                                         6.198713539858257,
                                         6.213604956994236,
                                         6.73397854893658,
                                         6.73397854893658,
                                         6.743547791194661,
                                         6.744609103740889,
                                         6.744609103740889.
                                         6.749543065628153,
                                         6.749543065628153,
                                         8.615256229309818,
                                         8.635090640841518,
                                         9.012323512360366,
                                         9.012323512360366,
```

```
9.930483613907942,
9.930483613907942,
11.782061805135282.
0.6870051227789642,
0.5234095533264759,
0.11216801162302814,
0.044591843687496906.
-0.747159787599118,
1.5727279855217766,
-0.16958009141159439,
-0.7234855106318131,
0.45999589631996707.
1.3613822619347415,
0.5234464983029046,
0.18337466193510712,
1.0660408011194182,
1.2813123812864906.
0.34899885807903364,
1.2204971120849089,
0.37250493843195553,
0.3861568591798728,
-0.4881036169368887.
0.23720347697856276,
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716,
0.5103741134651811,
-0.48491784736765847,
-1.939727949979543,
0.5221979500550953,
-0.39618913325979604,
-0.5258671175956018,
0.08753210163723862,
1.3619602585721242,
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274,
-0.7045257843816373,
-0.4468310259761979.
0.6091022847926961,
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836.
0.37020611055835473,
0.4465655907565091,
-1.4308928069625704,
1.6254306194316424,
-0.16298810299835312.
-1.249293985363804,
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616,
-1.1357659634071433,
-0.5734897531715744,
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403.
0.06392732561319403,
0.7711512775812011,
-1.8472478314151175,
-0.46160141905881696,
1.8963279721150403,
-2.313663424814036,
0.060952702837845166,
-1.4971949982077863,
1.3040610818975555,
0.10605679464403613,
-1.138800572315487,
-0.03947636943653289,
0.07839455865010819.
-0.6470277815644087,
```

0.946101637008616,

```
-0.32144060478582315,
                           -0.6371693991779968,
                           0.30580409265523.
                           -0.2617129381706641,
                           0.4094287336545931,
                           0.49837362733711055,
                           -0.9058714721495094.
                           0.6137893604415533,
                           0.8546844695081749,
                           -0.8205470722456557,
                           -0.598852289145785,
                           0.46823811794119646.
                           1.2205247300232143,
                           0.031629319060699435,
                           1.1369587010491427,
                           0.12298062775535874,
                           -0.016960252964031076,
                           1.1127338626212067,
                           0.37972118532018134,
                           -0.1475616440844684,
                           0.32749925367563326,
                           0.030050642250761914.
                           0.17169542743574548,
                           -0.5825729547476518,
                           0.7052714548722974,
                           0.9884296874822006,
                           -0.500384308215816,
                           0.01722431287494931,
                           0.40290712722731054,
                           -0.029200452046427447,
                           1.2704708243944813,
                           2.3709704014259345,
                           -2.0267551524865275,
                           0.7347873374577798,
                           -0.34767223966060473,
                           0.009778943736386289,
                           0.221000841842164,
                           -0.010995780695540691,
                           -0.481889271583797,
                           0.7008500159073542,
                           2.3944065221124076,
                           -0.08320445199579081,
                           2.02470278988152,
                           0.02142760118000664,
                           1.6794429086669174,
                           1.6046551807968945,
                           0.2831685070910348,
                           1.5805135598594935]},
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric4_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 0],
                                     [3, 3, 3, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 7, 0, -6.429933051303131],
                          [12, 6, 21, 8, -3.199071961215845],
                          [20, 10, 35, 16, -1.6351376911040885],
                          [28, 14, 49, 24, -0.8526977600673815]],
         'degree': 0,
         'method': 'richardson',
```

```
'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.482269287109375e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.291607159781275,
                              'others': { 'beta_coeffiecients': [ 1.856490433543659,
                                                                   -1.5404920618766529,
                                                                   0.8938657642987985,
                                                                   -0.20986413596580492],
                                           'cost_richardson_zne': 6.662711482694253,
                                           'sorted_expectation_vals': [ -6.429933051303131,
                                                                        -3.199071961215845,
                                                                        -1.6351376911040885,
                                                                        -0.8526977600673815],
                                           'sorted_noise': [13, 47, 81, 115]},
                              'sampled data': [ [4, 2, 7, 0, -6.429933051303131],
                                                 [12, 6, 21, 8, -3.199071961215845],
                                                 [20, 10, 35, 16, -1.6351376911040885],
                                                 [28, 14, 49, 24, -0.8526977600673815]],
                              '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': [ 0.003375513600300809,
                                         0.4884127443235871,
                                         0.6719352108785641,
                                         0.9073170135093351,
                                         1.4946633690060278,
                                         1.5076957064847494,
                                         3.872917838142945,
                                         3.872917838142945,
                                         3.872917838142945,
                                         3.872917838142945,
                                         5.047622474508209,
                                         5.054336886650782,
                                         5.067626550795242,
                                         5.0733174878702085,
                                         5.094629387163461,
                                         5.749571576552799,
                                         5.7731554023304374,
                                         7.144946717661993.
                                         7.144946717661993,
                                         7.144946717661993,
                                          7.144946717661993,
                                          7.602314289267704,
                                         7.602314289267704.
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         9.661071929582006,
                                         0.2735947252101626,
                                         2.471262065567802,
                                         0.18954222370300397.
                                         0.2633058348660961,
                                         0.07494334922808346,
                                         1.4980157261935538,
                                         0.3538857424122425,
                                         0.26341770410626436,
                                         0.17174804107002956,
                                          -0.22912718472194316,
                                         0.11060714764109056,
                                         -0.30804859927082595.
                                         2.8406850614439736,
                                         1.0823654569610508,
                                         0.9668529413216363,
                                         1.8727663516543385,
                                         -0.0901659930896485,
                                         0.05868560690604535,
```

```
0.24212775097742179,
1.0092515209898247,
-0.7556969386491817.
0.3279350524218167,
1.078117272505244,
0.10391815458190773,
-0.7434930272741371.
-1.6965388530236032,
-1.360748554100242,
0.34939560927302815,
0.03188634842980519,
-1.2447472675125983.
0.06092342743494014,
1.017082923902293,
-1.007905562333318,
-0.8576057837691866,
0.5321038189070756.
1.300652060018237,
-1.8122591145188616,
-1.247002191580596,
1.2529274198051785,
0.3750417535596218.
0.2898066740735119,
1.589675559301449,
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883,
0.2658818907332787.
-0.9372958671062981,
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732.
2.008892916411081,
0.15285666374274742,
-1.782425531898792,
0.07791440554206944,
-1.28397958204954,
-0.7247696039786395,
0.5612678373457747,
-0.004762916486662008,
0.4386089298525658,
0.010283368626678616.
0.8990610129088383,
0.03840864905637026,
-1.2418081984826976,
0.33190310279028407,
0.3061008622829172.
-0.06950158836023225,
0.93859456058615,
-0.02489786142317165,
0.9927840878492759,
-0.0709710381209458,
-1.4546153026559692,
-0.6707274766895803,
1.0492831078613678,
1.59883886587945,
-0.7948795957139008,
0.011914265512354442,
0.29611851635537545,
-0.026452865362460363,
0.17911271593442915.
-0.268102313362264,
-0.31698956355176716,
0.5150163737561883,
-0.2617344493849528,
-0.08207987775663798,
```

-0.7031192006515304,

```
-1.3322481995457,
                                         -0.8096620548125795.
                                         0.22894179493051453,
                                         -0.6404807766018014,
                                         0.5981001234262467,
                                         0.6725836248662437.
                                         -0.24769451099401643,
                                         -1.5367942204876157,
                                         0.32496629998060117,
                                         0.8231756699235411,
                                         0.27229759145944715,
                                         -0.4283887626472357,
                                         0.6783210911797265,
                                         1.178917544999848,
                                         -0.48124012627536317,
                                         -0.23642700938756703,
                                         -0.22983768395119897,
                                         0.7841497681166887,
                                         0.5963513861028734,
                                         -0.8505831212819382,
                                         0.6516631671421783.
                                         0.6698405071431395,
                                         0.7826636181190869,
                                         -1.6023915303224998,
                                         0.6733061844063541,
                                         1.5755992624240989]},
              'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric4_sample#7'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                    [1, 1, 1, 0],
                                                   [2, 2, 2, 0],
                                                   [3, 3, 3, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                         'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.397817460329862],
                                        [12, 6, 21, 8, -3.2115716730808748],
                                        [20, 10, 35, 16, -1.641958817033255],
                                        [28, 14, 49, 24, -0.8464644349040011]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.4345855712890625e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.22013448780964,
                              'others': { 'beta_coefficcients': [ 1.856490433543659,
                                                                   -1.5404920618766529,
                                                                   0.8938657642987985,
                                                                   -0.20986413596580492],
                                          'cost_richardson_zne': 6.662711482694253,
                                           'sorted_expectation_vals': [ -6.397817460329862,
                                                                        -3.2115716730808748,
                                                                        -1.641958817033255,
                                                                        -0.8464644349040011],
                                          'sorted_noise': [13, 47, 81, 115]},
                              'sampled data': [ [4, 2, 7, 0, -6.397817460329862],
                                                [12, 6, 21, 8, -3.2115716730808748],
                                                [20, 10, 35, 16, -1.641958817033255],
                                                [28, 14, 49, 24, -0.8464644349040011]],
                              'sampling': 'default'}}},
{ 'config': { 'ansatz': { 'gateset': 1,
```

0.10296103394319861,

```
'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': [ 1.5680106786222674e-17,
                           1.0238650999177359,
                           1.0238650999177359,
                           1.0238650999177359,
                           1.7041550191762513,
                           2.070931805530806,
                           2.586234954306046,
                           2.6265616878606783,
                           2.7566136785306155,
                           2.7689271757054255,
                           4.271831894498143,
                           4.271831894498143,
                           4.271831894498143,
                           5.004110362344359,
                           5.004110362344359,
                           5.529689350278954.
                           5.529689350278954,
                           5.529689350278954,
                           5.5493166460873375,
                           7.855838962179162,
                           7.855838962179162,
                           8.508023697610218,
                           8.540796404638465,
                           8.940056981382925,
                           8.940056981382925,
                           8.940056981382925,
                           8.940056981382925,
                           9.524293982069336,
                           9.524293982069336,
                           9.815045396471412,
                           0.717685470636315,
                           0.29125971197830336,
                           0.013619559122678915,
                           -0.46174394022911175,
                           -0.7802589318548062,
                           1.8785332138943256,
                           -0.07718385116900997,
                           -0.4181315830102034,
                           0.3859499067718677,
                           0.7218523694763775,
                           0.16350787496293626,
                           -0.06274337543165032,
                           1.048639096314506,
                           0.9454500907927006,
                           -0.18328208251477485,
                           0.5336296017995852,
                           0.7047960543548563,
                           -0.4717130073686535,
                           -0.14327049451726778,
                           0.5646728024946054,
                           0.1377201649736573,
                           1.0845662084088512,
                           0.7117671017527167,
                           1.8562916393289055.
                           -1.0958742208007046,
                           0.314756410152813,
                           1.0055290931424188,
                           -1.2653176839886926,
                           -0.6435463058390287,
                           -0.13689785210195535,
                           0.5185042269644529,
                           -0.07994120596020922
                           -1.3394312085309903,
                           -0.01354724643952521,
                           -0.8508707890759795,
                           -0.7258020036409927,
                           -0.1513648764845159,
                           -0.5702686618598916,
                           -0.20804467461705725,
```

```
-0.059043388294177074,
0.9724468840137966,
1.6889388278999584.
0.19460354666786345,
1.52688995899303,
0.40690710189505636,
0.054839646577847824.
-1.9384169999074634,
-0.8955556931339368,
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788.
-0.008629533947631484,
1.3318794505555018,
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042,
0.6437292330207226,
0.02590432636550948,
0.44592066957482307.
-0.0809779454755679,
-1.1390483539597829,
0.4898473400025203,
0.11381426982162568,
0.6089836387514223,
0.17594570893388972,
0.012948010393531988,
-0.547404644839424,
0.028969189369927453,
1.1006601522977721,
-0.6406183594181203,
-0.12562720825840668,
2.0392738219317867.
0.9906966768182601,
0.03179376057566713,
1.5460159269414353,
-0.01674613470972367,
-1.1841027420803907,
0.24496917335434354,
-0.07332300856328518,
0.25897293698241475,
0.35918978324443196,
-0.007942172382781155.
0.4618323110818234,
-0.08547471514820712,
-0.5115221242285567,
0.4563488682048878,
-1.2086759202201718.
0.14282176979415442,
0.48263581465206523,
0.09855500655515351,
0.5327824526475502,
-0.19110982084320108,
-0.775795154813047,
-0.31907838177549175,
0.03477100089693282,
0.7436201132387485,
-0.022209896476399357,
-0.14741027177548285,
-0.10110024079398225,
0.20359400710495562,
-0.15623022021775929,
0.1964090589605299,
0.18042072654891128,
0.8910666012551952,
0.03518277211157266,
0.11858050209575345.
0.6912090997145024,
0.05142750966379351,
1.2523961498884204,
-1.1477698487953947.
-0.16063831357643202,
```

-1.0074319345942784,

```
0.29535289246662044,
                                         -0.002280412475169233,
                                         0.45599081133710123.
                                         -1.6715207166067523,
                                         0.3320227490012926,
                                         1.5421306314740455]},
              'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric4_sample#1'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                    [1, 1, 1, 0],
                                                   [2, 2, 2, 0],
                                                   [3, 3, 3, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.515742960091851],
                                        [12, 6, 21, 8, -3.36492111003702],
                                        [20, 10, 35, 16, -1.7545658776574033],
                                        [28, 14, 49, 24, -0.9139478342631158]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 3.933906555175781e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.289321710676138,
                              'others': { 'beta_coeffiecients': [ 1.856490433543659,
                                                                   -1.5404920618766529,
                                                                   0.8938657642987985,
                                                                   -0.20986413596580492],
                                          'cost_richardson_zne': 6.662711482694253,
                                          'sorted_expectation_vals': [ -6.515742960091851,
                                                                        -3.36492111003702,
                                                                        -1.7545658776574033,
                                                                        -0.9139478342631158],
                                          'sorted_noise': [13, 47, 81, 115]},
                              'sampled data': [ [4, 2, 7, 0, -6.515742960091851],
                                                [12, 6, 21, 8, -3.36492111003702],
                                                [20, 10, 35, 16, -1.7545658776574033],
                                                [28, 14, 49, 24, -0.9139478342631158]],
                              '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': [ 0.00030922277578629,
                                         0.881375055029912,
                                         0.881375055029912,
                                         0.8813750550299119,
                                         0.9803845151714838,
                                         0.9803845151714838,
                                         1.201629973822729,
                                         1.2441077564052723,
                                         1.8660677974280824.
                                         1.8660677974280824,
                                         2.651002314516478,
                                         2.651002314516478,
                                         3.233637461790533,
                                         4.36384995486056,
                                         4.36384995486056,
```

```
4.975714528653046,
4.975714528653046,
6.591840750700408.
6.591840750700408,
8.234009055219385,
8.238223602720305,
8.238223602720305.
8.238223602720305,
8.903406631369169,
8.903406631369169,
8.903406631369169,
9.126449234760914.
9.126449234760914,
9.441918167657187,
9.441918167657187,
0.4384156956352651,
-0.017407483354635628,
-0.13579407977759564,
-0.08181457210659056,
-0.5635031413839604,
0.570197125887921,
-0.07389454022208618.
0.18950484918514415,
0.23442314823895152,
0.5187197914643009,
0.03760777637611914,
1.2080522066616035,
-0.006796933498365149,
0.7597395812711474,
0.3165595784185247,
0.09234381717322694,
-0.047116958459538144,
0.02161370846364295,
-0.3330735946096464,
-0.310519881157395,
-0.1321730433969341,
-0.32004747583182785,
0.38880240494533963,
0.5587916266845782,
-0.04068226055752174
-0.04929253976644778,
0.7350044083650977,
-0.3347542084226466,
0.07994172439872818,
0.177027499128215,
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313.
-1.8841797053563085,
-0.39250057722196113,
0.0604718224769807,
-0.15658247224402194,
1.097732135880844.
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626.
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875,
-0.29954118659750983,
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
```

```
0.32920686175801595,
                           0.0470036094807545,
                           0.6942117349751494,
                           -0.24738597040458754,
                           -0.3530344251488351,
                           -0.7207866325012796,
                           0.6865004571010461,
                           -0.022934954570734595,
                           -0.4703523591474931,
                           0.00010065187353926284,
                           -0.25737840979321513,
                           -0.37927040299996573,
                           0.3323512575736423,
                           -0.7162822410895011,
                           -0.8849129065134153,
                           -0.02984860970928172,
                           0.9857401879405846,
                           0.13869536095324345,
                           -0.4901093246549395,
                           -0.15185390643388375,
                           -1.1107951730061545,
                           1.1255217267520845.
                           -0.36113008327046914,
                           0.12498769155032201,
                           1.105653484876161,
                           -0.0826241142760939,
                           -0.6079720837354008,
                           -0.4798331114275297,
                           -1.1230771992973987,
                           0.13634359721928585,
                           -1.0117198549615587,
                           0.0420371772323395,
                           0.4704689604818435,
                           -0.1136051809968673,
                           -0.4158299646895606,
                           0.7682233881623428,
                           -0.8567828943049521,
                           -1.0844985071567337,
                           0.8118563616911731,
                           -1.0011580890685694,
                           0.06773503500153778,
                           -0.9972068257582826,
                           0.22064841214728595,
                           1.015101892093672,
                           -0.023903188302909387.
                           -1.5448535965900865,
                           0.40727537812840897,
                           0.6273868528756265,
                           -0.06403282214251436
                           0.1402221940396834,
                           0.011807494022614938,
                           0.19970219531306482,
                           -0.3159297567283321,
                           0.5243897804672414,
                           0.6302439365729751.
                           0.4184253509022523,
                           0.38422115408735924,
                           0.8610939738936156,
                           0.3457693810952046,
                           0.19105880264763628]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric4_sample#10'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 0],
                                     [3, 3, 3, 0]]},
```

```
'run': 'zne',
                                     'state': 'dmatrix',
                                     'vqe': { 'iteration': 1,
                                              'optimization': { 'algorithm': 'SLSQP',
                                                                'constraint': True,
                                                                'status': False}},
                                     'zne': { 'data_points': [ [4, 2, 7, 0, -6.511175848027214],
                                                               [12, 6, 21, 8, -3.5131084000754242],
                                                               [20, 10, 35, 16, -1.9256894730075684],
                                                               [28, 14, 49, 24, -1.064810006156379]],
                                              'degree': 0,
                                              'method': 'richardson',
                                              'sampling': 'default'}},
                        'output': { 'exact_sol': -8.566772233505624,
                                     'run_time_sec': 4.482269287109375e-05,
                                     'zne_values': { 'degree': 0,
                                                     'extrapolated_value': -8.173862530836974,
                                                     'others': { 'beta_coefficients': [ 1.856490433543659,
                                                                                          -1.5404920618766529,
                                                                                          0.8938657642987985,
                                                                                          -0.20986413596580492],
                                                                 'cost_richardson_zne': 6.662711482694253,
                                                                 'sorted_expectation_vals': [ -6.511175848027214,
                                                                                               -3.5131084000754242.
                                                                                               -1.9256894730075684,
                                                                                               -1.064810006156379],
                                                                 'sorted_noise': [13, 47, 81, 115]},
                                                     'sampled data': [ [4, 2, 7, 0, -6.511175848027214],
                                                                       [12, 6, 21, 8, -3.5131084000754242],
                                                                       [20, 10, 35, 16, -1.9256894730075684],
                                                                       [28, 14, 49, 24, -1.064810006156379]],
                                                     'sampling': 'default'}}}],
'xy-ric5': { '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': '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'},
                                          'naubits': 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': '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 \times 0 \times 1 + 0.5 \times 0 \times 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':
                                                                             '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,
                                        -8.4818863732741771,
            '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,
```

False.

```
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,
 1.55418180841950071,
[ 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,
 -0.0412049699912434841,
[ 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,
-0.17185617277774212,
-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],
                                                                        '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': [ 1.5680106786222674e-17,
                                                         1.0238650999177359,
                                                         1.0238650999177359,
                                                         1.0238650999177359,
                                                         1.7041550191762513,
                                                         2.070931805530806,
                                                         2.586234954306046,
                                                         2.6265616878606783,
                                                         2.7566136785306155,
                                                         2.7689271757054255,
                                                         4.271831894498143,
                                                         4.271831894498143.
                                                         4.271831894498143,
                                                         5.004110362344359,
                                                         5.004110362344359,
                                                         5.529689350278954,
                                                         5.529689350278954,
                                                         5.529689350278954,
                                                         5.5493166460873375,
                                                         7.855838962179162,
                                                         7.855838962179162,
                                                         8.508023697610218,
                                                         8.540796404638465,
                                                         8.940056981382925,
                                                         8.940056981382925,
                                                         8.940056981382925,
                                                         8.940056981382925,
```

```
9.524293982069336,
9.524293982069336,
9.815045396471412,
0.717685470636315,
0.29125971197830336,
0.013619559122678915,
-0.46174394022911175,
-0.7802589318548062,
1.8785332138943256,
-0.07718385116900997,
-0.4181315830102034,
0.3859499067718677.
0.7218523694763775,
0.16350787496293626,
-0.06274337543165032,
1.048639096314506,
0.9454500907927006.
-0.18328208251477485,
0.5336296017995852,
0.7047960543548563,
-0.4717130073686535,
-0.14327049451726778.
0.5646728024946054,
0.1377201649736573,
1.0845662084088512,
0.7117671017527167,
1.8562916393289055,
-1.0958742208007046,
0.314756410152813,
1.0055290931424188,
-1.2653176839886926,
-0.6435463058390287,
-0.13689785210195535,
0.5185042269644529,
-0.07994120596020922,
-1.3394312085309903,
-0.01354724643952521,
-0.8508707890759795,
-0.7258020036409927,
-0.1513648764845159,
-0.5702686618598916,
-0.20804467461705725,
-0.059043388294177074,
0.9724468840137966,
1.6889388278999584.
0.19460354666786345,
1.52688995899303,
0.40690710189505636,
0.054839646577847824,
-1.9384169999074634.
-0.8955556931339368,
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788,
-0.008629533947631484.
1.3318794505555018,
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042,
0.6437292330207226,
0.02590432636550948,
0.44592066957482307,
-0.0809779454755679,
-1.1390483539597829,
0.4898473400025203,
0.11381426982162568,
0.6089836387514223,
0.17594570893388972,
0.012948010393531988,
-0.547404644839424,
0.028969189369927453.
1.1006601522977721,
```

-0.6406183594181203,

```
-0.12562720825840668,
                                       2.0392738219317867,
                                       0.9906966768182601.
                                       0.03179376057566713,
                                       1.5460159269414353,
                                       -0.01674613470972367,
                                       -1.1841027420803907,
                                       0.24496917335434354,
                                       -0.07332300856328518,
                                       0.25897293698241475,
                                       0.35918978324443196,
                                       -0.007942172382781155,
                                       0.4618323110818234,
                                       -0.08547471514820712,
                                       -0.5115221242285567,
                                       0.4563488682048878,
                                       -1.2086759202201718,
                                       0.14282176979415442,
                                       0.48263581465206523,
                                       0.09855500655515351,
                                       0.5327824526475502,
                                       -0.19110982084320108.
                                       -0.775795154813047,
                                       -0.31907838177549175,
                                       0.03477100089693282,
                                       0.7436201132387485,
                                       -0.022209896476399357,
                                       -0.14741027177548285,
                                       -0.10110024079398225,
                                       0.20359400710495562,
                                       -0.15623022021775929,
                                       0.1964090589605299,
                                       0.18042072654891128,
                                       0.8910666012551952,
                                       0.03518277211157266,
                                       0.11858050209575345,
                                       0.6912090997145024,
                                       0.05142750966379351,
                                       1.2523961498884204,
                                       -1.1477698487953947.
                                       -0.16063831357643202,
                                       -1.0074319345942784,
                                       0.29535289246662044,
                                       -0.002280412475169233,
                                       0.45599081133710123,
                                       -1.6715207166067523,
                                       0.3320227490012926,
                                       1.5421306314740455]},
            'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric5_sample#1'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                  [2, 2, 2, 0],
                                                 [3, 3, 3, 0],
                                                 [4, 4, 4, 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 \times 5 \times 6 + 0.5 \times 5 \times 6 \times 1,
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.515742960091852],
                                                                [12, 6, 21, 8, -3.36492111003702],
                                                               [20, 10, 35, 16, -1.7545658776574036],
                                                               [28, 14, 49, 24, -0.9139478342631155],
                                                               [36, 18, 63, 32, -0.46803177808311025]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [28, 7, 7, 24],
                                                                    'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [36, 9, 9, 32],
                                                                    'identity_factors': [4, 4, 4, 0],
                                                                    'noise_level': [36, 18, 63, 32],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
```

'value':

```
0},
```

```
'noise_prob': [ 0.001,
                                                                        0.001,
                                                                        0.001,
                                                                        0.001],
                                                        'status': True,
                                                        'type': 'depolarizing'},
                                    'odd_wires': 4}],
              'run_time_sec': 60.80421566963196}},
{ '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': [ 0.0019047787007362745,
                                          0.7201496918445128,
                                          0.7201496918445128,
                                          0.7201496918445127,
                                          0.7226708680142584,
                                          0.8068041864232433,
                                          1.3847174673528184,
                                          1.6031895944534578,
                                          2.458865333289775,
                                          2.458865333289775,
                                          2.721120236828938,
                                          2.721120236828938,
                                          3.554687304897056,
                                          3.554687304897056,
                                          4.537252190232355,
                                          4.537252190232355,
                                          5.239770593633025,
                                          5.242363659304797,
                                          5.566731623636481,
                                          5.566731623636481,
                                          5.566731623636481,
                                          5.566731623636481,
                                          5.566731623636481,
                                          7.6484324534494865,
                                          7.6484324534494865,
                                          8.96757120343865,
                                          9.352637118466301,
                                          9.381932224950582,
                                          9.966925955531599,
                                          9.966925955531599,
                                          0.29840004251263574,
                                          0.3207087147269936,
                                          -0.22478909909228914,
                                          -1.2242611593120782,
                                          0.061748844824383295,
                                          1.9931455249507801,
                                          0.02449362327304914,
                                          -0.23402928130657288,
                                          0.3399922671860315,
                                          0.2355005268966802,
                                          0.7912945290539132,
                                          -0.9147564287830934,
                                          0.12280724330167514,
                                          0.42016875545313104,
                                          0.6183328009701774,
                                          0.9098148543333162,
                                          0.2439503202728901,
                                          0.4941740976390827,
                                          0.0721485641264495,
                                          0.20051214721509877,
                                          0.14273239312798908,
                                          -0.03846070968482946,
                                          0.11474641891065286,
                                          0.1552743298359438,
```

```
-0.050455466832234855,
0.24385918138398863,
0.0646818550964626.
1.0379575003266166,
0.4438839418702803,
0.6652939620943935,
0.6574583263339632.
0.6386444070388955,
0.30923240052603657,
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079.
0.25272330748816335,
-0.05865013289270936,
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059,
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072.
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661,
0.256318263131488,
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428,
-0.007804627058269528,
-2.9100406031766375,
-0.17918863042787767,
-0.29620353111227854,
-0.2953351498676352,
0.4434234593316091,
0.0018987515325079429.
0.5290648024022053,
0.011057994967698829,
0.03103232328752182,
-0.21693206073792237,
-0.07883582131375938,
-0.2554965378040217,
1.978711034134111,
-0.02822992907519939,
1.110830733101554,
0.04155227001102173,
0.17370289874025888,
-0.08435695708516765,
0.38686640173882947,
1.0727525781247964,
-1.4871438236674412.
0.1437881416009117,
-0.15769165641037303,
0.46096388290194723,
0.3881288491041242,
0.3113157866411551,
-0.21237825892214532,
1.3408904937177344,
0.033287678968192874,
-0.22654084728278404,
0.09162287503278096,
1.1250326534568733,
0.670327239820091,
-1.4911819217025961.
0.8417198858779599.
0.018685303562101165,
-0.5955098452611822,
1.37350461224772,
-0.5503685346151788.
0.07415629279393592,
0.22396953453102358,
```

```
-0.02219350017922496,
                                       2.5136787648879593,
                                       1.5560141766956836,
                                       -0.037039417521638966,
                                       -1.5578667717297374,
                                       -0.15174825264689498,
                                       -0.0075908588231686416.
                                       -0.1347910987366526,
                                       0.7535559035800633,
                                       2.9519825568174283,
                                       -0.8640992588734872,
                                       -0.486197602889753,
                                       -0.029079605859607876,
                                       0.1393557947212105,
                                       -0.03201203543340934,
                                       -0.17255788414719309,
                                       -0.6220837667998668,
                                       0.10441375911567917,
                                       0.7019930428559267,
                                       1.822960884928266,
                                       0.0010256621400676815]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric5_sample#9'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                  [2, 2, 2, 0],
                                                  [3, 3, 3, 0],
                                                  [4, 4, 4, 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, 7, 0, -6.536182288327376],
                             [12, 6, 21, 8, -3.4500813502488756],
                             [20, 10, 35, 16, -1.8650932993173603],
                             [28, 14, 49, 24, -1.0247351729167147],
                             [36, 18, 63, 32, -0.5670015302617211]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                 'identity_factors': [0, 0, 0, 0],
                                 'noise_level': [4, 2, 7, 0],
                                 'noise_profile': { 'noise_on_init_param': { 'status':
                                                                               'value':
                                                     'noise_prob': [ 0.001,
                                                                     0.001,
                                                                     0.001,
                                                                     0.001],
                                                     'status': True,
                                                     'type': 'depolarizing'},
                                 'odd_wires': 4},
```

False,

0},

```
{ 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                   'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                              'run_time_sec': 49.731422901153564}},
                               { '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': [ 0.33528943002425843,
                                                                         0.8608925283648261,
                                                                         2.8309935233222867,
                                                                         2.8382233121900358,
                                                                         2.847558790018716,
                                                                         2.8477263794127468,
```

```
3.9337993695450666,
3.9337993695450666,
3.9337993695450666,
3.9337993695450666,
3.9337993695450666,
5.127462455084763,
5.128383696390232.
5.132051241075024,
5.132231848473024,
5.132297186784173,
5.132297186784173,
5.132297186784173,
5.132320898992942,
5.134903164275234,
5.734798022200061,
5.734798022200061,
5.734798022200061.
6.71748919093495,
6.71748919093495,
9.773430860122208,
9.791656954875775,
9.791980525916317.
9.804782964874805,
9.947289619134542,
0.6818618664375632,
0.42253658736184846,
0.19067339209915313,
-2.314563573529872,
-1.7784854373672185,
-0.10945476580518654,
0.08980428543050965,
0.6265702304745648,
-0.12016219313034968,
0.005450784512528824,
0.9621316606784164,
-0.01940541263687908,
-1.2890091107885369,
-0.09216272929775945,
-0.8615487717558121,
0.021600758375482327,
1.1068545366678577,
-0.06436428812394061,
-1.8186253546793636,
-0.2455724158610742,
0.7444478114283775,
1.0647343146888184,
-1.6388802958603008,
-0.05032235091912311,
0.7589104637111997,
0.0934759886788552,
0.7280377617711271,
-0.10012682423470079,
-2.7917715562202794,
0.5843828201862561,
1.2003794612588048.
-0.2782652692858759,
1.253725179404932,
-0.831140674623039,
-1.3898002860152843,
1.7689493816619246.
-0.768539740515663,
-0.5265628815801298,
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446,
0.06348552937029919,
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522,
-0.5743460857513,
0.873550995352649.
0.8797938271812764,
```

-0.37270941226617715,

```
0.6188766136751805,
                           -0.4012501825920459,
                           -0.4763388197192611,
                           -0.34431485887187113,
                           -1.1697954599661295,
                           0.5556509722807279,
                           -0.5397649164737537,
                           -0.41722730509388967,
                           0.9275888618509817,
                           0.4371362266023078,
                           -1.4110895986752616.
                           0.6716489600966955,
                           0.08900519900900147,
                           0.7708643633651343,
                           0.0944251249629154,
                           -0.053131619179539805,
                           -0.132883145931867,
                           0.44414428660563765,
                           -0.3164026614336652,
                           0.9835391768228284,
                           -0.49696354121947833.
                           0.3510514174127117,
                           -0.24991518010085176,
                           -0.7780713458689107,
                           1.3387260017849976,
                           0.712191280671364,
                           -0.4436070432657242,
                           1.090195713122469,
                           0.3876483875477464,
                           1.113683201871723,
                           0.09724940056823322,
                           -1.3265075307540413,
                           -1.8530581309545013,
                           0.335564434910613,
                           0.16061631243062188,
                           0.6994545842241634,
                           -0.0055568765936962455,
                           1.8148369905661879,
                           -0.9149620921846291,
                           -0.5341673651010566,
                           -0.6583203681162046,
                           -0.05148037848607484,
                           -0.1302834828824637,
                           -0.2083684341417298,
                           -0.7142637766159184,
                           0.4980789266978527,
                           -2.030263033934291,
                           -0.002330467371510849,
                           -0.7835259213136883,
                           -0.18712783689065152,
                           -0.271594041353006,
                           0.606962231033315,
                           0.19917323339650786,
                           0.581852597021436,
                           1.0547240409345577,
                           0.07111303544026976,
                           1.4877210254684077,
                           0.08669172360020491,
                           0.8024105605127613.
                           0.8315802366658298,
                           1.117305276662395,
                           -1.0742437197416552,
                           0.30921812342286065,
                           -0.06994991433225481,
                           1.0419800264617582,
                           1.4507701003592177,
                           0.2408413974211676,
                           1.6573761327725358]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   'status': True,
                   'type': 'depolarizing'},
'nqubits': 7,
'observable': { 'coefficients': { 'bn': [1.0, 1.0, 1.0, 1.0, 1.0, 1.0],
```

0.20553479070949218,

```
'r': 1},
                                                              'def': 'ising'},
                                              'output': { 'draw': { 'fig_dpi': 100, 'status': False, 'type': 'png'},
                                                          'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric5_sample#2'},
                                              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                    [1, 1, 1, 0],
                                                                                    [2, 2, 2, 0],
                                                                                    [3, 3, 3, 0],
                                                                                    [4, 4, 4, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.333005581610797],
                                                               [12, 6, 21, 8, -3.1651017858597426],
                                                               [20, 10, 35, 16, -1.6439583689682524],
                                                               [28, 14, 49, 24, -0.8813072530521874],
                                                               [36, 18, 63, 32, -0.48318628235120475]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
```

'cn': [0.5, 0.5, 0.5, 0.5, 0.5, 0.5],

```
'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                   'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 47.62909483909607}},
                               { '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': [ 0.00030922277578629,
                                                                         0.881375055029912,
                                                                         0.881375055029912,
                                                                         0.8813750550299119,
                                                                         0.9803845151714838,
                                                                         0.9803845151714838,
                                                                         1.201629973822729,
                                                                         1.2441077564052723,
                                                                         1.8660677974280824,
                                                                         1.8660677974280824,
                                                                         2.651002314516478,
                                                                         2.651002314516478,
                                                                         3.233637461790533,
                                                                         4.36384995486056,
                                                                         4.36384995486056,
                                                                         4.975714528653046,
                                                                         4.975714528653046,
                                                                         6.591840750700408.
                                                                         6.591840750700408,
                                                                         8.234009055219385,
                                                                         8.238223602720305,
                                                                         8.238223602720305,
                                                                         8.238223602720305,
                                                                         8.903406631369169,
                                                                         8.903406631369169,
                                                                         8.903406631369169,
                                                                         9.126449234760914,
                                                                         9.126449234760914,
                                                                         9.441918167657187,
                                                                         9.441918167657187,
                                                                         0.4384156956352651,
                                                                         -0.017407483354635628,
```

-0.13579407977759564,

```
-0.08181457210659056,
-0.5635031413839604,
0.570197125887921,
-0.07389454022208618,
0.18950484918514415,
0.23442314823895152,
0.5187197914643009.
0.03760777637611914,
1.2080522066616035,
-0.006796933498365149,
0.7597395812711474,
0.3165595784185247,
0.09234381717322694,
-0.047116958459538144,
0.02161370846364295,
-0.3330735946096464,
-0.310519881157395,
-0.1321730433969341,
-0.32004747583182785,
0.38880240494533963,
0.5587916266845782,
-0.04068226055752174.
-0.04929253976644778,
0.7350044083650977,
-0.3347542084226466,
0.07994172439872818,
0.177027499128215,
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313,
-1.8841797053563085,
-0.39250057722196113,
0.0604718224769807,
-0.15658247224402194,
1.097732135880844,
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626,
0.5767878477607333,
0.4375958673531614,
0.017187174100509652.
-1.172587468420202,
0.736957937590481,
-1.8818047463381875,
-0.29954118659750983,
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638.
-0.4874528967327087,
0.05731267695545898,
0.32920686175801595,
0.0470036094807545,
0.6942117349751494.
-0.24738597040458754,
-0.3530344251488351,
-0.7207866325012796,
0.6865004571010461,
-0.022934954570734595,
-0.4703523591474931,
0.00010065187353926284,
-0.25737840979321513,
-0.37927040299996573,
0.3323512575736423,
-0.7162822410895011,
-0.8849129065134153,
-0.02984860970928172,
0.9857401879405846,
```

0.13869536095324345,

```
-0.15185390643388375,
                                                                        -1.1107951730061545.
                                                                        1.1255217267520845,
                                                                        -0.36113008327046914,
                                                                        0.12498769155032201,
                                                                        1.105653484876161.
                                                                        -0.0826241142760939,
                                                                        -0.6079720837354008,
                                                                        -0.4798331114275297,
                                                                        -1.1230771992973987,
                                                                        0.13634359721928585,
                                                                        -1.0117198549615587,
                                                                        0.0420371772323395,
                                                                        0.4704689604818435,
                                                                        -0.1136051809968673,
                                                                        -0.4158299646895606,
                                                                        0.7682233881623428,
                                                                        -0.8567828943049521,
                                                                        -1.0844985071567337,
                                                                        0.8118563616911731,
                                                                        -1.0011580890685694.
                                                                        0.06773503500153778,
                                                                        -0.9972068257582826,
                                                                        0.22064841214728595,
                                                                        1.015101892093672,
                                                                        -0.023903188302909387,
                                                                        -1.5448535965900865,
                                                                        0.40727537812840897,
                                                                        0.6273868528756265,
                                                                        -0.06403282214251436,
                                                                        0.1402221940396834,
                                                                        0.011807494022614938,
                                                                        0.19970219531306482,
                                                                        -0.3159297567283321,
                                                                        0.5243897804672414,
                                                                        0.6302439365729751,
                                                                        0.4184253509022523,
                                                                        0.38422115408735924,
                                                                        0.8610939738936156,
                                                                        0.3457693810952046,
                                                                        0.19105880264763628]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                '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_noisy_time_evo_ric5_sample#10'},
                                             'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                  [1, 1, 1, 0],
                                                                                  [2, 2, 2, 0],
                                                                                  [3, 3, 3, 0],
                                                                                  [4, 4, 4, 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 + '
```

-0.4901093246549395,

```
^{\circ}0.5 X 3 X 4 + 0.5 Z 3 Z 4 + ^{\circ}
                                                                                            '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, 7, 0, -6.5111758480272135],
                                                                [12, 6, 21, 8, -3.513108400075424],
                                                                [20, 10, 35, 16, -1.9256894730075684],
                                                               [28, 14, 49, 24, -1.0648100061563792],
                                                               [36, 18, 63, 32, -0.5886022016151555]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [28, 7, 7, 24],
                                                                    'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001.
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [36, 9, 9, 32],
                                                                    'identity_factors': [4, 4, 4, 0],
                                                                    'noise_level': [36, 18, 63, 32],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
```

0.001],

```
'status': True,
                                                       'type': 'depolarizing'},
                                    'odd_wires': 4}],
              'run_time_sec': 48.79940581321716}},
{ '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': [ 3.750846163374531e-05,
                                         0.22285241391868899,
                                          0.26252411232084344,
                                         0.26252411232084344,
                                         0.26252411232084344,
                                         1.459545906754556.
                                         1.4595459067545562,
                                         1.6094835194149661,
                                          2.5927782099427628,
                                         2.5927782099427628,
                                          2.5927782099427628.
                                          2.5927782099427623,
                                          3.3552499939702187,
                                          3.3552499939702187,
                                         5.033284106467877,
                                         5.033284106467877,
                                         5.056477210452712,
                                          6.768913439946703,
                                         6.768913439946703,
                                         7.2782492670747585,
                                         7.2782492670747585,
                                          7.2782492670747585,
                                          7.2782492670747585,
                                         7.2782492670747585,
                                         7.2782492670747585,
                                         8.934198246659292,
                                          8.937369801451712,
                                         9.544406408519471,
                                         9.544406408519471,
                                         10.23170722265548,
                                          -0.4501443853573418,
                                          0.06519513561037263,
                                          -0.13386490845883003,
                                         -0.01542333988020039,
                                         0.3988203537526196,
                                         0.9163371790808124,
                                         0.08159154039220383,
                                         -0.11665429084087826,
                                         -0.21130662780886203,
                                         1.515236372470638,
                                          0.4436142129357345,
                                          -0.28780404896369716,
                                          0.3681425383234808,
                                         0.648176841676201.
                                         0.3046875502986337,
                                          0.05897820457762899,
                                         0.09316951897603123,
                                         1.5277657654344678,
                                         -0.655141628591867,
                                          0.073084468489131,
                                          -0.11423944001370272,
                                          0.3986898081963471,
                                         1.0974832156349317,
                                         1.8462557861113,
                                         0.5998463368708868,
                                         -0.0014214294560794885,
                                         0.4026665434776887,
                                         -0.03860309342262787,
                                          0.3728818533964108,
```

```
1.7322816292529104,
0.42156018976657544,
0.9872712539907578.
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974.
0.4324416138472369,
0.7909276553155474,
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866.
-0.0743310361925915,
1.1363109745761366,
0.32003332101567866,
0.08535303128967886,
1.1165485958252095,
0.476282782575683,
0.11414859665640108,
0.8927652783900955,
0.027791184984770272,
0.8970588198442948.
-0.04579755391586939,
0.10596016247070955,
0.4721342517962854,
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702,
0.2928189752635581,
-0.4120973709154422,
-0.16251962266938982,
-0.928532755338732,
0.13709877636127538,
0.09386847134985479,
-0.9415336108192559.
-1.3861285848764584,
0.5116476525314603,
-1.5694556777668651,
0.31948518026769196.
-0.0136576069296156,
0.8752899744519326,
-0.448175539102687,
-0.8567162669878051,
0.737642795798484,
-0.5233142967805873,
-0.020239952918795164,
0.9696407297918527,
1.064479355466651,
-0.43102633401249074.
0.3234367312145231,
0.02606795235445944,
0.2525608175326581,
0.09544790103129135,
0.30399471295861424,
0.6638935631613432,
2.095756590649309,
-0.5383535092385583,
-0.1523671776118538,
-0.49733805370513506,
1.0814777965289457,
-0.5541810322110113,
0.4702060218904802,
0.1941018040115748.
0.027389458133440587,
-0.6339976476553459,
0.824073822166477,
-0.8904328829691108
0.5852778403101284,
-0.37705413851354036,
-0.20234246488211116,
0.19390975159216547,
-0.03854894368679599,
-0.5885610444718222,
```

0.2892174263372239,

```
-0.03853087013753846,
                                        0.36228239756074476.
                                        0.06448164730191597,
                                        0.8103021451607575,
                                        0.04195704491201313,
                                        2.1946244272306323,
                                        1.1078290402756337,
                                        -0.0920096926231485,
                                        0.7957980849005134,
                                        0.10683086015182242,
                                        0.04139972880547422,
                                        1.068477454710041,
                                        1.5812878062267348,
                                       1.0292383703670558,
                                       1.5822631942162138]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                '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_noisy_time_evo_ric5_sample#6'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                  [2, 2, 2, 0],
                                                  [3, 3, 3, 0],
                                                  [4, 4, 4, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
'output': { 'data_points': [ [4, 2, 7, 0, -6.4606782650454075],
                             [12, 6, 21, 8, -3.2738854608106305],
                             [20, 10, 35, 16, -1.6974907774474755],
                             [28, 14, 49, 24, -0.8939947022135477],
                             [36, 18, 63, 32, -0.4736436630774058]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                  'identity_factors': [0, 0, 0, 0],
                                  'noise_level': [4, 2, 7, 0],
                                  'noise_profile': { 'noise_on_init_param': { 'status':
                                                                               'value':
                                                     'noise_prob': [ 0.001,
                                                                      0.001,
                                                                      0.001,
                                                                      0.001],
                                                     'status': True,
                                                     'type': 'depolarizing'},
                                  'odd_wires': 4},
                                { 'gates_num': [12, 3, 3, 8],
                                  'identity_factors': [1, 1, 1, 0],
                                  'noise_level': [12, 6, 21, 8],
                                  'noise_profile': { 'noise_on_init_param': { 'status':
```

-0.7158388932188376,

False,

0 } ,

```
'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                    'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd wires': 4}],
                                              'run_time_sec': 49.173208713531494}},
                               { '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': [ 0.08591881204796584,
                                                                         1.5026023651616802,
                                                                          1.9179097588555833,
                                                                         1.9179097588555831,
                                                                         1.9179097588555831,
                                                                         1.9179097588555831,
                                                                          2.8800636946459592,
                                                                         2.9523818900173797,
                                                                         2.9523818900173797,
                                                                         2.954896407422686,
```

3.0487820562708485,

```
3.0487820562708485,
3.9462134206000328,
3.9462134206000328.
5.170248653928018,
5.170248653928018,
6.5066905594049205,
6.5066905594049205.
6.5066905594049205,
6.914119522580601,
6.914119522580601,
6.9842551957162815,
7.300516913785898.
8.782483894556266,
8.782483894556266,
8.999633503017922,
8.999633503017922,
8.999633503017922.
9.414122362394847,
9.414122362394847,
0.09854676674938925,
-0.05173289612974198,
0.30094803169630163.
-1.1984142138894447,
0.08610670053567002,
0.2851928692216035,
0.26177875477440216,
0.11764473243628538,
0.3495067876706816,
-0.9678438601279628,
-0.08762050677252062,
0.014826088936787857,
-0.30347729159143555,
-1.1730530788097624,
-0.12550631929596553,
2.258056275075482,
-0.5160508087356981.
0.004541093619226378,
-0.9345420797218197,
0.47154522212338745,
-0.9129446894819914,
0.2768683391341781,
0.29975752794333804,
-0.16177915588279423,
0.6021148977823381,
0.35405737535162146,
0.8149645603473178,
-0.7074306860917636,
-0.8281028342440522,
-0.20840122350984505,
-0.19593362207831977,
1.2208184674045053,
-0.10408257731449277,
0.9878855326441833,
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756,
-0.44913621684685756,
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635.
-0.4440190475287521,
0.5925479388494825,
0.1500100176310508,
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612,
0.4987130755500597,
-0.007720607194202524.
0.7816530161823243,
-0.8246572495389679,
-0.28480932751570914,
1.8751826609713358.
-0.20740645402102328,
-0.04894031202761418,
```

```
-1.0170156037248201,
                           -0.035476380392734465,
                           0.9940259955458774.
                           -0.657126951929564,
                           -0.4786936406484008,
                           1.4564140457987391,
                           -1.062151832750044.
                           -0.01496017231630948,
                           0.16259290081999456,
                           0.601493806263198,
                           -0.20485253219607644,
                           -1.2421776762345744.
                           1.152288606322054,
                           1.1883019471730756,
                           0.9817659575699377,
                           0.9653429636905305,
                           0.5382122852444811,
                           0.722384759736696,
                           -0.13079560936986118,
                           -0.9638314109375934,
                           -0.13358671856975504,
                           -0.3949417844115237.
                           1.01780227278121,
                           0.6746960094686067,
                           0.14295933107831804,
                           -0.37974724013569766,
                           0.3641245559377578,
                           0.12972678280008856,
                           0.5949873255000262,
                           0.8499370211382984,
                           -0.0792654431528575,
                           1.9402087793428133,
                           -0.5583113020357903,
                           0.6535986429024293,
                           1.0008805619835928,
                           0.16556690201288055,
                           1.1071973338235597,
                           0.07194244573338314,
                           -0.9146859400815048,
                           -0.005186820541518637,
                           0.4795762978809806,
                           0.6475066336984044,
                           0.11860845746693519,
                           0.08044881503693782,
                           0.5402817334108434.
                           1.5532870492056725,
                           0.36643388228039625,
                           1.6150985923432208,
                           0.22271977417212363,
                           -0.04956133994172771,
                           -0.6258533610916538,
                           -0.6517224443292691,
                           0.2594825887888975,
                           -0.1286341552665023,
                           0.48749759828242367,
                           -0.009813928289633511,
                           0.5249350004928881,
                           -0.01015655683116892,
                           -0.48671658518654837,
                           -0.588311268126242.
                           -0.25978871509233853,
                           0.9039610340757382,
                           1.5549616218831699,
                           -0.05330158954092406]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric5_sample#3'},
```

```
[1, 1, 1, 0],
                                                                                   [2, 2, 2, 0],
                                                                                   [3, 3, 3, 0],
                                                                                   [4, 4, 4, 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, 7, 0, -6.4104927992121],
                                                               [12, 6, 21, 8, -3.25771336700167],
                                                               [20, 10, 35, 16, -1.674813432318219],
                                                               [28, 14, 49, 24, -0.8591076530612253],
                                                               [36, 18, 63, 32, -0.43058689568319575]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
```

'redundant': { 'identity\_factors': [ [0, 0, 0, 0],

```
False,
                                                                                                                   'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                         0.001,
                                                                                                         0.001,
                                                                                                         0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [36, 9, 9, 32],
                                                                    'identity_factors': [4, 4, 4, 0],
                                                                    'noise_level': [36, 18, 63, 32],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                   'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                         0.001,
                                                                                                         0.001,
                                                                                                         0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4}],
                                              'run_time_sec': 48.794405460357666}},
                               \{ \text{'config': } \{ \text{'ansatz': } \{ \text{'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': [ -5.647934061474703e-18,
                                                                           1.4787834906243755,
                                                                          1.478918229526628,
                                                                          1.478918229526628,
                                                                          2.0077351764243123,
                                                                           2.4302809101456218,
                                                                          2.4302809101456218,
                                                                          3.009709563144601,
                                                                          3.009709563144601,
                                                                          3.239471043198664,
                                                                           3.2405283031129133,
                                                                           3.2405283031129133,
                                                                          3.2656598154222434,
                                                                          3.5353392937639825,
                                                                          6.198713539858257,
                                                                          6.213604956994236,
                                                                          6.73397854893658,
                                                                          6.73397854893658,
                                                                          6.743547791194661,
                                                                          6.744609103740889,
                                                                          6.744609103740889,
                                                                          6.749543065628153,
                                                                          6.749543065628153,
                                                                          8.615256229309818,
                                                                          8.635090640841518,
                                                                          9.012323512360366,
                                                                          9.012323512360366,
                                                                          9.930483613907942,
                                                                           9.930483613907942,
                                                                          11.782061805135282,
                                                                          0.6870051227789642,
                                                                          0.5234095533264759,
                                                                          0.11216801162302814,
                                                                          0.044591843687496906,
                                                                          -0.747159787599118,
                                                                          1.5727279855217766,
                                                                          -0.16958009141159439,
                                                                           -0.7234855106318131,
```

```
0.45999589631996707,
1.3613822619347415,
0.5234464983029046,
0.18337466193510712,
1.0660408011194182,
1.2813123812864906,
0.34899885807903364.
1.2204971120849089,
0.37250493843195553,
0.3861568591798728,
-0.4881036169368887,
0.23720347697856276.
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716,
0.5103741134651811,
-0.48491784736765847,
-1.939727949979543,
0.5221979500550953,
-0.39618913325979604,
-0.5258671175956018,
0.08753210163723862.
1.3619602585721242,
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274,
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961,
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473,
0.4465655907565091,
-1.4308928069625704,
1.6254306194316424,
-0.16298810299835312,
-1.249293985363804.
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616,
-1.1357659634071433,
-0.5734897531715744.
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403,
0.06392732561319403,
0.7711512775812011,
-1.8472478314151175,
-0.46160141905881696,
1.8963279721150403,
-2.313663424814036.
0.060952702837845166,
-1.4971949982077863,
1.3040610818975555,
0.10605679464403613,
-1.138800572315487.
-0.03947636943653289,
0.07839455865010819,
-0.6470277815644087,
0.946101637008616,
-0.32144060478582315,
-0.6371693991779968,
0.30580409265523,
-0.2617129381706641
0.4094287336545931,
0.49837362733711055,
-0.9058714721495094,
0.6137893604415533,
0.8546844695081749,
-0.8205470722456557,
```

-0.598852289145785,

```
1.2205247300232143,
                                        0.031629319060699435.
                                        1.1369587010491427,
                                        0.12298062775535874,
                                        -0.016960252964031076,
                                        1.1127338626212067.
                                        0.37972118532018134,
                                        -0.1475616440844684,
                                        0.32749925367563326,
                                        0.030050642250761914,
                                        0.17169542743574548.
                                        -0.5825729547476518,
                                        0.7052714548722974,
                                        0.9884296874822006,
                                        -0.500384308215816,
                                        0.01722431287494931,
                                        0.40290712722731054,
                                        -0.029200452046427447,
                                        1.2704708243944813,
                                        2.3709704014259345,
                                        -2.0267551524865275.
                                        0.7347873374577798,
                                        -0.34767223966060473,
                                        0.009778943736386289,
                                        0.221000841842164,
                                        -0.010995780695540691,
                                        -0.481889271583797,
                                        0.7008500159073542,
                                        2.3944065221124076,
                                        -0.08320445199579081,
                                        2.02470278988152,
                                        0.02142760118000664,
                                        1.6794429086669174,
                                        1.6046551807968945,
                                        0.2831685070910348,
                                        1.5805135598594935]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                '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_noisy_time_evo_ric5_sample#8'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                  [2, 2, 2, 0],
                                                  [3, 3, 3, 0],
                                                  [4, 4, 4, 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 \times 0 \times 1 + 0.5 \times 0 \times 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 \times 5 \times 6 + 0.5 \times 5 \times 6
'output': { 'data_points': [ [4, 2, 7, 0, -6.429933051303131],
                              [12, 6, 21, 8, -3.1990719612158447],
                              [20, 10, 35, 16, -1.635137691104089],
```

0.46823811794119646,

```
[28, 14, 49, 24, -0.8526977600673817],
                                                               [36, 18, 63, 32, -0.44953303322849647]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.0011,
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [28, 7, 7, 24],
                                                                    'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [36, 9, 9, 32],
                                                                    'identity_factors': [4, 4, 4, 0],
                                                                    'noise_level': [36, 18, 63, 32],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4}],
                                              'run_time_sec': 49.53232932090759}},
                               { 'config': { 'ansatz': { 'gateset': 1,
                                                           'layer': 30,
```

```
'ugate': { 'coefficients': { 'bn': [0, 0, 0, 0, 0, 0],
                                          'cn': [ 0.5,
                                                  0.5,
                                                  0.5,
                                                  0.5,
                                                  0.51,
                                          'r': 0},
                       'time': {'max': 10.0, 'min': 0.0},
                       'type': 'xy-iss'}},
'init_param': { 'value': [ -6.331146189926128e-17,
                           0.7069927066774304,
                           0.7069927066774304,
                           0.7069927066774305,
                           0.7069927066774304,
                           1.0044153364322925,
                           1.0092418692996383,
                           2.470333794214341,
                           2.478143749866421,
                           3.5776564981759003,
                           3.5776564981759003,
                           3.5776564981759003,
                           3.61745967653339,
                           3.6981780389472076,
                           3.755720232685741,
                           3.9712286023902594,
                           3.9712286023902594,
                           4.519037432417192,
                           4.519037432417193,
                           4.519037432417193,
                           5.280953883299406,
                           5.280953883299406,
                           6.620356980277175,
                           6.620356980277175,
                           6.620356980277175,
                           6.620356980277176,
                           8.214004051881032,
                           8.214004051881032,
                           9.105951544537387,
                           10.829366164164977,
                           1.4490195266558639,
                           1.145329650589643,
                           -0.9374272684957279,
                           -1.2910248872233119,
                           0.9701069453007352,
                           2.0238893871034924,
                           -0.6731600678051081,
                           -0.7305037462514778,
                           0.6743483023845589,
                           1.611766624162738,
                           -0.162446688913207,
                           -0.2464021583836281,
                           1.3073653685111934,
                           1.560629053845934,
                           -0.09768282308379246,
                           -0.31393750682085847,
                           0.1625705045557987,
                           -0.1344649185634244,
                           -0.03516682581352061,
                           0.15934568227883428.
                           1.4484389719925783,
                           0.31346340320241645,
                           -1.5406853809043388,
                           0.3831701903776482,
                           0.07255447956326048,
                           -0.4619144712511035,
                           0.6220101497739178,
                           -0.08645510294766677,
                           -0.036774035023737585,
                           -0.02433291891195538,
                           1.2745777688613118,
                           0.806643386980706,
                           -0.1734465019831428,
                           -1.474099767063678,
                           -1.2534035864969235,
```

```
0.024086803725753666,
-0.5946515656594247,
3.047855036387052.
0.561263952510902,
-0.27353577574812815,
0.476385213099692,
-0.4183083264972014.
-0.07584344603997495,
-0.04004176630390785,
0.6379867024754904,
3.306912023625799,
0.6758488609505069.
-0.49379826249780634,
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808.
0.043470303912556706,
0.2301819741695647,
1.9247102260310271,
0.19401136489510468,
0.17784496580796996.
-0.12037519976757159,
0.10596613899479704,
0.02480260398862852,
0.33616247382037256,
-0.2960626605489573,
1.2038327046358004,
-0.4266046665751028,
-0.14331073423696536,
0.33240571018120446,
0.13743208352564132,
0.21308235615415505,
-0.8816113951868988,
-0.03958129872975694,
1.7385124490728345,
1.3953860705003918,
0.7193393529381484,
-0.5890148767931709,
1.6845229617798814,
-0.04059142172715042,
-0.6588344885662398,
-1.5492107393137406,
0.9886630320432893,
1.3955090248591298,
-1.7521400718196618,
-0.02012078102450614,
1.5598528019020075,
-0.041272015671692544,
0.6659176073691222.
-0.10884895615623923,
-0.8860283635501729,
-0.042494102069769425,
-0.5241060846215897,
-0.049429521011899694.
-1.6158837397685775,
-0.29703279066650246,
0.6940812648197017,
-1.0869617874060826,
-1.1891726572683667,
0.03935191545498333,
-1.7727595774952096,
-0.0005664350349098603,
-1.2288438066739866,
2.182693040857262,
1.2648198022740724,
0.636776362006322,
-1.1418938134635428,
0.04892386539982865,
-0.6595482134655696,
-0.016038133219537475,
-1.53365152672916,
-0.5818287115590742,
-0.8537662908823758,
```

1.3418170063691075,

```
-0.8323242421777916.
                                                                         1.5026664500941838,
                                                                         1.809610363246633,
                                                                         -1.5283405786971713,
                                                                         0.5470095670143573.
                                                                         -1.4753657998350065,
                                                                         0.8122840148585063,
                                                                         1.5317878779716176]},
                                             'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric5_sample#5'},
                                             'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                   [1, 1, 1, 0],
                                                                                   [2, 2, 2, 0],
                                                                                   [3, 3, 3, 0],
                                                                                   [4, 4, 4, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.311563719128683],
                                                               [12, 6, 21, 8, -3.2712898811023576],
                                                               [20, 10, 35, 16, -1.7533390824025292],
                                                               [28, 14, 49, 24, -0.966227702270059],
                                                               [36, 18, 63, 32, -0.5436512754494954]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001.
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001.
                                                                                                       0.001,
                                                                                                       0.001],
```

-0.32888813707646736, -0.018460135902194714,

```
'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                   'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001.
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 48.256184101104736}},
                               { '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': [ 0.3773346757087749,
                                                                         0.5734233884194113,
                                                                         0.5734233884194113,
                                                                         1.2094818154974225,
                                                                         1.2528672337957094,
                                                                         1.3073966674132076,
                                                                         4.193348178434801,
                                                                         4.228670385547864,
                                                                         4.228670385547864,
                                                                         4.228670385547864,
                                                                         4.228670385547864,
                                                                         4.228670385547864,
                                                                         4.274742575727675,
                                                                         5.343872214974395,
                                                                         5.354523589318104,
                                                                         5.449133113124401,
```

5.449133113124401,

```
5.449133113124401,
5.449133113124401,
6.208341300319731,
6.208341300319731,
6.738723848778546,
6.7473872692498285,
8.515456463543387.
8.552181104315652,
8.552181104315652,
8.552181104315652,
9.363042150968939,
9.363042150968939,
11.478464454984158,
-0.2683676450988651,
-0.9370321768196137,
0.03790413469005285,
-0.3520989510779511,
0.5131804204688105,
0.767748989456867,
-1.1529933056041268,
1.0195402939041247,
-0.5189860890713169.
1.700377968800765,
0.48912124484584857,
1.506730848787325,
0.4485612726223177,
-1.6248073049289613,
0.10079320215400162,
1.7454590745233427,
1.474284546585253,
0.08837986403943651,
1.215839965531947,
-0.42666568442503866,
0.04298065245990749,
-1.495484471060033,
0.39055472334393304,
-0.06187227108331559,
1.0010296249342066,
-0.33745943355443286,
-0.19046242319241546,
-0.4884459619425607,
0.8930564792122229,
0.09947441181287657,
-1.4049039336860292,
1.0413688199593338.
0.027348986225077598,
1.5457890290583323,
0.8022774572900748,
-1.0377116853398,
0.5652694406258009.
0.9990396087940023,
-0.3409174955760714,
-0.8590373420111477,
0.3662952964918326,
0.6492392290096071,
-1.0735392409833318,
-0.620775369578654,
0.5064494688850749,
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065.
0.40348292639904854,
0.7429600006983637,
0.13897118193917846,
0.13192395570874205,
-0.560408177185694,
-0.7293430452459922,
1.2393938765994381,
0.16520016983754293,
-0.04218705839108043.
1.9844775109402493,
-0.40811731341033075,
```

```
0.40494641878472026,
                           0.44317505546879765,
                           -0.14541224425415586.
                           -1.3628454492957067,
                           0.35572573997739254,
                           -0.17363781014762678,
                           -0.21765464091811726.
                           0.25867396534698067,
                           -0.19299239511743832,
                           0.842583631219517,
                           0.01538577194684443,
                           -1.3780712180305699,
                           0.30168991607554185,
                           0.03816118508668757,
                           -0.6330896266111891,
                           -0.14462412237866193,
                           0.22751230177420415,
                           2.198362599080823,
                           0.5538971259685714,
                           1.6735676153080048,
                           0.01161307703421222,
                           0.15241612900647253.
                           -0.4114895408906573,
                           0.020024246948836234,
                           -0.361021382333633,
                           1.2366726872792735,
                           -0.8652479233612058,
                           -0.38157323774943186,
                           -1.2043495043519374,
                           0.03294448415473864,
                           1.864475600371399,
                           -0.048446953541905424,
                           1.483038428004856,
                           0.02119809714572118,
                           -0.20756566215919184,
                           1.2566509021622863,
                           0.4040298326697209,
                           0.0492062183426151,
                           0.3396501220758691,
                           0.09097515161528406,
                           -0.4545275805495163,
                           1.5327906096069877,
                           -0.47568898039994184,
                           0.7447654713950665,
                           0.7179833985093875,
                           -0.03692927531761856,
                           0.11509825242982577,
                           0.020898935398901888,
                           0.2387893529411216,
                           1.5195379458286031,
                           -0.5337205856413728,
                           -0.5741707032781822,
                           1.298358172715442,
                           -0.010829860462227588,
                           -1.9037204771139875,
                           1.5774751765228583,
                           -0.28550943128124906,
                           1.5531884118568244]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric5_sample#4'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 0],
                                     [3, 3, 3, 0],
                                     [4, 4, 4, 0]]},
'run': 'redundant',
```

```
'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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.44845457619454],
                                                               [12, 6, 21, 8, -3.2446894681699203],
                                                               [20, 10, 35, 16, -1.6866076162118238],
                                                               [28, 14, 49, 24, -0.8984323471828195],
                                                               [36, 18, 63, 32, -0.4857082686875758]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                    'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
```

'state': 'dmatrix',

```
0.001],
                                                       'status': True,
                                                       'type': 'depolarizing'},
                                    'odd_wires': 4},
                                  { 'gates_num': [36, 9, 9, 32],
                                   'identity_factors': [4, 4, 4, 0],
                                   'noise_level': [36, 18, 63, 32],
                                    'noise_profile': { 'noise_on_init_param': { 'status':
                                                                                 'value':
                                                       'noise_prob': [ 0.001,
                                                                        0.001,
                                                                        0.001,
                                                                        0.001],
                                                       'status': True,
                                                       'type': 'depolarizing'},
                                    'odd_wires': 4}],
              'run_time_sec': 47.56407403945923}},
{ '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': [ 0.003375513600300809,
                                         0.4884127443235871,
                                          0.6719352108785641,
                                         0.9073170135093351,
                                         1.4946633690060278,
                                         1.5076957064847494,
                                          3.872917838142945,
                                          3.872917838142945,
                                          3.872917838142945,
                                         3.872917838142945,
                                         5.047622474508209,
                                          5.054336886650782,
                                         5.067626550795242,
                                         5.0733174878702085,
                                          5.094629387163461,
                                          5.749571576552799,
                                          5.7731554023304374,
                                          7.144946717661993,
                                         7.144946717661993,
                                         7.144946717661993,
                                         7.144946717661993,
                                         7.602314289267704,
                                         7.602314289267704,
                                          8.018775147517832,
                                         8.018775147517832,
                                          8.018775147517832,
                                          8.018775147517832,
                                         8.018775147517832,
                                          8.018775147517832,
                                          9.661071929582006,
                                         0.2735947252101626,
                                         2.471262065567802,
                                         0.18954222370300397,
                                         0.2633058348660961,
                                         0.07494334922808346,
                                          1.4980157261935538,
                                         0.3538857424122425,
                                         0.26341770410626436,
                                         0.17174804107002956,
                                          -0.22912718472194316,
                                         0.11060714764109056,
                                         -0.30804859927082595,
                                         2.8406850614439736,
```

1.0823654569610508,

False,

0},

```
0.9668529413216363,
1.8727663516543385,
-0.0901659930896485.
0.05868560690604535,
0.24212775097742179,
1.0092515209898247,
-0.7556969386491817,
0.3279350524218167,
1.078117272505244,
0.10391815458190773,
-0.7434930272741371,
-1.6965388530236032,
-1.360748554100242,
0.34939560927302815,
0.03188634842980519,
-1.2447472675125983,
0.06092342743494014.
1.017082923902293,
-1.007905562333318,
-0.8576057837691866,
0.5321038189070756,
1.300652060018237.
-1.8122591145188616,
-1.247002191580596,
1.2529274198051785,
0.3750417535596218,
0.2898066740735119,
1.589675559301449,
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883,
0.2658818907332787,
-0.9372958671062981,
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732,
2.008892916411081.
0.15285666374274742,
-1.782425531898792,
0.07791440554206944,
-1.28397958204954,
-0.7247696039786395,
0.5612678373457747,
-0.004762916486662008,
0.4386089298525658,
0.010283368626678616,
0.8990610129088383,
0.03840864905637026,
-1.2418081984826976,
0.33190310279028407,
0.3061008622829172,
-0.06950158836023225.
0.93859456058615,
-0.02489786142317165,
0.9927840878492759,
-0.0709710381209458,
-1.4546153026559692,
-0.6707274766895803,
1.0492831078613678,
1.59883886587945,
-0.7948795957139008,
0.011914265512354442,
0.29611851635537545,
-0.026452865362460363,
0.17911271593442915.
-0.268102313362264,
-0.31698956355176716,
```

```
0.5150163737561883,
                                        -0.2617344493849528
                                        -0.08207987775663798.
                                        -0.7031192006515304,
                                       0.10296103394319861,
                                       -1.3322481995457,
                                       -0.8096620548125795.
                                       0.22894179493051453,
                                        -0.6404807766018014,
                                        0.5981001234262467,
                                       0.6725836248662437,
                                       -0.24769451099401643,
                                       -1.5367942204876157,
                                       0.32496629998060117,
                                       0.8231756699235411,
                                       0.27229759145944715,
                                       -0.4283887626472357,
                                       0.6783210911797265,
                                       1.178917544999848,
                                        -0.48124012627536317,
                                       -0.23642700938756703,
                                       -0.22983768395119897.
                                       0.7841497681166887,
                                       0.5963513861028734,
                                       -0.8505831212819382,
                                       0.6516631671421783,
                                       0.6698405071431395,
                                        0.7826636181190869,
                                        -1.6023915303224998,
                                        0.6733061844063541,
                                       1.5755992624240989]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric5_sample#7'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                  [2, 2, 2, 0],
                                                  [3, 3, 3, 0],
                                                  [4, 4, 4, 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 + '
                                                         ^{\circ}0.5 X 3 X 4 + 0.5 Z 3 Z 4 + ^{\circ}
                                                         '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, 7, 0, -6.397817460329861],
                             [12, 6, 21, 8, -3.2115716730808748],
                             [20, 10, 35, 16, -1.641958817033255],
                             [28, 14, 49, 24, -0.8464644349040011],
                             [36, 18, 63, 32, -0.4337371704190119]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                  'identity_factors': [0, 0, 0, 0],
                                  'noise_level': [4, 2, 7, 0],
                                  'noise_profile': { 'noise_on_init_param': { 'status':
```

```
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                   'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                              'run_time_sec': 50.0461266040802}}],
               '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': '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': 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_noisey_time_evo'},
            'redundant': {'identity_factors': [[0, 0, 0, 0], [1, 1, 0, 0]]},
            'run': 'vae',
            '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 \times 5 \times 6 + 0.5 \times 5 \times 6"]
'output': { 'exact_sol': -8.56677223350563,
            'initial_cost_history': [ 3.5476707600867368,
                                       2.3562053879970173,
                                       1.7833099820235232,
                                       2.4654982864165467,
                                       3.6613143494662093,
                                       3.6462371631182062,
                                       3.2935768662401737,
                                       3.7145398712422657,
                                       2.5227446974102397,
                                       2.4756634278387035],
            'noise_details': { 'gates_num': [4, 1, 1, 0],
                                'identity_factors': [0, 0, 0, 0],
                                'noise_level': [4, 2, 7, 0],
                                'noise_profile': { 'noise_on_init_param': { 'status': False,
                                                                             'value': 0},
                                                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                    'status': True,
                                                    'type': 'depolarizing'},
                                'odd_wires': 4},
            'optimized_minimum_cost': [ -6.515742960091897,
                                         -6.3330055816107915,
                                         -6.410492799212151,
                                         -6.4484545761945915,
                                         -6.311563719128753,
                                         -6.46067826504545,
                                         -6.397817460329919,
                                         -6.429933051303193,
                                         -6.536182288327426,
                                         -6.511175848027232],
            'optimized_parameters': [ [ 1.5680106786222674e-17,
                                         1.0238650999177359,
                                         1.0238650999177359,
                                         1.0238650999177359,
                                         1.7041550191762513,
                                         2.070931805530806,
                                         2.586234954306046,
                                         2.6265616878606783,
                                         2.7566136785306155,
                                         2.7689271757054255,
                                         4.271831894498143,
                                         4.271831894498143,
                                         4.271831894498143,
                                         5.004110362344359,
                                         5.004110362344359,
```

```
5.529689350278954,
5.529689350278954,
5.529689350278954.
5.5493166460873375,
7.855838962179162,
7.855838962179162,
8.508023697610218.
8.540796404638465,
8.940056981382925,
8.940056981382925,
8.940056981382925,
8.940056981382925.
9.524293982069336,
9.524293982069336,
9.815045396471412,
0.717685470636315,
0.29125971197830336,
0.013619559122678915,
-0.46174394022911175,
-0.7802589318548062,
1.8785332138943256,
-0.07718385116900997.
-0.4181315830102034,
0.3859499067718677,
0.7218523694763775,
0.16350787496293626,
-0.06274337543165032,
1.048639096314506,
0.9454500907927006,
-0.18328208251477485,
0.5336296017995852,
0.7047960543548563,
-0.4717130073686535,
-0.14327049451726778,
0.5646728024946054,
0.1377201649736573,
1.0845662084088512,
0.7117671017527167,
1.8562916393289055,
-1.0958742208007046.
0.314756410152813,
1.0055290931424188,
-1.2653176839886926,
-0.6435463058390287,
-0.13689785210195535,
0.5185042269644529,
-0.07994120596020922,
-1.3394312085309903,
-0.01354724643952521,
-0.8508707890759795.
-0.7258020036409927,
-0.1513648764845159,
-0.5702686618598916,
-0.20804467461705725,
-0.059043388294177074.
0.9724468840137966,
1.6889388278999584,
0.19460354666786345,
1.52688995899303,
0.40690710189505636.
0.054839646577847824,
-1.9384169999074634,
-0.8955556931339368,
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788,
-0.008629533947631484,
1.3318794505555018,
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042.
0.6437292330207226,
0.02590432636550948,
```

```
0.44592066957482307,
  -0.0809779454755679,
  -1.1390483539597829.
  0.4898473400025203,
  0.11381426982162568,
  0.6089836387514223,
  0.17594570893388972.
  0.012948010393531988,
  -0.547404644839424,
  0.028969189369927453,
  1.1006601522977721,
 -0.6406183594181203,
  -0.12562720825840668,
  2.0392738219317867,
  0.9906966768182601,
  0.03179376057566713,
 1.5460159269414353,
  -0.01674613470972367,
  -1.1841027420803907,
  0.24496917335434354,
 -0.07332300856328518,
  0.25897293698241475.
 0.35918978324443196,
  -0.007942172382781155,
  0.4618323110818234,
  -0.08547471514820712,
  -0.5115221242285567,
  0.4563488682048878,
  -1.2086759202201718,
  0.14282176979415442,
  0.48263581465206523,
 0.09855500655515351,
  0.5327824526475502,
  -0.19110982084320108,
  -0.775795154813047,
 -0.31907838177549175,
  0.03477100089693282,
  0.7436201132387485,
  -0.022209896476399357,
  -0.14741027177548285,
 -0.10110024079398225,
 0.20359400710495562,
  -0.15623022021775929,
  0.1964090589605299,
  0.18042072654891128.
  0.8910666012551952,
  0.03518277211157266,
  0.11858050209575345,
  0.6912090997145024,
 0.05142750966379351.
 1.2523961498884204,
  -1.1477698487953947,
  -0.16063831357643202,
 -1.0074319345942784,
  0.29535289246662044.
  -0.002280412475169233,
  0.45599081133710123,
  -1.6715207166067523,
  0.3320227490012926,
 1.54213063147404551.
[ 0.33528943002425843,
  0.8608925283648261,
  2.8309935233222867,
  2.8382233121900358,
  2.847558790018716,
  2.8477263794127468,
  3.9337993695450666,
  3.9337993695450666,
  3.9337993695450666.
  3.9337993695450666,
  3.9337993695450666,
  5.127462455084763,
  5.128383696390232.
  5.132051241075024,
```

5.132231848473024,

```
5.132297186784173,
5.132297186784173,
5.132297186784173.
5.132320898992942,
5.134903164275234,
5.734798022200061,
5.734798022200061.
5.734798022200061,
6.71748919093495,
6.71748919093495,
9.773430860122208,
9.791656954875775.
9.791980525916317,
9.804782964874805,
9.947289619134542,
0.6818618664375632,
0.42253658736184846.
0.19067339209915313,
-2.314563573529872,
-1.7784854373672185
-0.10945476580518654,
0.08980428543050965.
0.6265702304745648,
-0.12016219313034968,
0.005450784512528824,
0.9621316606784164,
-0.01940541263687908,
-1.2890091107885369,
-0.09216272929775945,
-0.8615487717558121,
0.021600758375482327,
1.1068545366678577,
-0.06436428812394061,
-1.8186253546793636,
-0.2455724158610742,
0.7444478114283775,
1.0647343146888184,
-1.6388802958603008,
-0.05032235091912311,
0.7589104637111997,
0.0934759886788552,
0.7280377617711271,
-0.10012682423470079,
-2.7917715562202794,
0.5843828201862561.
1.2003794612588048,
-0.2782652692858759,
1.253725179404932,
-0.831140674623039,
-1.3898002860152843.
1.7689493816619246,
-0.768539740515663,
-0.5265628815801298,
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446,
0.06348552937029919,
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522,
-0.5743460857513,
0.873550995352649,
0.8797938271812764,
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805,
-0.4012501825920459,
-0.4763388197192611,
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537,
```

-0.41722730509388967,

```
0.9275888618509817,
  0.4371362266023078,
  -1.4110895986752616,
  0.6716489600966955,
  0.08900519900900147,
  0.7708643633651343,
  0.0944251249629154,
  -0.053131619179539805,
  -0.132883145931867,
  0.44414428660563765,
  -0.3164026614336652,
  0.9835391768228284,
 -0.49696354121947833,
 0.3510514174127117,
  -0.24991518010085176,
  -0.7780713458689107,
 1.3387260017849976,
  0.712191280671364,
  -0.4436070432657242,
  1.090195713122469,
  0.3876483875477464,
 1.113683201871723.
 0.09724940056823322,
  -1.3265075307540413,
  -1.8530581309545013,
  0.335564434910613,
  0.16061631243062188,
  0.6994545842241634,
  -0.0055568765936962455,
  1.8148369905661879,
 -0.9149620921846291
 -0.5341673651010566,
  -0.6583203681162046,
  -0.05148037848607484,
  -0.1302834828824637,
 -0.2083684341417298,
  -0.7142637766159184,
  0.4980789266978527,
  -2.030263033934291,
  -0.002330467371510849,
 -0.7835259213136883,
 -0.18712783689065152,
  -0.271594041353006,
  0.606962231033315,
  0.19917323339650786.
  0.581852597021436,
 1.0547240409345577,
  0.07111303544026976,
  1.4877210254684077,
 0.08669172360020491.
 0.8024105605127613,
  0.8315802366658298,
 1.117305276662395,
 -1.0742437197416552,
  0.30921812342286065,
  -0.06994991433225481,
  1.0419800264617582,
  1.4507701003592177,
  0.2408413974211676,
 1.65737613277253581.
[ 0.08591881204796584,
 1.5026023651616802,
 1.9179097588555833,
 1.9179097588555831,
 1.9179097588555831,
  1.9179097588555831,
  2.8800636946459592,
  2.9523818900173797,
  2.9523818900173797,
  2.954896407422686,
  3.0487820562708485,
  3.0487820562708485,
  3.9462134206000328,
  3.9462134206000328,
```

5.170248653928018,

```
5.170248653928018,
6.5066905594049205,
6.5066905594049205.
6.5066905594049205,
6.914119522580601,
6.914119522580601,
6.9842551957162815.
7.300516913785898,
8.782483894556266,
8.782483894556266,
8.999633503017922,
8.999633503017922.
8.999633503017922,
9.414122362394847,
9.414122362394847,
0.09854676674938925
-0.05173289612974198.
0.30094803169630163,
-1.1984142138894447,
0.08610670053567002,
0.2851928692216035,
0.26177875477440216,
0.11764473243628538,
0.3495067876706816,
-0.9678438601279628,
-0.08762050677252062,
0.014826088936787857,
-0.30347729159143555,
-1.1730530788097624,
-0.12550631929596553,
2.258056275075482,
-0.5160508087356981,
0.004541093619226378,
-0.9345420797218197,
0.47154522212338745,
-0.9129446894819914,
0.2768683391341781,
0.29975752794333804,
-0.16177915588279423,
0.6021148977823381,
0.35405737535162146,
0.8149645603473178,
-0.7074306860917636,
-0.8281028342440522,
-0.20840122350984505.
-0.19593362207831977,
1.2208184674045053,
-0.10408257731449277,
0.9878855326441833,
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756,
-0.44913621684685756,
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521,
0.5925479388494825,
0.1500100176310508,
-0.4655542365338734.
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612,
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243,
-0.8246572495389679,
-0.28480932751570914,
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
-0.035476380392734465.
0.9940259955458774,
```

-0.657126951929564,

```
-0.4786936406484008,
  1.4564140457987391,
 -1.062151832750044,
  -0.01496017231630948,
  0.16259290081999456,
  0.601493806263198,
  -0.20485253219607644.
 -1.2421776762345744,
  1.152288606322054,
  1.1883019471730756,
  0.9817659575699377,
  0.9653429636905305,
 0.5382122852444811,
 0.722384759736696,
 -0.13079560936986118,
  -0.9638314109375934,
 -0.13358671856975504,
  -0.3949417844115237,
  1.01780227278121,
  0.6746960094686067,
  0.14295933107831804,
 -0.37974724013569766.
 0.3641245559377578,
  0.12972678280008856,
  0.5949873255000262,
  0.8499370211382984,
 -0.0792654431528575,
  1.9402087793428133,
  -0.5583113020357903,
  0.6535986429024293,
 1.0008805619835928,
 0.16556690201288055,
 1.1071973338235597,
  0.07194244573338314,
 -0.9146859400815048,
 -0.005186820541518637,
  0.4795762978809806,
  0.6475066336984044,
  0.11860845746693519,
  0.08044881503693782,
 0.5402817334108434,
 1.5532870492056725,
  0.36643388228039625,
 1.6150985923432208,
  0.22271977417212363.
  -0.04956133994172771,
  -0.6258533610916538,
  -0.6517224443292691,
  0.2594825887888975,
 -0.1286341552665023.
 0.48749759828242367,
  -0.009813928289633511,
  0.5249350004928881,
 -0.01015655683116892,
  -0.48671658518654837,
  -0.588311268126242,
  -0.25978871509233853,
  0.9039610340757382,
 1.5549616218831699,
 -0.053301589540924061.
[ 0.3773346757087749,
  0.5734233884194113,
  0.5734233884194113,
 1.2094818154974225,
 1.2528672337957094,
  1.3073966674132076,
  4.193348178434801,
  4.228670385547864,
  4.228670385547864.
  4.228670385547864,
  4.228670385547864,
  4.228670385547864,
  4.274742575727675.
  5.343872214974395,
```

5.354523589318104,

```
5.449133113124401,
5.449133113124401,
5.449133113124401.
5.449133113124401,
6.208341300319731,
6.208341300319731,
6.738723848778546.
6.7473872692498285,
8.515456463543387,
8.552181104315652,
8.552181104315652,
8.552181104315652.
9.363042150968939,
9.363042150968939,
11.478464454984158,
-0.2683676450988651,
-0.9370321768196137.
0.03790413469005285,
-0.3520989510779511,
0.5131804204688105,
0.767748989456867,
-1.1529933056041268.
1.0195402939041247,
-0.5189860890713169,
1.700377968800765,
0.48912124484584857,
1.506730848787325,
0.4485612726223177,
-1.6248073049289613,
0.10079320215400162,
1.7454590745233427,
1.474284546585253,
0.08837986403943651,
1.215839965531947,
-0.42666568442503866,
0.04298065245990749,
-1.495484471060033,
0.39055472334393304,
-0.06187227108331559,
1.0010296249342066,
-0.33745943355443286,
-0.19046242319241546,
-0.4884459619425607,
0.8930564792122229,
0.09947441181287657,
-1.4049039336860292,
1.0413688199593338,
0.027348986225077598,
1.5457890290583323,
0.8022774572900748,
-1.0377116853398,
0.5652694406258009,
0.9990396087940023,
-0.3409174955760714,
-0.8590373420111477.
0.3662952964918326,
0.6492392290096071,
-1.0735392409833318,
-0.620775369578654,
0.5064494688850749.
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637,
0.13897118193917846,
0.13192395570874205,
-0.560408177185694,
-0.7293430452459922,
1.2393938765994381.
0.16520016983754293,
```

-0.04218705839108043,

```
1.9844775109402493,
 -0.40811731341033075,
 0.40494641878472026.
 0.44317505546879765,
 -0.14541224425415586,
 -1.3628454492957067,
 0.35572573997739254.
 -0.17363781014762678,
 -0.21765464091811726,
 0.25867396534698067,
 -0.19299239511743832,
 0.842583631219517,
 0.01538577194684443,
 -1.3780712180305699,
 0.30168991607554185,
 0.03816118508668757,
 -0.6330896266111891,
 -0.14462412237866193,
 0.22751230177420415,
 2.198362599080823,
 0.5538971259685714,
 1.6735676153080048.
 0.01161307703421222,
 0.15241612900647253,
 -0.4114895408906573,
 0.020024246948836234,
 -0.361021382333633,
 1.2366726872792735,
  -0.8652479233612058,
 -0.38157323774943186,
 -1.2043495043519374,
 0.03294448415473864,
 1.864475600371399,
 -0.048446953541905424,
 1.483038428004856,
 0.02119809714572118,
 -0.20756566215919184,
 1.2566509021622863,
 0.4040298326697209,
 0.0492062183426151,
 0.3396501220758691,
 0.09097515161528406,
  -0.4545275805495163,
 1.5327906096069877,
 -0.47568898039994184.
 0.7447654713950665,
 0.7179833985093875,
  -0.03692927531761856,
 0.11509825242982577,
 0.020898935398901888.
 0.2387893529411216,
 1.5195379458286031,
 -0.5337205856413728,
 -0.5741707032781822,
 1.298358172715442.
 -0.010829860462227588,
  -1.9037204771139875,
 1.5774751765228583,
 -0.28550943128124906,
 1.55318841185682441.
[ -6.331146189926128e-17,
 0.7069927066774304,
 0.7069927066774304,
 0.7069927066774305,
 0.7069927066774304,
 1.0044153364322925,
 1.0092418692996383,
 2.470333794214341,
 2.478143749866421,
 3.5776564981759003,
 3.5776564981759003,
 3.5776564981759003,
 3.61745967653339.
 3.6981780389472076,
```

3.755720232685741,

```
3.9712286023902594,
3.9712286023902594,
4.519037432417192.
4.519037432417193,
4.519037432417193,
5.280953883299406,
5.280953883299406.
6.620356980277175,
6.620356980277175,
6.620356980277175,
6.620356980277176,
8.214004051881032.
8.214004051881032,
9.105951544537387,
10.829366164164977,
1.4490195266558639,
1.145329650589643.
-0.9374272684957279,
-1.2910248872233119,
0.9701069453007352,
2.0238893871034924,
-0.6731600678051081.
-0.7305037462514778,
0.6743483023845589,
1.611766624162738,
-0.162446688913207,
-0.2464021583836281,
1.3073653685111934,
1.560629053845934,
-0.09768282308379246,
-0.31393750682085847,
0.1625705045557987,
-0.1344649185634244,
-0.03516682581352061,
0.15934568227883428,
1.4484389719925783,
0.31346340320241645,
-1.5406853809043388,
0.3831701903776482,
0.07255447956326048,
-0.4619144712511035,
0.6220101497739178,
-0.08645510294766677,
-0.036774035023737585,
-0.02433291891195538,
1.2745777688613118,
0.806643386980706,
-0.1734465019831428,
-1.474099767063678,
-1.2534035864969235,
0.024086803725753666,
-0.5946515656594247,
3.047855036387052,
0.561263952510902,
-0.27353577574812815.
0.476385213099692,
-0.4183083264972014,
-0.07584344603997495,
-0.04004176630390785,
0.6379867024754904.
3.306912023625799,
0.6758488609505069,
-0.49379826249780634,
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808,
0.043470303912556706,
0.2301819741695647,
1.9247102260310271,
0.19401136489510468,
0.17784496580796996,
-0.12037519976757159.
0.10596613899479704,
```

0.02480260398862852,

```
0.33616247382037256,
  -0.2960626605489573,
  1.2038327046358004,
 -0.4266046665751028,
  -0.14331073423696536,
  0.33240571018120446,
  0.13743208352564132.
 0.21308235615415505,
  -0.8816113951868988,
  -0.03958129872975694,
  1.7385124490728345,
 1.3953860705003918.
 0.7193393529381484,
  -0.5890148767931709,
 1.6845229617798814,
  -0.04059142172715042,
  -0.6588344885662398,
  -1.5492107393137406,
  0.9886630320432893,
  1.3955090248591298,
 -1.7521400718196618,
  -0.02012078102450614.
 1.5598528019020075,
  -0.041272015671692544,
  0.6659176073691222,
  -0.10884895615623923,
  -0.8860283635501729,
  -0.042494102069769425,
  -0.5241060846215897,
  -0.049429521011899694,
  -1.6158837397685775,
  -0.29703279066650246,
 0.6940812648197017,
  -1.0869617874060826,
 -1.1891726572683667,
  0.03935191545498333,
  -1.7727595774952096,
  -0.0005664350349098603,
  -1.2288438066739866,
  2.182693040857262,
 1.2648198022740724,
 0.636776362006322,
  -1.1418938134635428,
  0.04892386539982865,
 -0.6595482134655696.
  -0.016038133219537475,
  -1.53365152672916,
  -0.5818287115590742,
  -0.8537662908823758,
 1.3418170063691075,
 -0.32888813707646736,
  -0.018460135902194714,
 -0.8323242421777916,
 1.5026664500941838,
 1.809610363246633.
  -1.5283405786971713,
  0.5470095670143573,
  -1.4753657998350065,
  0.8122840148585063,
 1.53178787797161761.
[ 3.750846163374531e-05,
  0.22285241391868899,
  0.26252411232084344,
  0.26252411232084344,
 0.26252411232084344,
  1.459545906754556,
  1.4595459067545562,
 1.6094835194149661,
  2.5927782099427628.
  2.5927782099427628,
  2.5927782099427628,
  2.5927782099427623,
  3.3552499939702187.
  3.3552499939702187,
```

5.033284106467877,

```
5.033284106467877,
5.056477210452712,
6.768913439946703,
6.768913439946703,
7.2782492670747585,
7.2782492670747585,
7.2782492670747585.
7.2782492670747585,
7.2782492670747585,
7.2782492670747585,
8.934198246659292,
8.937369801451712.
9.544406408519471,
9.544406408519471,
10.23170722265548,
-0.4501443853573418,
0.06519513561037263,
-0.13386490845883003,
-0.01542333988020039,
0.3988203537526196,
0.9163371790808124,
0.08159154039220383.
-0.11665429084087826,
-0.21130662780886203,
1.515236372470638,
0.4436142129357345,
-0.28780404896369716,
0.3681425383234808,
0.648176841676201,
0.3046875502986337,
0.05897820457762899,
0.09316951897603123,
1.5277657654344678,
-0.655141628591867,
0.073084468489131,
-0.11423944001370272,
0.3986898081963471,
1.0974832156349317,
1.8462557861113,
0.5998463368708868,
-0.0014214294560794885,
0.4026665434776887,
-0.03860309342262787,
0.3728818533964108,
1.7322816292529104.
0.42156018976657544,
0.9872712539907578,
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974,
0.4324416138472369,
0.7909276553155474,
1.0132171075838867,
0.008626434202972095.
-1.4776636473003866,
-0.0743310361925915,
1.1363109745761366,
0.32003332101567866,
0.08535303128967886.
1.1165485958252095,
0.476282782575683,
0.11414859665640108,
0.8927652783900955,
0.027791184984770272,
0.8970588198442948,
-0.04579755391586939,
0.10596016247070955,
0.4721342517962854.
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702.
0.2928189752635581,
-0.4120973709154422,
```

```
-0.16251962266938982,
  -0.928532755338732,
  0.13709877636127538,
  0.09386847134985479,
  -0.9415336108192559,
 -1.3861285848764584,
  0.5116476525314603.
  -1.5694556777668651,
  0.31948518026769196,
  -0.0136576069296156,
  0.8752899744519326,
 -0.448175539102687.
 -0.8567162669878051,
 0.737642795798484,
  -0.5233142967805873,
  -0.020239952918795164,
  0.9696407297918527.
  1.064479355466651,
  -0.43102633401249074,
  0.3234367312145231,
  0.02606795235445944,
  0.2525608175326581.
 0.09544790103129135,
  0.30399471295861424,
  0.6638935631613432,
  2.095756590649309,
  -0.5383535092385583,
  -0.1523671776118538,
  -0.49733805370513506,
  1.0814777965289457,
  -0.5541810322110113,
  0.4702060218904802,
  0.1941018040115748,
  0.027389458133440587,
  -0.6339976476553459,
  0.824073822166477,
  -0.8904328829691108,
  0.5852778403101284,
  -0.37705413851354036,
  -0.20234246488211116,
  0.19390975159216547,
 -0.03854894368679599,
  -0.5885610444718222,
  0.2892174263372239,
 -0.7158388932188376.
  -0.03853087013753846,
  0.36228239756074476,
  0.06448164730191597,
  0.8103021451607575,
 0.04195704491201313.
  2.1946244272306323,
 1.1078290402756337,
  -0.0920096926231485,
  0.7957980849005134,
  0.10683086015182242.
 0.04139972880547422,
  1.068477454710041,
  1.5812878062267348,
 1.0292383703670558,
 1.58226319421621381.
[ 0.003375513600300809,
  0.4884127443235871,
  0.6719352108785641,
  0.9073170135093351,
 1.4946633690060278,
  1.5076957064847494,
  3.872917838142945,
  3.872917838142945,
  3.872917838142945.
  3.872917838142945,
  5.047622474508209,
  5.054336886650782,
  5.067626550795242.
  5.0733174878702085,
```

5.094629387163461,

```
5.749571576552799,
5.7731554023304374,
7.144946717661993,
7.144946717661993,
7.144946717661993,
7.144946717661993,
7.602314289267704.
7.602314289267704,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832.
8.018775147517832,
8.018775147517832,
9.661071929582006,
0.2735947252101626,
2.471262065567802,
0.18954222370300397,
0.2633058348660961,
0.07494334922808346,
1.4980157261935538,
0.3538857424122425.
0.26341770410626436,
0.17174804107002956,
-0.22912718472194316,
0.11060714764109056,
-0.30804859927082595,
2.8406850614439736,
1.0823654569610508,
0.9668529413216363,
1.8727663516543385,
-0.0901659930896485,
0.05868560690604535,
0.24212775097742179,
1.0092515209898247,
-0.7556969386491817,
0.3279350524218167,
1.078117272505244,
0.10391815458190773,
-0.7434930272741371,
-1.6965388530236032,
-1.360748554100242,
0.34939560927302815,
0.03188634842980519,
-1.2447472675125983.
0.06092342743494014,
1.017082923902293,
-1.007905562333318,
-0.8576057837691866,
0.5321038189070756,
1.300652060018237,
-1.8122591145188616,
-1.247002191580596,
1.2529274198051785,
0.3750417535596218.
0.2898066740735119,
1.589675559301449,
2.3222772390172888,
-1.568740409290771,
0.5925151941094322.
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883,
0.2658818907332787,
-0.9372958671062981,
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732,
2.008892916411081,
```

0.15285666374274742,

```
-1.782425531898792,
  0.07791440554206944,
 -1.28397958204954.
  -0.7247696039786395,
  0.5612678373457747,
 -0.004762916486662008,
  0.4386089298525658.
 0.010283368626678616,
  0.8990610129088383,
  0.03840864905637026,
  -1.2418081984826976,
  0.33190310279028407,
 0.3061008622829172,
  -0.06950158836023225,
  0.93859456058615,
  -0.02489786142317165,
  0.9927840878492759.
  -0.0709710381209458,
  -1.4546153026559692,
  -0.6707274766895803,
  1.0492831078613678,
 1.59883886587945.
 -0.7948795957139008,
  0.011914265512354442,
  0.29611851635537545,
 -0.026452865362460363,
  0.17911271593442915,
  -0.268102313362264,
  -0.31698956355176716,
  0.5150163737561883,
 -0.2617344493849528,
 -0.08207987775663798,
  -0.7031192006515304,
  0.10296103394319861,
 -1.3322481995457,
 -0.8096620548125795,
  0.22894179493051453,
  -0.6404807766018014,
  0.5981001234262467,
  0.6725836248662437,
 -0.24769451099401643,
 -1.5367942204876157,
  0.32496629998060117,
  0.8231756699235411,
  0.27229759145944715.
  -0.4283887626472357,
  0.6783210911797265,
  1.178917544999848,
  -0.48124012627536317,
 -0.23642700938756703.
 -0.22983768395119897,
 0.7841497681166887,
  0.5963513861028734,
 -0.8505831212819382,
  0.6516631671421783.
  0.6698405071431395,
  0.7826636181190869,
  -1.6023915303224998,
  0.6733061844063541,
 1.57559926242409891.
[ -5.647934061474703e-18,
 1.4787834906243755,
 1.478918229526628,
 1.478918229526628.
  2.0077351764243123,
  2.4302809101456218,
  2.4302809101456218,
  3.009709563144601,
  3.009709563144601.
  3.239471043198664,
  3.2405283031129133,
  3.2405283031129133,
  3.2656598154222434.
  3.5353392937639825,
```

6.198713539858257,

```
6.213604956994236,
6.73397854893658,
6.73397854893658.
6.743547791194661,
6.744609103740889,
6.744609103740889,
6.749543065628153.
6.749543065628153,
8.615256229309818,
8.635090640841518,
9.012323512360366,
9.012323512360366.
9.930483613907942,
9.930483613907942,
11.782061805135282,
0.6870051227789642,
0.5234095533264759,
0.11216801162302814,
0.044591843687496906,
-0.747159787599118,
1.5727279855217766,
-0.16958009141159439.
-0.7234855106318131,
0.45999589631996707,
1.3613822619347415,
0.5234464983029046,
0.18337466193510712,
1.0660408011194182,
1.2813123812864906,
0.34899885807903364,
1.2204971120849089,
0.37250493843195553,
0.3861568591798728,
-0.4881036169368887,
0.23720347697856276,
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716,
0.5103741134651811,
-0.48491784736765847,
-1.939727949979543,
0.5221979500550953,
-0.39618913325979604,
-0.5258671175956018,
0.08753210163723862.
1.3619602585721242,
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274.
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961,
0.4198375873878555,
0.5765253059135943.
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473,
0.4465655907565091,
-1.4308928069625704.
1.6254306194316424,
-0.16298810299835312,
-1.249293985363804,
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616,
-1.1357659634071433,
-0.5734897531715744,
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403,
0.06392732561319403.
0.7711512775812011,
```

-1.8472478314151175,

```
-0.46160141905881696,
  1.8963279721150403,
  -2.313663424814036,
  0.060952702837845166,
  -1.4971949982077863,
 1.3040610818975555,
  0.10605679464403613.
  -1.138800572315487,
  -0.03947636943653289,
  0.07839455865010819,
  -0.6470277815644087,
  0.946101637008616,
 -0.32144060478582315,
  -0.6371693991779968,
  0.30580409265523,
  -0.2617129381706641,
  0.4094287336545931,
  0.49837362733711055,
  -0.9058714721495094,
  0.6137893604415533,
  0.8546844695081749,
 -0.8205470722456557.
 -0.598852289145785,
  0.46823811794119646,
 1.2205247300232143,
 0.031629319060699435,
 1.1369587010491427,
  0.12298062775535874,
  -0.016960252964031076,
  1.1127338626212067,
  0.37972118532018134,
 -0.1475616440844684,
 0.32749925367563326,
  0.030050642250761914,
  0.17169542743574548,
 -0.5825729547476518,
  0.7052714548722974,
  0.9884296874822006,
  -0.500384308215816,
  0.01722431287494931.
 0.40290712722731054,
  -0.029200452046427447,
  1.2704708243944813,
  2.3709704014259345,
 -2.0267551524865275.
  0.7347873374577798,
  -0.34767223966060473,
  0.009778943736386289,
  0.221000841842164,
 -0.010995780695540691,
 -0.481889271583797,
  0.7008500159073542,
  2.3944065221124076,
 -0.08320445199579081,
  2.02470278988152.
  0.02142760118000664,
  1.6794429086669174,
  1.6046551807968945,
  0.2831685070910348,
 1.58051355985949351.
[ 0.0019047787007362745,
  0.7201496918445128,
  0.7201496918445128,
  0.7201496918445127,
  0.7226708680142584,
  0.8068041864232433,
  1.3847174673528184,
 1.6031895944534578,
  2.458865333289775.
  2.458865333289775,
  2.721120236828938,
  2.721120236828938,
  3.554687304897056.
  3.554687304897056,
```

4.537252190232355,

```
4.537252190232355,
5.239770593633025,
5.242363659304797,
5.566731623636481,
5.566731623636481,
5.566731623636481,
5.566731623636481.
5.566731623636481,
7.6484324534494865,
7.6484324534494865,
8.96757120343865,
9.352637118466301.
9.381932224950582,
9.966925955531599,
9.966925955531599,
0.29840004251263574,
0.3207087147269936.
-0.22478909909228914,
-1.2242611593120782,
0.061748844824383295,
1.9931455249507801,
0.02449362327304914.
-0.23402928130657288,
0.3399922671860315,
0.2355005268966802,
0.7912945290539132,
-0.9147564287830934,
0.12280724330167514,
0.42016875545313104,
0.6183328009701774,
0.9098148543333162,
0.2439503202728901,
0.4941740976390827,
0.0721485641264495,
0.20051214721509877,
0.14273239312798908,
-0.03846070968482946,
0.11474641891065286,
0.1552743298359438,
-0.050455466832234855,
0.24385918138398863,
0.0646818550964626,
1.0379575003266166,
0.4438839418702803,
0.6652939620943935.
0.6574583263339632,
0.6386444070388955,
0.30923240052603657,
-0.34636230410321134,
0.23860747048870812.
-0.8837469955189079,
0.25272330748816335,
-0.05865013289270936,
0.324900593333006,
0.14494577696571714.
-0.2063591527406891,
0.03616506891850059,
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661,
0.256318263131488,
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428,
-0.007804627058269528,
-2.9100406031766375,
-0.17918863042787767,
```

```
-0.29620353111227854,
  -0.2953351498676352
  0.4434234593316091,
  0.0018987515325079429,
  0.5290648024022053,
  0.011057994967698829,
  0.03103232328752182.
  -0.21693206073792237,
  -0.07883582131375938,
  -0.2554965378040217,
  1.978711034134111,
 -0.02822992907519939.
 1.110830733101554,
  0.04155227001102173,
  0.17370289874025888,
  -0.08435695708516765,
  0.38686640173882947.
 1.0727525781247964,
  -1.4871438236674412,
  0.1437881416009117,
 -0.15769165641037303,
  0.46096388290194723.
 0.3881288491041242,
  0.3113157866411551,
  -0.21237825892214532,
 1.3408904937177344,
  0.033287678968192874,
  -0.22654084728278404,
  0.09162287503278096,
  1.1250326534568733,
  0.670327239820091,
 -1.4911819217025961,
  0.8417198858779599,
  0.018685303562101165,
 -0.5955098452611822,
 1.37350461224772,
  -0.5503685346151788,
  0.07415629279393592,
  0.22396953453102358,
 -0.02219350017922496,
  2.5136787648879593,
 1.5560141766956836,
 -0.037039417521638966,
 -1.5578667717297374,
 -0.15174825264689498.
  -0.0075908588231686416,
  -0.1347910987366526,
  0.7535559035800633,
  2.9519825568174283,
 -0.8640992588734872,
 -0.486197602889753,
  -0.029079605859607876,
  0.1393557947212105,
 -0.03201203543340934,
  -0.17255788414719309.
  -0.6220837667998668,
  0.10441375911567917,
  0.7019930428559267,
 1.822960884928266,
 0.00102566214006768151.
[ 0.00030922277578629,
  0.881375055029912,
  0.881375055029912,
  0.8813750550299119.
  0.9803845151714838,
  0.9803845151714838,
  1.201629973822729,
 1.2441077564052723,
 1.8660677974280824.
 1.8660677974280824,
  2.651002314516478,
  2.651002314516478,
  3.233637461790533.
  4.36384995486056,
```

4.36384995486056,

```
4.975714528653046,
4.975714528653046,
6.591840750700408.
6.591840750700408,
8.234009055219385,
8.238223602720305,
8.238223602720305.
8.238223602720305,
8.903406631369169,
8.903406631369169,
8.903406631369169,
9.126449234760914.
9.126449234760914,
9.441918167657187,
9.441918167657187,
0.4384156956352651,
-0.017407483354635628,
-0.13579407977759564,
-0.08181457210659056,
-0.5635031413839604,
0.570197125887921,
-0.07389454022208618.
0.18950484918514415,
0.23442314823895152,
0.5187197914643009,
0.03760777637611914,
1.2080522066616035,
-0.006796933498365149,
0.7597395812711474,
0.3165595784185247,
0.09234381717322694
-0.047116958459538144,
0.02161370846364295,
-0.3330735946096464,
-0.310519881157395,
-0.1321730433969341,
-0.32004747583182785,
0.38880240494533963,
0.5587916266845782,
-0.04068226055752174,
-0.04929253976644778,
0.7350044083650977,
-0.3347542084226466,
0.07994172439872818,
0.177027499128215,
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313,
-1.8841797053563085,
-0.39250057722196113,
0.0604718224769807,
-0.15658247224402194,
1.097732135880844,
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626.
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875,
-0.29954118659750983,
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
```

```
0.0470036094807545,
                                                    0.6942117349751494,
                                                    -0.24738597040458754,
                                                    -0.3530344251488351,
                                                    -0.7207866325012796,
                                                    0.6865004571010461,
                                                    -0.022934954570734595,
                                                    -0.4703523591474931,
                                                    0.00010065187353926284,
                                                    -0.25737840979321513,
                                                    -0.37927040299996573,
                                                    0.3323512575736423,
                                                    -0.7162822410895011,
                                                    -0.8849129065134153,
                                                    -0.02984860970928172,
                                                    0.9857401879405846,
                                                    0.13869536095324345,
                                                    -0.4901093246549395,
                                                    -0.15185390643388375,
                                                    -1.1107951730061545,
                                                    1.1255217267520845,
                                                    -0.36113008327046914,
                                                    0.12498769155032201,
                                                    1.105653484876161,
                                                    -0.0826241142760939,
                                                    -0.6079720837354008,
                                                    -0.4798331114275297,
                                                    -1.1230771992973987,
                                                    0.13634359721928585,
                                                    -1.0117198549615587,
                                                    0.0420371772323395,
                                                    0.4704689604818435,
                                                    -0.1136051809968673,
                                                    -0.4158299646895606,
                                                    0.7682233881623428,
                                                    -0.8567828943049521,
                                                    -1.0844985071567337,
                                                    0.8118563616911731,
                                                    -1.0011580890685694
                                                    0.06773503500153778,
                                                    -0.9972068257582826,
                                                    0.22064841214728595,
                                                    1.015101892093672,
                                                    -0.023903188302909387,
                                                    -1.5448535965900865,
                                                    0.40727537812840897,
                                                    0.6273868528756265,
                                                    -0.06403282214251436,
                                                    0.1402221940396834,
                                                    0.011807494022614938,
                                                    0.19970219531306482,
                                                    -0.3159297567283321,
                                                    0.5243897804672414,
                                                    0.6302439365729751,
                                                    0.4184253509022523,
                                                    0.38422115408735924,
                                                    0.8610939738936156,
                                                    0.3457693810952046,
                                                    0.19105880264763628]],
                       'run_time_sec': 68892.59480500221}}],
'zne': [ { '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': [ 0.003375513600300809,
                                                  0.4884127443235871,
                                                   0.6719352108785641,
                                                  0.9073170135093351,
                                                  1.4946633690060278,
                                                  1.5076957064847494,
                                                   3.872917838142945,
```

0.32920686175801595,

```
3.872917838142945,
3.872917838142945,
3.872917838142945,
5.047622474508209,
5.054336886650782,
5.067626550795242,
5.0733174878702085.
5.094629387163461,
5.749571576552799,
5.7731554023304374,
7.144946717661993,
7.144946717661993.
7.144946717661993,
7.144946717661993,
7.602314289267704,
7.602314289267704,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832,
8.018775147517832,
9.661071929582006,
0.2735947252101626,
2.471262065567802,
0.18954222370300397,
0.2633058348660961,
0.07494334922808346,
1.4980157261935538,
0.3538857424122425,
0.26341770410626436,
0.17174804107002956,
-0.22912718472194316,
0.11060714764109056,
-0.30804859927082595,
2.8406850614439736,
1.0823654569610508,
0.9668529413216363,
1.8727663516543385,
-0.0901659930896485,
0.05868560690604535,
0.24212775097742179,
1.0092515209898247,
-0.7556969386491817,
0.3279350524218167.
1.078117272505244,
0.10391815458190773,
-0.7434930272741371,
-1.6965388530236032,
-1.360748554100242.
0.34939560927302815,
0.03188634842980519,
-1.2447472675125983,
0.06092342743494014,
1.017082923902293.
-1.007905562333318,
-0.8576057837691866,
0.5321038189070756,
1.300652060018237,
-1.8122591145188616.
-1.247002191580596,
1.2529274198051785,
0.3750417535596218,
0.2898066740735119,
1.589675559301449,
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217.
0.6791516075394335,
-0.10885247153326365,
```

```
0.2658818907332787,
                           -0.9372958671062981.
                           -1.0664167087973948,
                           -0.7139434901419379,
                           1.3816698348804732,
                           2.008892916411081.
                           0.15285666374274742,
                           -1.782425531898792,
                           0.07791440554206944,
                           -1.28397958204954,
                           -0.7247696039786395.
                           0.5612678373457747,
                           -0.004762916486662008,
                           0.4386089298525658,
                           0.010283368626678616,
                           0.8990610129088383,
                           0.03840864905637026,
                           -1.2418081984826976,
                           0.33190310279028407,
                           0.3061008622829172,
                           -0.06950158836023225.
                           0.93859456058615,
                           -0.02489786142317165,
                           0.9927840878492759,
                           -0.0709710381209458,
                           -1.4546153026559692,
                           -0.6707274766895803,
                           1.0492831078613678,
                           1.59883886587945,
                           -0.7948795957139008,
                           0.011914265512354442,
                           0.29611851635537545,
                           -0.026452865362460363,
                           0.17911271593442915,
                           -0.268102313362264,
                           -0.31698956355176716,
                           0.5150163737561883,
                           -0.2617344493849528,
                           -0.08207987775663798,
                           -0.7031192006515304,
                           0.10296103394319861,
                           -1.3322481995457,
                           -0.8096620548125795,
                           0.22894179493051453,
                           -0.6404807766018014,
                           0.5981001234262467,
                           0.6725836248662437,
                           -0.24769451099401643,
                           -1.5367942204876157,
                           0.32496629998060117,
                           0.8231756699235411,
                           0.27229759145944715,
                           -0.4283887626472357,
                           0.6783210911797265,
                           1.178917544999848,
                           -0.48124012627536317,
                           -0.23642700938756703,
                           -0.22983768395119897,
                           0.7841497681166887,
                           0.5963513861028734,
                           -0.8505831212819382,
                           0.6516631671421783,
                           0.6698405071431395,
                           0.7826636181190869,
                           -1.6023915303224998,
                           0.6733061844063541,
                           1.5755992624240989]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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],
```

-2.2650870540994883,

```
'r': 1},
                               'def': 'ising'},
              'output': { 'draw': { 'fig_dpi': 100, 'status': False, 'type': 'png'},
                           'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric5_sample#7'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                    [1, 1, 1, 0],
                                                    [2, 2, 2, 0],
                                                    [3, 3, 3, 0],
                                                     [4, 4, 4, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                        'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.397817460329861],
                                         [12, 6, 21, 8, -3.2115716730808748],
                                         [20, 10, 35, 16, -1.641958817033255],
                                         [28, 14, 49, 24, -0.8464644349040011], [36, 18, 63, 32, -0.4337371704190119]],
                        'degree': 0,
                        'method': 'richardson',
                        'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 6.532669067382812e-05,
              'zne_values': { 'degree': 0,
                               'extrapolated_value': -8.30019728011024,
                               'others': { 'beta_coeffiecients': [ 2.0339490779265086,
                                                                     -2.250326639408051,
                                                                    1.9586176305958964,
                                                                    -0.9196987134972037,
                                                                    0.17745864438284967],
                                           'cost_richardson_zne': 13.914439152583324,
                                           'sorted_expectation_vals': [ -6.397817460329861,
                                                                          -3.2115716730808748,
                                                                          -1.641958817033255,
                                                                          -0.8464644349040011,
                                                                          -0.4337371704190119],
                                           'sorted_noise': [13, 47, 81, 115, 149]},
                               'sampled data': [ [4, 2, 7, 0, -6.397817460329861],
                                                 [12, 6, 21, 8, -3.2115716730808748],
                                                 [20, 10, 35, 16, -1.641958817033255],
                                                  [28, 14, 49, 24, -0.8464644349040011],
                                                 [36, 18, 63, 32, -0.4337371704190119]],
                               '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': [ 3.750846163374531e-05,
                                          0.22285241391868899,
                                          0.26252411232084344,
                                          0.26252411232084344,
                                          0.26252411232084344,
                                          1.459545906754556,
                                          1.4595459067545562,
                                          1.6094835194149661.
                                          2.5927782099427628,
                                          2.5927782099427628,
                                          2.5927782099427628,
                                          2.5927782099427623,
                                          3.3552499939702187,
                                          3.3552499939702187,
                                          5.033284106467877,
                                          5.033284106467877,
                                          5.056477210452712,
                                          6.768913439946703,
                                          6.768913439946703,
                                          7.2782492670747585,
                                          7.2782492670747585,
                                          7.2782492670747585,
                                          7.2782492670747585,
```

```
7.2782492670747585,
7.2782492670747585,
8.934198246659292,
8.937369801451712,
9.544406408519471,
9.544406408519471,
10.23170722265548.
-0.4501443853573418,
0.06519513561037263,
-0.13386490845883003,
-0.01542333988020039,
0.3988203537526196.
0.9163371790808124,
0.08159154039220383,
-0.11665429084087826,
-0.21130662780886203,
1.515236372470638.
0.4436142129357345,
-0.28780404896369716,
0.3681425383234808,
0.648176841676201,
0.3046875502986337.
0.05897820457762899,
0.09316951897603123,
1.5277657654344678,
-0.655141628591867,
0.073084468489131,
-0.11423944001370272,
0.3986898081963471,
1.0974832156349317,
1.8462557861113,
0.5998463368708868,
-0.0014214294560794885,
0.4026665434776887,
-0.03860309342262787
0.3728818533964108.
1.7322816292529104,
0.42156018976657544,
0.9872712539907578,
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974,
0.4324416138472369,
0.7909276553155474,
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866,
-0.0743310361925915,
1.1363109745761366.
0.32003332101567866,
0.08535303128967886,
1.1165485958252095,
0.476282782575683,
0.11414859665640108.
0.8927652783900955,
0.027791184984770272,
0.8970588198442948,
-0.04579755391586939,
0.10596016247070955.
0.4721342517962854,
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702,
0.2928189752635581,
-0.4120973709154422
-0.16251962266938982,
-0.928532755338732,
0.13709877636127538,
0.09386847134985479,
-0.9415336108192559,
-1.3861285848764584.
0.5116476525314603,
```

-1.5694556777668651,

```
0.31948518026769196,
                           -0.0136576069296156,
                           0.8752899744519326,
                           -0.448175539102687,
                           -0.8567162669878051,
                           0.737642795798484,
                           -0.5233142967805873.
                           -0.020239952918795164,
                           0.9696407297918527,
                           1.064479355466651,
                           -0.43102633401249074,
                           0.3234367312145231.
                           0.02606795235445944,
                           0.2525608175326581,
                           0.09544790103129135,
                           0.30399471295861424,
                           0.6638935631613432,
                           2.095756590649309,
                           -0.5383535092385583,
                           -0.1523671776118538,
                           -0.49733805370513506,
                           1.0814777965289457,
                           -0.5541810322110113,
                           0.4702060218904802,
                           0.1941018040115748,
                           0.027389458133440587,
                           -0.6339976476553459,
                           0.824073822166477,
                           -0.8904328829691108,
                           0.5852778403101284,
                           -0.37705413851354036,
                           -0.20234246488211116,
                           0.19390975159216547,
                           -0.03854894368679599,
                           -0.5885610444718222,
                           0.2892174263372239,
                           -0.7158388932188376,
                           -0.03853087013753846,
                           0.36228239756074476,
                           0.06448164730191597,
                           0.8103021451607575,
                           0.04195704491201313,
                           2.1946244272306323,
                           1.1078290402756337,
                           -0.0920096926231485,
                           0.7957980849005134,
                           0.10683086015182242,
                           0.04139972880547422,
                           1.068477454710041,
                           1.5812878062267348,
                           1.0292383703670558,
                           1.5822631942162138]},
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   'status': True,
                   'type': 'depolarizing'},
'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_noisy_time_evo_ric5_sample#6'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 0],
                                     [3, 3, 3, 0],
                                     [4, 4, 4, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 7, 0, -6.4606782650454075],
```

```
[12, 6, 21, 8, -3.2738854608106305],
                                        [20, 10, 35, 16, -1.6974907774474755],
                                        [28, 14, 49, 24, -0.8939947022135477],
                                        [36, 18, 63, 32, -0.4736436630774058]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 0.00014090538024902344,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.359960682489763,
                              'others': { 'beta_coeffiecients': [ 2.0339490779265086,
                                                                   -2.250326639408051,
                                                                   1.9586176305958964,
                                                                   -0.9196987134972037,
                                                                   0.17745864438284967],
                                          'cost_richardson_zne': 13.914439152583324,
                                          'sorted_expectation_vals': [ -6.4606782650454075,
                                                                        -3.2738854608106305,
                                                                        -1.6974907774474755,
                                                                        -0.8939947022135477,
                                                                        -0.4736436630774058],
                                          'sorted_noise': [13, 47, 81, 115, 149]},
                              'sampled data': [ [4, 2, 7, 0, -6.4606782650454075],
                                                [12, 6, 21, 8, -3.2738854608106305],
                                                [20, 10, 35, 16, -1.6974907774474755],
                                                [28, 14, 49, 24, -0.8939947022135477],
                                                [36, 18, 63, 32, -0.4736436630774058]],
                              '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': [ 0.0019047787007362745,
                                         0.7201496918445128,
                                         0.7201496918445128,
                                         0.7201496918445127,
                                         0.7226708680142584,
                                         0.8068041864232433,
                                         1.3847174673528184,
                                         1.6031895944534578,
                                         2.458865333289775,
                                         2.458865333289775,
                                         2.721120236828938,
                                         2.721120236828938,
                                         3.554687304897056,
                                         3.554687304897056,
                                         4.537252190232355,
                                         4.537252190232355,
                                         5.239770593633025,
                                         5.242363659304797,
                                         5.566731623636481,
                                         5.566731623636481,
                                         5.566731623636481,
                                         5.566731623636481,
                                         5.566731623636481,
                                         7.6484324534494865.
                                         7.6484324534494865,
                                         8.96757120343865,
                                         9.352637118466301,
                                         9.381932224950582,
                                         9.966925955531599,
                                         9.966925955531599,
                                         0.29840004251263574,
                                         0.3207087147269936.
                                         -0.22478909909228914,
                                         -1.2242611593120782,
                                         0.061748844824383295,
                                         1.9931455249507801,
                                         0.02449362327304914,
                                         -0.23402928130657288,
                                         0.3399922671860315,
```

```
0.2355005268966802,
0.7912945290539132,
-0.9147564287830934.
0.12280724330167514,
0.42016875545313104,
0.6183328009701774,
0.9098148543333162.
0.2439503202728901,
0.4941740976390827,
0.0721485641264495,
0.20051214721509877,
0.14273239312798908.
-0.03846070968482946,
0.11474641891065286,
0.1552743298359438,
-0.050455466832234855,
0.24385918138398863.
0.0646818550964626,
1.0379575003266166,
0.4438839418702803,
0.6652939620943935,
0.6574583263339632.
0.6386444070388955,
0.30923240052603657,
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079,
0.25272330748816335,
-0.05865013289270936,
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059,
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661,
0.256318263131488,
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428,
-0.007804627058269528,
-2.9100406031766375,
-0.17918863042787767,
-0.29620353111227854,
-0.2953351498676352,
0.4434234593316091,
0.0018987515325079429,
0.5290648024022053,
0.011057994967698829,
0.03103232328752182,
-0.21693206073792237,
-0.07883582131375938.
-0.2554965378040217,
1.978711034134111,
-0.02822992907519939,
1.110830733101554,
0.04155227001102173,
0.17370289874025888,
-0.08435695708516765,
0.38686640173882947,
1.0727525781247964.
-1.4871438236674412,
0.1437881416009117,
-0.15769165641037303,
0.46096388290194723.
0.3881288491041242,
```

0.3113157866411551,

```
1.3408904937177344,
                                       0.033287678968192874,
                                       -0.22654084728278404,
                                       0.09162287503278096,
                                       1.1250326534568733,
                                       0.670327239820091.
                                       -1.4911819217025961,
                                       0.8417198858779599,
                                       0.018685303562101165,
                                       -0.5955098452611822,
                                       1.37350461224772,
                                       -0.5503685346151788,
                                       0.07415629279393592,
                                       0.22396953453102358,
                                       -0.02219350017922496,
                                       2.5136787648879593,
                                       1.5560141766956836,
                                       -0.037039417521638966,
                                       -1.5578667717297374,
                                       -0.15174825264689498,
                                       -0.0075908588231686416.
                                       -0.1347910987366526,
                                       0.7535559035800633,
                                       2.9519825568174283,
                                       -0.8640992588734872,
                                       -0.486197602889753,
                                       -0.029079605859607876,
                                       0.1393557947212105,
                                       -0.03201203543340934,
                                       -0.17255788414719309,
                                       -0.6220837667998668,
                                       0.10441375911567917,
                                       0.7019930428559267,
                                       1.822960884928266,
                                       0.0010256621400676815]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric5_sample#9'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                 [2, 2, 2, 0],
                                                 [3, 3, 3, 0],
                                                  [4, 4, 4, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                        'constraint': True,
                                       'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.536182288327376],
                                      [12, 6, 21, 8, -3.4500813502488756],
                                      [20, 10, 35, 16, -1.8650932993173603],
                                      [28, 14, 49, 24, -1.0247351729167147],
                                      [36, 18, 63, 32, -0.5670015302617211]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 6.651878356933594e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.341628289378761,
                            'others': { 'beta_coeffiecients': [ 2.0339490779265086,
                                                                 -2.250326639408051,
                                                                 1.9586176305958964,
                                                                 -0.9196987134972037,
                                                                 0.17745864438284967],
```

-0.21237825892214532,

```
'cost_richardson_zne': 13.914439152583324,
                                           'sorted_expectation_vals': [ -6.536182288327376,
                                                                        -3.4500813502488756,
                                                                        -1.8650932993173603,
                                                                        -1.0247351729167147,
                                                                        -0.5670015302617211],
                                          'sorted_noise': [13, 47, 81, 115, 149]},
                              'sampled data': [ [4, 2, 7, 0, -6.536182288327376],
                                                 [12, 6, 21, 8, -3.4500813502488756],
                                                 [20, 10, 35, 16, -1.8650932993173603],
                                                 [28, 14, 49, 24, -1.0247351729167147],
                                                 [36, 18, 63, 32, -0.5670015302617211]],
                              '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': [ -6.331146189926128e-17,
                                          0.7069927066774304.
                                         0.7069927066774304,
                                         0.7069927066774305,
                                         0.7069927066774304,
                                         1.0044153364322925,
                                         1.0092418692996383.
                                          2.470333794214341,
                                          2.478143749866421,
                                         3.5776564981759003,
                                         3.5776564981759003,
                                         3.5776564981759003,
                                         3.61745967653339,
                                         3.6981780389472076,
                                         3.755720232685741,
                                         3.9712286023902594,
                                         3.9712286023902594,
                                          4.519037432417192,
                                          4.519037432417193,
                                         4.519037432417193,
                                         5.280953883299406,
                                         5.280953883299406,
                                         6.620356980277175,
                                         6.620356980277175,
                                         6.620356980277175.
                                         6.620356980277176,
                                         8.214004051881032,
                                         8.214004051881032,
                                         9.105951544537387,
                                         10.829366164164977,
                                         1.4490195266558639,
                                         1.145329650589643,
                                         -0.9374272684957279,
                                         -1.2910248872233119,
                                         0.9701069453007352,
                                         2.0238893871034924,
                                          -0.6731600678051081,
                                          -0.7305037462514778,
                                         0.6743483023845589,
                                         1.611766624162738.
                                         -0.162446688913207,
                                         -0.2464021583836281,
                                         1.3073653685111934,
                                         1.560629053845934,
                                         -0.09768282308379246,
                                          -0.31393750682085847,
                                          0.1625705045557987,
                                         -0.1344649185634244,
                                         -0.03516682581352061,
                                         0.15934568227883428,
                                         1.4484389719925783,
                                         0.31346340320241645,
                                         -1.5406853809043388,
                                         0.3831701903776482,
                                         0.07255447956326048,
```

```
-0.4619144712511035,
0.6220101497739178,
-0.08645510294766677
-0.036774035023737585,
-0.02433291891195538,
1.2745777688613118,
0.806643386980706.
-0.1734465019831428,
-1.474099767063678,
-1.2534035864969235,
0.024086803725753666,
-0.5946515656594247.
3.047855036387052,
0.561263952510902,
-0.27353577574812815,
0.476385213099692,
-0.4183083264972014.
-0.07584344603997495,
-0.04004176630390785,
0.6379867024754904,
3.306912023625799,
0.6758488609505069.
-0.49379826249780634,
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808,
0.043470303912556706,
0.2301819741695647,
1.9247102260310271,
0.19401136489510468,
0.17784496580796996,
-0.12037519976757159,
0.10596613899479704,
0.02480260398862852,
0.33616247382037256,
-0.2960626605489573,
1.2038327046358004,
-0.4266046665751028,
-0.14331073423696536,
0.33240571018120446,
0.13743208352564132,
0.21308235615415505,
-0.8816113951868988,
-0.03958129872975694.
1.7385124490728345,
1.3953860705003918,
0.7193393529381484,
-0.5890148767931709,
1.6845229617798814,
-0.04059142172715042,
-0.6588344885662398,
-1.5492107393137406,
0.9886630320432893,
1.3955090248591298.
-1.7521400718196618,
-0.02012078102450614,
1.5598528019020075,
-0.041272015671692544,
0.6659176073691222,
-0.10884895615623923,
-0.8860283635501729,
-0.042494102069769425,
-0.5241060846215897,
-0.049429521011899694,
-1.6158837397685775,
-0.29703279066650246,
0.6940812648197017,
-1.0869617874060826,
-1.1891726572683667,
0.03935191545498333,
-1.7727595774952096,
-0.0005664350349098603,
-1.2288438066739866,
```

2.182693040857262,

```
1.2648198022740724,
                                         0.636776362006322,
                                         -1.1418938134635428,
                                         0.04892386539982865,
                                         -0.6595482134655696,
                                         -0.016038133219537475,
                                         -1.53365152672916.
                                         -0.5818287115590742,
                                          -0.8537662908823758,
                                         1.3418170063691075,
                                          -0.32888813707646736,
                                         -0.018460135902194714,
                                         -0.8323242421777916,
                                         1.5026664500941838,
                                         1.809610363246633,
                                         -1.5283405786971713,
                                         0.5470095670143573,
                                         -1.4753657998350065,
                                         0.8122840148585063,
                                         1.5317878779716176]},
              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric5_sample#5'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                    [1, 1, 1, 0],
                                                   [2, 2, 2, 0],
                                                   [3, 3, 3, 0],
                                                   [4, 4, 4, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.311563719128683],
                                         [12, 6, 21, 8, -3.2712898811023576],
                                         [20, 10, 35, 16, -1.7533390824025292],
                                         \hbox{\tt [28, 14, 49, 24, -0.966227702270059],}
                                         [36, 18, 63, 32, -0.5436512754494954]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.38690185546875e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.117886524967124,
                              'others': { 'beta_coeffiecients': [ 2.0339490779265086,
                                                                   -2.250326639408051,
                                                                   1.9586176305958964,
                                                                   -0.9196987134972037,
                                                                   0.17745864438284967],
                                           'cost_richardson_zne': 13.914439152583324,
                                           'sorted_expectation_vals': [ -6.311563719128683,
                                                                        -3.2712898811023576,
                                                                        -1.7533390824025292,
                                                                        -0.966227702270059,
                                                                        -0.5436512754494954],
                                           'sorted_noise': [13, 47, 81, 115, 149]},
                              'sampled data': [ [4, 2, 7, 0, -6.311563719128683],
                                                 [12, 6, 21, 8, -3.2712898811023576],
                                                 [20, 10, 35, 16, -1.7533390824025292],
                                                 [28, 14, 49, 24, -0.966227702270059],
                                                 [36, 18, 63, 32, -0.5436512754494954]],
                              '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': [ 1.5680106786222674e-17,
                           1.0238650999177359,
                           1.0238650999177359.
                           1.0238650999177359,
                           1.7041550191762513,
                           2.070931805530806,
                           2.586234954306046,
                           2.6265616878606783,
                           2.7566136785306155,
                           2.7689271757054255,
                           4.271831894498143,
                           4.271831894498143,
                           4.271831894498143,
                           5.004110362344359,
                           5.004110362344359,
                           5.529689350278954,
                           5.529689350278954,
                           5.529689350278954.
                           5.5493166460873375,
                           7.855838962179162,
                           7.855838962179162,
                           8.508023697610218,
                           8.540796404638465,
                           8.940056981382925,
                           8.940056981382925,
                           8.940056981382925,
                           8.940056981382925,
                           9.524293982069336,
                           9.524293982069336,
                           9.815045396471412,
                           0.717685470636315,
                           0.29125971197830336,
                           0.013619559122678915,
                           -0.46174394022911175,
                           -0.7802589318548062,
                           1.8785332138943256,
                           -0.07718385116900997,
                           -0.4181315830102034,
                           0.3859499067718677,
                           0.7218523694763775,
                           0.16350787496293626,
                           -0.06274337543165032,
                           1.048639096314506,
                           0.9454500907927006,
                           -0.18328208251477485,
                           0.5336296017995852,
                           0.7047960543548563,
                           -0.4717130073686535,
                           -0.14327049451726778,
                           0.5646728024946054,
                           0.1377201649736573.
                           1.0845662084088512,
                           0.7117671017527167,
                           1.8562916393289055,
                           -1.0958742208007046,
                           0.314756410152813.
                           1.0055290931424188,
                           -1.2653176839886926,
                           -0.6435463058390287,
                           -0.13689785210195535,
                           0.5185042269644529,
                           -0.07994120596020922,
                           -1.3394312085309903,
                           -0.01354724643952521,
                           -0.8508707890759795,
                           -0.7258020036409927,
                           -0.1513648764845159,
                           -0.5702686618598916,
                           -0.20804467461705725,
                           -0.059043388294177074,
```

0.9724468840137966,

```
1.6889388278999584,
0.19460354666786345,
1.52688995899303.
0.40690710189505636,
0.054839646577847824,
-1.9384169999074634,
-0.8955556931339368.
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788,
-0.008629533947631484,
1.3318794505555018.
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042,
0.6437292330207226,
0.02590432636550948,
0.44592066957482307,
-0.0809779454755679,
-1.1390483539597829.
0.4898473400025203,
0.11381426982162568,
0.6089836387514223,
0.17594570893388972,
0.012948010393531988,
-0.547404644839424,
0.028969189369927453,
1.1006601522977721,
-0.6406183594181203,
-0.12562720825840668,
2.0392738219317867,
0.9906966768182601,
0.03179376057566713,
1.5460159269414353,
-0.01674613470972367,
-1.1841027420803907,
0.24496917335434354,
-0.07332300856328518.
0.25897293698241475,
0.35918978324443196,
-0.007942172382781155,
0.4618323110818234,
-0.08547471514820712.
-0.5115221242285567,
0.4563488682048878,
-1.2086759202201718,
0.14282176979415442,
0.48263581465206523,
0.09855500655515351,
0.5327824526475502,
-0.19110982084320108,
-0.775795154813047,
-0.31907838177549175
0.03477100089693282,
0.7436201132387485,
-0.022209896476399357,
-0.14741027177548285,
-0.10110024079398225,
0.20359400710495562,
-0.15623022021775929,
0.1964090589605299,
0.18042072654891128,
0.8910666012551952,
0.03518277211157266,
0.11858050209575345,
0.6912090997145024,
0.05142750966379351,
1.2523961498884204,
-1.1477698487953947,
-0.16063831357643202,
-1.0074319345942784.
0.29535289246662044,
```

-0.002280412475169233,

```
0.45599081133710123,
                                         -1.6715207166067523,
                                         0.3320227490012926,
                                         1.5421306314740455]},
              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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': { 'fiq_dpi': 100, 'status': False, 'type': 'png'},
                          'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric5_sample#1'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                    [1, 1, 1, 0],
                                                    [2, 2, 2, 0],
                                                   [3, 3, 3, 0],
                                                   [4, 4, 4, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vge': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.515742960091852],
                                        [12, 6, 21, 8, -3.36492111003702],
                                        [20, 10, 35, 16, -1.7545658776574036],
                                        [28, 14, 49, 24, -0.9139478342631155],
                                        [36, 18, 63, 32, -0.46803177808311025]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.2438507080078125e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.35954107177528,
                              'others': { 'beta_coeffiecients': [ 2.0339490779265086,
                                                                   -2.250326639408051.
                                                                   1.9586176305958964,
                                                                   -0.9196987134972037,
                                                                   0.17745864438284967],
                                           'cost_richardson_zne': 13.914439152583324,
                                           'sorted_expectation_vals': [ -6.515742960091852,
                                                                        -3.36492111003702,
                                                                        -1.7545658776574036,
                                                                        -0.9139478342631155,
                                                                        -0.46803177808311025],
                                           'sorted_noise': [13, 47, 81, 115, 149]},
                              'sampled data': [ [4, 2, 7, 0, -6.515742960091852],
                                                [12, 6, 21, 8, -3.36492111003702],
                                                 [20, 10, 35, 16, -1.7545658776574036],
                                                [28, 14, 49, 24, -0.9139478342631155],
                                                [36, 18, 63, 32, -0.46803177808311025]],
                              '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': [ 0.3773346757087749,
                                         0.5734233884194113,
                                         0.5734233884194113,
                                         1.2094818154974225,
                                         1.2528672337957094,
                                         1.3073966674132076.
                                         4.193348178434801,
                                         4.228670385547864,
                                         4.228670385547864,
                                         4.228670385547864.
                                         4.228670385547864,
                                         4.228670385547864,
```

```
4.274742575727675,
5.343872214974395,
5.354523589318104.
5.449133113124401,
5.449133113124401,
5.449133113124401,
5.449133113124401.
6.208341300319731,
6.208341300319731,
6.738723848778546,
6.7473872692498285,
8.515456463543387.
8.552181104315652,
8.552181104315652,
8.552181104315652,
9.363042150968939,
9.363042150968939.
11.478464454984158,
-0.2683676450988651,
-0.9370321768196137,
0.03790413469005285,
-0.3520989510779511.
0.5131804204688105,
0.767748989456867,
-1.1529933056041268,
1.0195402939041247,
-0.5189860890713169,
1.700377968800765,
0.48912124484584857,
1.506730848787325,
0.4485612726223177,
-1.6248073049289613,
0.10079320215400162,
1.7454590745233427,
1.474284546585253,
0.08837986403943651,
1.215839965531947,
-0.42666568442503866,
0.04298065245990749,
-1.495484471060033,
0.39055472334393304,
-0.06187227108331559,
1.0010296249342066,
-0.33745943355443286,
-0.19046242319241546.
-0.4884459619425607,
0.8930564792122229,
0.09947441181287657,
-1.4049039336860292,
1.0413688199593338.
0.027348986225077598,
1.5457890290583323,
0.8022774572900748,
-1.0377116853398,
0.5652694406258009.
0.9990396087940023,
-0.3409174955760714,
-0.8590373420111477,
0.3662952964918326,
0.6492392290096071.
-1.0735392409833318,
-0.620775369578654,
0.5064494688850749,
0.6065178361322348.
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637,
0.13897118193917846,
0.13192395570874205.
-0.560408177185694,
```

-0.7293430452459922,

```
1.2393938765994381,
                           0.16520016983754293,
                           -0.04218705839108043.
                           1.9844775109402493,
                           -0.40811731341033075,
                           0.40494641878472026,
                           0.44317505546879765.
                           -0.14541224425415586,
                           -1.3628454492957067,
                           0.35572573997739254,
                           -0.17363781014762678,
                           -0.21765464091811726,
                           0.25867396534698067,
                           -0.19299239511743832,
                           0.842583631219517,
                           0.01538577194684443,
                           -1.3780712180305699,
                           0.30168991607554185,
                           0.03816118508668757,
                           -0.6330896266111891,
                           -0.14462412237866193,
                           0.22751230177420415.
                           2.198362599080823,
                           0.5538971259685714,
                           1.6735676153080048,
                           0.01161307703421222,
                           0.15241612900647253,
                           -0.4114895408906573,
                           0.020024246948836234,
                           -0.361021382333633,
                           1.2366726872792735,
                           -0.8652479233612058,
                           -0.38157323774943186,
                           -1.2043495043519374,
                           0.03294448415473864,
                           1.864475600371399,
                           -0.048446953541905424,
                           1.483038428004856,
                           0.02119809714572118,
                           -0.20756566215919184,
                           1.2566509021622863,
                           0.4040298326697209,
                           0.0492062183426151,
                           0.3396501220758691,
                           0.09097515161528406,
                           -0.4545275805495163,
                           1.5327906096069877,
                           -0.47568898039994184,
                           0.7447654713950665,
                           0.7179833985093875,
                           -0.03692927531761856,
                           0.11509825242982577,
                           0.020898935398901888,
                           0.2387893529411216,
                           1.5195379458286031,
                           -0.5337205856413728,
                           -0.5741707032781822,
                           1.298358172715442,
                           -0.010829860462227588,
                           -1.9037204771139875.
                           1.5774751765228583,
                           -0.28550943128124906,
                           1.5531884118568244]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric5_sample#4'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
```

```
[1, 1, 1, 0],
                                                   [2, 2, 2, 0],
                                                   [3, 3, 3, 0],
                                                   [4, 4, 4, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.44845457619454],
                                        [12, 6, 21, 8, -3.2446894681699203],
                                        [20, 10, 35, 16, -1.6866076162118238],
                                        [28, 14, 49, 24, -0.8984323471828195],
                                        [36, 18, 63, 32, -0.4857082686875758]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.696846008300781e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.377542562540667,
                              'others': { 'beta_coefficients': [ 2.0339490779265086,
                                                                   -2.250326639408051.
                                                                   1.9586176305958964,
                                                                   -0.9196987134972037,
                                                                   0.17745864438284967],
                                           'cost_richardson_zne': 13.914439152583324,
                                           'sorted_expectation_vals': [ -6.44845457619454,
                                                                        -3.2446894681699203,
                                                                        -1.6866076162118238,
                                                                        -0.8984323471828195,
                                                                        -0.4857082686875758],
                                           'sorted_noise': [13, 47, 81, 115, 149]},
                              'sampled data': [ [4, 2, 7, 0, -6.44845457619454],
                                                 [12, 6, 21, 8, -3.2446894681699203],
                                                 [20, 10, 35, 16, -1.6866076162118238],
                                                 [28, 14, 49, 24, -0.8984323471828195],
                                                 [36, 18, 63, 32, -0.4857082686875758]],
                              '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': [ -5.647934061474703e-18,
                                         1.4787834906243755,
                                         1.478918229526628.
                                         1.478918229526628,
                                         2.0077351764243123,
                                         2.4302809101456218,
                                         2.4302809101456218,
                                         3.009709563144601,
                                         3.009709563144601,
                                         3.239471043198664,
                                         3.2405283031129133,
                                         3.2405283031129133,
                                         3.2656598154222434.
                                         3.5353392937639825,
                                         6.198713539858257,
                                         6.213604956994236,
                                         6.73397854893658,
                                         6.73397854893658,
                                         6.743547791194661,
                                         6.744609103740889,
                                         6.744609103740889,
                                         6.749543065628153.
                                         6.749543065628153,
                                         8.615256229309818,
                                         8.635090640841518,
                                         9.012323512360366.
                                         9.012323512360366,
                                         9.930483613907942,
```

```
9.930483613907942,
11.782061805135282,
0.6870051227789642,
0.5234095533264759,
0.11216801162302814,
0.044591843687496906,
-0.747159787599118.
1.5727279855217766,
-0.16958009141159439,
-0.7234855106318131,
0.45999589631996707,
1.3613822619347415.
0.5234464983029046,
0.18337466193510712,
1.0660408011194182,
1.2813123812864906,
0.34899885807903364,
1.2204971120849089,
0.37250493843195553,
0.3861568591798728,
-0.4881036169368887,
0.23720347697856276.
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716,
0.5103741134651811,
-0.48491784736765847,
-1.939727949979543,
0.5221979500550953,
-0.39618913325979604,
-0.5258671175956018,
0.08753210163723862,
1.3619602585721242,
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274,
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961,
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473.
0.4465655907565091,
-1.4308928069625704,
1.6254306194316424,
-0.16298810299835312
-1.249293985363804.
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616,
-1.1357659634071433,
-0.5734897531715744.
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403,
0.06392732561319403,
0.7711512775812011,
-1.8472478314151175,
-0.46160141905881696,
1.8963279721150403,
-2.313663424814036,
0.060952702837845166,
-1.4971949982077863,
1.3040610818975555,
0.10605679464403613.
-1.138800572315487,
-0.03947636943653289,
0.07839455865010819,
-0.6470277815644087.
0.946101637008616,
```

-0.32144060478582315,

```
-0.6371693991779968,
                           0.30580409265523,
                           -0.2617129381706641.
                           0.4094287336545931,
                           0.49837362733711055,
                           -0.9058714721495094,
                           0.6137893604415533.
                           0.8546844695081749,
                           -0.8205470722456557,
                           -0.598852289145785,
                           0.46823811794119646,
                           1.2205247300232143.
                           0.031629319060699435,
                           1.1369587010491427,
                           0.12298062775535874,
                           -0.016960252964031076,
                           1.1127338626212067,
                           0.37972118532018134,
                           -0.1475616440844684,
                           0.32749925367563326,
                           0.030050642250761914,
                           0.17169542743574548.
                           -0.5825729547476518,
                           0.7052714548722974,
                           0.9884296874822006,
                           -0.500384308215816,
                           0.01722431287494931,
                           0.40290712722731054,
                           -0.029200452046427447,
                           1.2704708243944813,
                           2.3709704014259345,
                           -2.0267551524865275,
                           0.7347873374577798,
                           -0.34767223966060473,
                           0.009778943736386289,
                           0.221000841842164,
                           -0.010995780695540691,
                           -0.481889271583797,
                           0.7008500159073542,
                           2.3944065221124076,
                           -0.08320445199579081,
                           2.02470278988152,
                           0.02142760118000664,
                           1.6794429086669174,
                           1.6046551807968945.
                           0.2831685070910348,
                           1.5805135598594935]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric5_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 0],
                                     [3, 3, 3, 0],
                                      [4, 4, 4, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
                           'status': False}},
'zne': { 'data_points': [ [4, 2, 7, 0, -6.429933051303131],
                          [12, 6, 21, 8, -3.1990719612158447],
                          [20, 10, 35, 16, -1.635137691104089],
                          [28, 14, 49, 24, -0.8526977600673817],
                          [36, 18, 63, 32, -0.44953303322849647]],
         'degree': 0,
```

```
'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.315376281738281e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.377357545114267,
                              'others': { 'beta_coeffiecients': [ 2.0339490779265086,
                                                                   -2.250326639408051,
                                                                   1.9586176305958964,
                                                                   -0.9196987134972037,
                                                                   0.17745864438284967],
                                           'cost_richardson_zne': 13.914439152583324,
                                           'sorted_expectation_vals': [ -6.429933051303131,
                                                                        -3.1990719612158447,
                                                                        -1.635137691104089,
                                                                        -0.8526977600673817,
                                                                        -0.44953303322849647],
                                           'sorted_noise': [13, 47, 81, 115, 149]},
                              'sampled data': [ [4, 2, 7, 0, -6.429933051303131],
                                                 [12, 6, 21, 8, -3.1990719612158447],
                                                 [20, 10, 35, 16, -1.635137691104089],
                                                [28, 14, 49, 24, -0.8526977600673817],
                                                [36, 18, 63, 32, -0.44953303322849647]],
                              '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': [ 0.33528943002425843,
                                         0.8608925283648261,
                                         2.8309935233222867,
                                         2.8382233121900358,
                                         2.847558790018716,
                                         2.8477263794127468,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         5.127462455084763,
                                         5.128383696390232,
                                         5.132051241075024.
                                         5.132231848473024,
                                         5.132297186784173,
                                         5.132297186784173,
                                         5.132297186784173,
                                         5.132320898992942.
                                         5.134903164275234,
                                         5.734798022200061,
                                         5.734798022200061,
                                         5.734798022200061,
                                         6.71748919093495,
                                         6.71748919093495,
                                         9.773430860122208,
                                         9.791656954875775,
                                         9.791980525916317,
                                         9.804782964874805.
                                         9.947289619134542,
                                         0.6818618664375632,
                                         0.42253658736184846,
                                         0.19067339209915313,
                                         -2.314563573529872,
                                         -1.7784854373672185,
                                          -0.10945476580518654,
                                         0.08980428543050965,
                                         0.6265702304745648,
                                         -0.12016219313034968,
                                         0.005450784512528824,
                                         0.9621316606784164,
                                         -0.01940541263687908,
                                         -1.2890091107885369,
                                         -0.09216272929775945,
```

```
-0.8615487717558121,
0.021600758375482327,
1.1068545366678577,
-0.06436428812394061,
-1.8186253546793636,
-0.2455724158610742,
0.7444478114283775.
1.0647343146888184,
-1.6388802958603008,
-0.05032235091912311,
0.7589104637111997,
0.0934759886788552.
0.7280377617711271,
-0.10012682423470079,
-2.7917715562202794,
0.5843828201862561,
1.2003794612588048.
-0.2782652692858759,
1.253725179404932,
-0.831140674623039,
-1.3898002860152843,
1.7689493816619246.
-0.768539740515663,
-0.5265628815801298,
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446,
0.06348552937029919,
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522,
-0.5743460857513,
0.873550995352649,
0.8797938271812764,
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805,
-0.4012501825920459,
-0.4763388197192611,
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537.
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616,
0.6716489600966955.
0.08900519900900147,
0.7708643633651343,
0.0944251249629154,
-0.053131619179539805,
-0.132883145931867.
0.44414428660563765,
-0.3164026614336652,
0.9835391768228284,
-0.49696354121947833,
0.3510514174127117.
-0.24991518010085176,
-0.7780713458689107,
1.3387260017849976,
0.712191280671364.
-0.4436070432657242,
1.090195713122469,
0.3876483875477464,
1.113683201871723,
0.09724940056823322,
-1.3265075307540413,
-1.8530581309545013,
0.335564434910613,
0.16061631243062188.
0.6994545842241634,
-0.0055568765936962455,
```

```
-0.9149620921846291,
                                        -0.5341673651010566,
                                        -0.6583203681162046,
                                        -0.05148037848607484,
                                       -0.1302834828824637,
                                        -0.2083684341417298.
                                        -0.7142637766159184,
                                        0.4980789266978527,
                                        -2.030263033934291,
                                        -0.002330467371510849,
                                       -0.7835259213136883,
                                       -0.18712783689065152,
                                        -0.271594041353006,
                                       0.606962231033315,
                                        0.19917323339650786,
                                        0.581852597021436,
                                        1.0547240409345577,
                                        0.07111303544026976,
                                        1.4877210254684077,
                                        0.08669172360020491,
                                       0.8024105605127613.
                                       0.8315802366658298,
                                       1.117305276662395,
                                        -1.0742437197416552,
                                        0.30921812342286065,
                                        -0.06994991433225481,
                                        1.0419800264617582,
                                        1.4507701003592177,
                                        0.2408413974211676,
                                        1.6573761327725358]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                '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': { 'fiq_dpi': 100, 'status': False, 'type': 'png'},
                        'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric5_sample#2'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                  [2, 2, 2, 0],
                                                  [3, 3, 3, 0],
                                                  [4, 4, 4, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                        'constraint': True,
                                        'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.333005581610797],
                                       [12, 6, 21, 8, -3.1651017858597426],
                                       \hbox{\tt [20, 10, 35, 16, -1.6439583689682524],}\\
                                       \hbox{\tt [28, 14, 49, 24, -0.8813072530521874],}\\
                                       [36, 18, 63, 32, -0.48318628235120475]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.172325134277344e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.253592279312013,
                             'others': { 'beta_coeffiecients': [ 2.0339490779265086,
                                                                  -2.250326639408051,
                                                                  1.9586176305958964,
                                                                  -0.9196987134972037,
                                                                  0.17745864438284967],
                                         'cost_richardson_zne': 13.914439152583324,
                                         'sorted_expectation_vals': [ -6.333005581610797,
                                                                       -3.1651017858597426,
                                                                       -1.6439583689682524,
                                                                       -0.8813072530521874,
```

1.8148369905661879,

```
-0.48318628235120475],
                                           'sorted_noise': [13, 47, 81, 115, 149]},
                              'sampled data': [ [4, 2, 7, 0, -6.333005581610797],
                                                [12, 6, 21, 8, -3.1651017858597426],
                                                 [20, 10, 35, 16, -1.6439583689682524],
                                                 [28, 14, 49, 24, -0.8813072530521874],
                                                [36, 18, 63, 32, -0.48318628235120475]],
                              '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': [ 0.00030922277578629,
                                         0.881375055029912,
                                         0.881375055029912,
                                         0.8813750550299119,
                                         0.9803845151714838,
                                         0.9803845151714838,
                                         1.201629973822729.
                                         1.2441077564052723,
                                         1.8660677974280824,
                                         1.8660677974280824,
                                         2.651002314516478,
                                         2.651002314516478,
                                         3.233637461790533,
                                         4.36384995486056,
                                         4.36384995486056,
                                         4.975714528653046,
                                         4.975714528653046,
                                         6.591840750700408,
                                         6.591840750700408,
                                         8.234009055219385,
                                         8.238223602720305,
                                         8.238223602720305,
                                         8.238223602720305,
                                         8.903406631369169,
                                         8.903406631369169,
                                         8.903406631369169,
                                         9.126449234760914,
                                         9.126449234760914,
                                         9.441918167657187,
                                         9.441918167657187,
                                         0.4384156956352651,
                                         -0.017407483354635628,
                                          -0.13579407977759564,
                                         -0.08181457210659056,
                                         -0.5635031413839604,
                                         0.570197125887921,
                                         -0.07389454022208618,
                                         0.18950484918514415,
                                         0.23442314823895152,
                                         0.5187197914643009,
                                         0.03760777637611914,
                                         1.2080522066616035,
                                         -0.006796933498365149,
                                         0.7597395812711474,
                                         0.3165595784185247.
                                         0.09234381717322694,
                                         -0.047116958459538144,
                                         0.02161370846364295,
                                         -0.3330735946096464,
                                         -0.310519881157395,
                                         -0.1321730433969341,
                                         -0.32004747583182785,
                                         0.38880240494533963,
                                         0.5587916266845782,
                                         -0.04068226055752174,
                                         -0.04929253976644778,
                                         0.7350044083650977,
                                         -0.3347542084226466,
                                         0.07994172439872818,
```

0.177027499128215,

```
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313,
-1.8841797053563085,
-0.39250057722196113.
0.0604718224769807,
-0.15658247224402194,
1.097732135880844,
-0.47958374693582667,
-0.13884788062191106.
1.2517060190766023,
0.08912037934357776,
1.8722824819152626,
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875,
-0.29954118659750983.
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
0.32920686175801595,
0.0470036094807545,
0.6942117349751494,
-0.24738597040458754,
-0.3530344251488351,
-0.7207866325012796,
0.6865004571010461,
-0.022934954570734595,
-0.4703523591474931,
0.00010065187353926284,
-0.25737840979321513,
-0.37927040299996573,
0.3323512575736423,
-0.7162822410895011,
-0.8849129065134153.
-0.02984860970928172,
0.9857401879405846,
0.13869536095324345,
-0.4901093246549395,
-0.15185390643388375,
-1.1107951730061545,
1.1255217267520845,
-0.36113008327046914,
0.12498769155032201,
1.105653484876161.
-0.0826241142760939,
-0.6079720837354008,
-0.4798331114275297,
-1.1230771992973987,
0.13634359721928585.
-1.0117198549615587,
0.0420371772323395,
0.4704689604818435,
-0.1136051809968673,
-0.4158299646895606,
0.7682233881623428,
-0.8567828943049521,
-1.0844985071567337,
0.8118563616911731,
-1.0011580890685694,
0.06773503500153778,
-0.9972068257582826,
0.22064841214728595.
1.015101892093672,
```

-0.023903188302909387,

```
-1.5448535965900865,
                                         0.40727537812840897,
                                         0.6273868528756265.
                                         -0.06403282214251436,
                                         0.1402221940396834,
                                         0.011807494022614938,
                                         0.19970219531306482.
                                         -0.3159297567283321,
                                         0.5243897804672414,
                                         0.6302439365729751,
                                         0.4184253509022523,
                                         0.38422115408735924.
                                         0.8610939738936156,
                                         0.3457693810952046,
                                         0.19105880264763628]},
              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric5_sample#10'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                   [1, 1, 1, 0],
                                                   [2, 2, 2, 0],
                                                   [3, 3, 3, 0],
                                                    [4, 4, 4, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.5111758480272135],
                                         [12, 6, 21, 8, -3.513108400075424],
                                        [20, 10, 35, 16, -1.9256894730075684],
                                        [28, 14, 49, 24, -1.0648100061563792],
                                        [36, 18, 63, 32, -0.5886022016151555]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 5.7220458984375e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.23459620137834,
                              'others': { 'beta_coeffiecients': [ 2.0339490779265086,
                                                                   -2.250326639408051,
                                                                   1.9586176305958964,
                                                                   -0.9196987134972037,
                                                                   0.17745864438284967],
                                          'cost_richardson_zne': 13.914439152583324,
                                           'sorted_expectation_vals': [ -6.5111758480272135,
                                                                        -3.513108400075424,
                                                                        -1.9256894730075684,
                                                                        -1.0648100061563792,
                                                                        -0.58860220161515551.
                                          'sorted_noise': [13, 47, 81, 115, 149]},
                              'sampled data': [ [4, 2, 7, 0, -6.5111758480272135],
                                                 [12, 6, 21, 8, -3.513108400075424],
                                                 [20, 10, 35, 16, -1.9256894730075684],
                                                 [28, 14, 49, 24, -1.0648100061563792],
                                                 [36, 18, 63, 32, -0.5886022016151555]],
                              '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': [ 0.08591881204796584,
```

```
1.5026023651616802,
1.9179097588555833,
1.9179097588555831.
1.9179097588555831,
1.9179097588555831,
2.8800636946459592,
2.9523818900173797.
2.9523818900173797,
2.954896407422686,
3.0487820562708485,
3.0487820562708485,
3.9462134206000328.
3.9462134206000328,
5.170248653928018,
5.170248653928018,
6.5066905594049205,
6.5066905594049205.
6.5066905594049205,
6.914119522580601,
6.914119522580601,
6.9842551957162815,
7.300516913785898.
8.782483894556266,
8.782483894556266,
8.999633503017922,
8.999633503017922,
8.999633503017922,
9.414122362394847,
9.414122362394847,
0.09854676674938925,
-0.05173289612974198,
0.30094803169630163,
-1.1984142138894447,
0.08610670053567002,
0.2851928692216035,
0.26177875477440216.
0.11764473243628538,
0.3495067876706816,
-0.9678438601279628,
-0.08762050677252062.
0.014826088936787857,
-0.30347729159143555,
-1.1730530788097624,
-0.12550631929596553,
2.258056275075482,
-0.5160508087356981,
0.004541093619226378,
-0.9345420797218197,
0.47154522212338745,
-0.9129446894819914.
0.2768683391341781,
0.29975752794333804,
-0.16177915588279423,
0.6021148977823381,
0.35405737535162146,
0.8149645603473178,
-0.7074306860917636,
-0.8281028342440522,
-0.20840122350984505,
-0.19593362207831977,
1.2208184674045053,
-0.10408257731449277,
0.9878855326441833,
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756,
-0.44913621684685756,
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521,
0.5925479388494825,
0.1500100176310508.
-0.4655542365338734,
```

0.09847924242741647,

```
-0.25695620197439545,
                           -0.5449201592551612,
                           0.4987130755500597.
                           -0.007720607194202524,
                           0.7816530161823243,
                           -0.8246572495389679,
                           -0.28480932751570914,
                           1.8751826609713358,
                           -0.20740645402102328,
                           -0.04894031202761418,
                           -1.0170156037248201,
                           -0.035476380392734465,
                           0.9940259955458774,
                           -0.657126951929564,
                           -0.4786936406484008,
                           1.4564140457987391,
                           -1.062151832750044,
                           -0.01496017231630948,
                           0.16259290081999456,
                           0.601493806263198,
                           -0.20485253219607644,
                           -1.2421776762345744,
                           1.152288606322054,
                           1.1883019471730756,
                           0.9817659575699377,
                           0.9653429636905305,
                           0.5382122852444811,
                           0.722384759736696,
                           -0.13079560936986118,
                           -0.9638314109375934,
                           -0.13358671856975504,
                           -0.3949417844115237,
                           1.01780227278121,
                           0.6746960094686067,
                           0.14295933107831804,
                           -0.37974724013569766,
                           0.3641245559377578,
                           0.12972678280008856,
                           0.5949873255000262,
                           0.8499370211382984.
                           -0.0792654431528575,
                           1.9402087793428133,
                           -0.5583113020357903,
                           0.6535986429024293,
                           1.0008805619835928,
                           0.16556690201288055,
                           1.1071973338235597,
                           0.07194244573338314,
                           -0.9146859400815048,
                           -0.005186820541518637.
                           0.4795762978809806,
                           0.6475066336984044,
                           0.11860845746693519,
                           0.08044881503693782,
                           0.5402817334108434,
                           1.5532870492056725,
                           0.36643388228039625,
                           1.6150985923432208,
                           0.22271977417212363,
                           -0.04956133994172771.
                           -0.6258533610916538,
                           -0.6517224443292691,
                           0.2594825887888975,
                           -0.1286341552665023,
                           0.48749759828242367,
                           -0.009813928289633511,
                           0.5249350004928881,
                           -0.01015655683116892,
                           -0.48671658518654837,
                           -0.588311268126242,
                           -0.25978871509233853,
                           0.9039610340757382,
                           1.5549616218831699,
                           -0.05330158954092406]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
```

```
'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                        '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_noisy_time_evo_ric5_sample#3'},
                                    'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                          [1, 1, 1, 0],
                                                                          [2, 2, 2, 0],
                                                                          [3, 3, 3, 0],
                                                                          [4, 4, 4, 0]]},
                                    'run': 'zne',
                                    'state': 'dmatrix',
                                    'vqe': { 'iteration': 1,
                                              'optimization': { 'algorithm': 'SLSQP',
                                                                'constraint': True,
                                                                'status': False}},
                                    'zne': { 'data_points': [ [4, 2, 7, 0, -6.4104927992121],
                                                               [12, 6, 21, 8, -3.25771336700167],
                                                               [20, 10, 35, 16, -1.674813432318219],
                                                               [28, 14, 49, 24, -0.8591076530612253],
                                                               [36, 18, 63, 32, -0.43058689568319575]],
                                             'degree': 0.
                                              'method': 'richardson',
                                             'sampling': 'default'}},
                        'output': { 'exact_sol': -8.566772233505624,
                                    'run_time_sec': 4.482269287109375e-05,
                                    'zne_values': { 'degree': 0,
                                                     'extrapolated_value': -8.274307024710657,
                                                     'others': { 'beta_coeffiecients': [ 2.0339490779265086,
                                                                                         -2.250326639408051,
                                                                                         1.9586176305958964,
                                                                                         -0.9196987134972037,
                                                                                         0.17745864438284967],
                                                                 'cost_richardson_zne': 13.914439152583324,
                                                                 'sorted_expectation_vals': [ -6.4104927992121,
                                                                                              -3.25771336700167,
                                                                                              -1.674813432318219,
                                                                                              -0.8591076530612253,
                                                                                              -0.43058689568319575],
                                                                 'sorted_noise': [13, 47, 81, 115, 149]},
                                                     'sampled data': [ [4, 2, 7, 0, -6.4104927992121],
                                                                       [12, 6, 21, 8, -3.25771336700167],
                                                                       [20, 10, 35, 16, -1.674813432318219],
                                                                       [28, 14, 49, 24, -0.8591076530612253],
                                                                       [36, 18, 63, 32, -0.43058689568319575]],
                                                     'sampling': 'default'}}}]},
'xy-ric6': { 'noiseoff': [ { 'config': { 'ansatz': { 'qateset': 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': '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, 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': 'vge',
           '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 '
                                ^{\prime}6 + 1 Z 5 + 1 Z 6^{\prime},
           '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':
                                                                          '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,

False,

```
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,
 1.0900003904895101,
 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,
 -0.17185617277774212,
 -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,

```
-0.016397767746330064,
                                                         -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],
                                                                        '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': [ 0.3773346757087749,
                                                         0.5734233884194113,
                                                         0.5734233884194113,
                                                         1.2094818154974225,
                                                         1.2528672337957094,
                                                         1.3073966674132076,
                                                         4.193348178434801,
                                                         4.228670385547864,
```

0.20826999854501216,

```
4.228670385547864,
4.228670385547864,
4.228670385547864.
4.228670385547864,
4.274742575727675,
5.343872214974395,
5.354523589318104.
5.449133113124401,
5.449133113124401,
5.449133113124401,
5.449133113124401,
6.208341300319731.
6.208341300319731,
6.738723848778546,
6.7473872692498285,
8.515456463543387,
8.552181104315652.
8.552181104315652,
8.552181104315652,
9.363042150968939,
9.363042150968939,
11.478464454984158.
-0.2683676450988651,
-0.9370321768196137,
0.03790413469005285,
-0.3520989510779511,
0.5131804204688105,
0.767748989456867,
-1.1529933056041268,
1.0195402939041247,
-0.5189860890713169,
1.700377968800765,
0.48912124484584857,
1.506730848787325,
0.4485612726223177,
-1.6248073049289613,
0.10079320215400162,
1.7454590745233427,
1.474284546585253,
0.08837986403943651,
1.215839965531947.
-0.42666568442503866,
0.04298065245990749,
-1.495484471060033,
0.39055472334393304.
-0.06187227108331559,
1.0010296249342066,
-0.33745943355443286,
-0.19046242319241546,
-0.4884459619425607,
0.8930564792122229,
0.09947441181287657,
-1.4049039336860292,
1.0413688199593338,
0.027348986225077598.
1.5457890290583323,
0.8022774572900748,
-1.0377116853398,
0.5652694406258009,
0.9990396087940023.
-0.3409174955760714,
-0.8590373420111477,
0.3662952964918326,
0.6492392290096071,
-1.0735392409833318,
-0.620775369578654,
0.5064494688850749,
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
```

0.7429600006983637,

```
0.13897118193917846,
                           0.13192395570874205,
                           -0.560408177185694,
                           -0.7293430452459922,
                           1.2393938765994381,
                           0.16520016983754293,
                           -0.04218705839108043.
                           1.9844775109402493,
                           -0.40811731341033075,
                           0.40494641878472026,
                           0.44317505546879765,
                           -0.14541224425415586.
                           -1.3628454492957067,
                           0.35572573997739254,
                           -0.17363781014762678,
                           -0.21765464091811726,
                           0.25867396534698067,
                           -0.19299239511743832,
                           0.842583631219517,
                           0.01538577194684443,
                           -1.3780712180305699,
                           0.30168991607554185.
                           0.03816118508668757,
                           -0.6330896266111891,
                           -0.14462412237866193,
                           0.22751230177420415,
                           2.198362599080823,
                           0.5538971259685714,
                           1.6735676153080048,
                           0.01161307703421222,
                           0.15241612900647253,
                           -0.4114895408906573,
                           0.020024246948836234,
                           -0.361021382333633,
                           1.2366726872792735,
                           -0.8652479233612058,
                           -0.38157323774943186,
                           -1.2043495043519374,
                           0.03294448415473864,
                           1.864475600371399,
                           -0.048446953541905424,
                           1.483038428004856,
                           0.02119809714572118,
                           -0.20756566215919184,
                           1.2566509021622863,
                           0.4040298326697209,
                           0.0492062183426151,
                           0.3396501220758691,
                           0.09097515161528406
                           -0.4545275805495163,
                           1.5327906096069877,
                           -0.47568898039994184,
                           0.7447654713950665,
                           0.7179833985093875,
                           -0.03692927531761856,
                           0.11509825242982577,
                           0.020898935398901888,
                           0.2387893529411216,
                           1.5195379458286031,
                           -0.5337205856413728,
                           -0.5741707032781822,
                           1.298358172715442,
                           -0.010829860462227588,
                           -1.9037204771139875,
                           1.5774751765228583,
                           -0.28550943128124906,
                           1.5531884118568244]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric6_sample#4'},
                                              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                     [1, 1, 1, 0],
                                                                                     [2, 2, 2, 0],
                                                                                     [3, 3, 3, 0],
                                                                                     [4, 4, 4, 0],
                                                                                     [5, 5, 5, 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 \times 0 \times 1 + 0.5 \times 0 \times 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 + '
                                                                                            ^{\circ}0.5 X 4 X 5 + 0.5 Z 4 Z 5 + ^{\circ}
                                                                                            '0.5 X 5 X 6 + 0.5 Z 5 Z 6']},
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.44845457619454],
                                                                [12, 6, 21, 8, -3.2446894681699203],
                                                                [20, 10, 35, 16, -1.686607616211824],
                                                                [28, 14, 49, 24, -0.8984323471828196],
                                                                [36, 18, 63, 32, -0.4857082686875758],
                                                                [44, 22, 77, 40, -0.2634879429635577]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                   'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                         0.001,
                                                                                                         0.001,
                                                                                                         0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                   'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                         0.001,
                                                                                                         0.001,
                                                                                                         0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                   'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                         0.001,
                                                                                                         0.001,
                                                                                                         0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
```

```
'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                   'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [44, 11, 11, 40],
                                                                   'identity_factors': [5, 5, 5, 0],
                                                                   'noise_level': [44, 22, 77, 40],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 68.87752628326416}},
                               { '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': [ -5.647934061474703e-18,
                                                                         1.4787834906243755,
                                                                         1.478918229526628,
                                                                         1.478918229526628,
                                                                         2.0077351764243123,
                                                                         2.4302809101456218,
                                                                         2.4302809101456218,
                                                                         3.009709563144601,
                                                                         3.009709563144601,
                                                                         3.239471043198664,
                                                                         3.2405283031129133,
                                                                         3.2405283031129133,
                                                                         3.2656598154222434,
                                                                         3.5353392937639825,
                                                                         6.198713539858257,
                                                                         6.213604956994236,
                                                                         6.73397854893658,
                                                                         6.73397854893658,
                                                                         6.743547791194661,
```

```
6.744609103740889,
6.744609103740889,
6.749543065628153,
6.749543065628153,
8.615256229309818,
8.635090640841518,
9.012323512360366.
9.012323512360366,
9.930483613907942,
9.930483613907942,
11.782061805135282,
0.6870051227789642,
0.5234095533264759,
0.11216801162302814,
0.044591843687496906,
-0.747159787599118,
1.5727279855217766,
-0.16958009141159439,
-0.7234855106318131,
0.45999589631996707,
1.3613822619347415,
0.5234464983029046.
0.18337466193510712,
1.0660408011194182,
1.2813123812864906,
0.34899885807903364,
1.2204971120849089,
0.37250493843195553,
0.3861568591798728,
-0.4881036169368887,
0.23720347697856276,
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716,
0.5103741134651811,
-0.48491784736765847,
-1.939727949979543,
0.5221979500550953,
-0.39618913325979604,
-0.5258671175956018,
0.08753210163723862,
1.3619602585721242,
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515.
-1.1285674400831274,
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961,
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473,
0.4465655907565091.
-1.4308928069625704,
1.6254306194316424,
-0.16298810299835312,
-1.249293985363804,
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616,
-1.1357659634071433,
-0.5734897531715744,
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403,
0.06392732561319403,
0.7711512775812011,
-1.8472478314151175,
-0.46160141905881696,
1.8963279721150403.
-2.313663424814036,
```

0.060952702837845166,

```
-1.4971949982077863,
                           1.3040610818975555,
                           0.10605679464403613.
                           -1.138800572315487,
                           -0.03947636943653289,
                           0.07839455865010819,
                           -0.6470277815644087,
                           0.946101637008616,
                           -0.32144060478582315,
                           -0.6371693991779968,
                           0.30580409265523,
                           -0.2617129381706641,
                           0.4094287336545931,
                           0.49837362733711055,
                           -0.9058714721495094,
                           0.6137893604415533,
                           0.8546844695081749,
                           -0.8205470722456557,
                           -0.598852289145785,
                           0.46823811794119646,
                           1.2205247300232143,
                           0.031629319060699435,
                           1.1369587010491427,
                           0.12298062775535874,
                           -0.016960252964031076,
                           1.1127338626212067,
                           0.37972118532018134,
                           -0.1475616440844684,
                           0.32749925367563326,
                           0.030050642250761914,
                           0.17169542743574548,
                           -0.5825729547476518,
                           0.7052714548722974,
                           0.9884296874822006,
                           -0.500384308215816,
                           0.01722431287494931,
                           0.40290712722731054,
                           -0.029200452046427447,
                           1.2704708243944813,
                           2.3709704014259345.
                           -2.0267551524865275,
                           0.7347873374577798,
                           -0.34767223966060473,
                           0.009778943736386289,
                           0.221000841842164,
                           -0.010995780695540691,
                           -0.481889271583797,
                           0.7008500159073542,
                           2.3944065221124076,
                           -0.08320445199579081,
                           2.02470278988152,
                           0.02142760118000664,
                           1.6794429086669174,
                           1.6046551807968945,
                           0.2831685070910348,
                           1.5805135598594935]},
'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric6_sample#8'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 0],
                                     [3, 3, 3, 0],
                                     [4, 4, 4, 0],
                                     [5, 5, 5, 0]]},
'run': 'redundant',
'state': 'dmatrix',
```

```
'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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.429933051303131],
                                                               [12, 6, 21, 8, -3.1990719612158447],
                                                               [20, 10, 35, 16, -1.6351376911040885],
                                                               [28, 14, 49, 24, -0.8526977600673817],
                                                               [36, 18, 63, 32, -0.44953303322849647],
                                                               [44, 22, 77, 40, -0.23666355366027367]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                    'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
```

'vqe': { 'iteration': 1,

```
0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                   'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [44, 11, 11, 40],
                                                                   'identity_factors': [5, 5, 5, 0],
                                                                   'noise_level': [44, 22, 77, 40],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 82.4823865890503}},
                               { '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': [ 0.003375513600300809,
                                                                         0.4884127443235871,
                                                                         0.6719352108785641,
                                                                         0.9073170135093351,
                                                                         1.4946633690060278,
                                                                         1.5076957064847494,
                                                                         3.872917838142945,
                                                                         3.872917838142945,
                                                                         3.872917838142945,
                                                                         3.872917838142945,
                                                                         5.047622474508209,
                                                                         5.054336886650782,
                                                                         5.067626550795242,
                                                                         5.0733174878702085,
                                                                         5.094629387163461,
                                                                         5.749571576552799,
                                                                         5.7731554023304374,
                                                                         7.144946717661993,
                                                                         7.144946717661993,
                                                                         7.144946717661993,
                                                                         7.144946717661993,
                                                                         7.602314289267704,
                                                                         7.602314289267704,
                                                                         8.018775147517832,
                                                                         8.018775147517832,
                                                                         8.018775147517832,
                                                                         8.018775147517832,
                                                                         8.018775147517832,
                                                                         8.018775147517832,
```

9.661071929582006,

```
0.2735947252101626,
2.471262065567802,
0.18954222370300397,
0.2633058348660961,
0.07494334922808346,
1.4980157261935538,
0.3538857424122425.
0.26341770410626436,
0.17174804107002956,
-0.22912718472194316,
0.11060714764109056,
-0.30804859927082595.
2.8406850614439736,
1.0823654569610508,
0.9668529413216363,
1.8727663516543385,
-0.0901659930896485,
0.05868560690604535,
0.24212775097742179,
1.0092515209898247,
-0.7556969386491817,
0.3279350524218167.
1.078117272505244,
0.10391815458190773,
-0.7434930272741371,
-1.6965388530236032,
-1.360748554100242,
0.34939560927302815,
0.03188634842980519,
-1.2447472675125983,
0.06092342743494014,
1.017082923902293,
-1.007905562333318,
-0.8576057837691866,
0.5321038189070756,
1.300652060018237,
-1.8122591145188616,
-1.247002191580596,
1.2529274198051785,
0.3750417535596218,
0.2898066740735119,
1.589675559301449,
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883,
0.2658818907332787,
-0.9372958671062981.
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732,
2.008892916411081,
0.15285666374274742.
-1.782425531898792,
0.07791440554206944,
-1.28397958204954,
-0.7247696039786395,
0.5612678373457747,
-0.004762916486662008,
0.4386089298525658,
0.010283368626678616,
0.8990610129088383,
0.03840864905637026,
-1.2418081984826976,
0.33190310279028407,
0.3061008622829172,
-0.06950158836023225,
```

0.93859456058615,

```
0.9927840878492759,
                                       -0.0709710381209458.
                                       -1.4546153026559692,
                                       -0.6707274766895803,
                                       1.0492831078613678,
                                       1.59883886587945.
                                       -0.7948795957139008,
                                       0.011914265512354442,
                                       0.29611851635537545,
                                       -0.026452865362460363,
                                       0.17911271593442915,
                                       -0.268102313362264,
                                       -0.31698956355176716,
                                       0.5150163737561883,
                                       -0.2617344493849528,
                                       -0.08207987775663798,
                                       -0.7031192006515304,
                                       0.10296103394319861,
                                       -1.3322481995457,
                                       -0.8096620548125795,
                                       0.22894179493051453.
                                       -0.6404807766018014,
                                       0.5981001234262467,
                                       0.6725836248662437,
                                       -0.24769451099401643,
                                       -1.5367942204876157,
                                       0.32496629998060117,
                                       0.8231756699235411,
                                       0.27229759145944715,
                                       -0.4283887626472357,
                                       0.6783210911797265,
                                       1.178917544999848,
                                       -0.48124012627536317,
                                       -0.23642700938756703,
                                       -0.22983768395119897,
                                       0.7841497681166887,
                                       0.5963513861028734,
                                       -0.8505831212819382,
                                       0.6516631671421783,
                                       0.6698405071431395,
                                       0.7826636181190869,
                                       -1.6023915303224998,
                                       0.6733061844063541,
                                       1.5755992624240989]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric6_sample#7'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                 [2, 2, 2, 0],
                                                 [3, 3, 3, 0],
                                                 [4, 4, 4, 0],
                                                 [5, 5, 5, 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',
```

-0.02489786142317165,

```
'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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.397817460329862],
                                                                [12, 6, 21, 8, -3.211571673080875],
                                                                [20, 10, 35, 16, -1.641958817033255],
                                                                [28, 14, 49, 24, -0.8464644349040009],
                                                                [36, 18, 63, 32, -0.4337371704190119],
                                                                [44, 22, 77, 40, -0.216007189653039]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                    'identity_factors': [0, 0, 0, 0],
                                                                    'noise_level': [4, 2, 7, 0],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                         0.001,
                                                                                                         0.001,
                                                                                                         0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                         0.001,
                                                                                                         0.001,
                                                                                                         0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                         0.001,
                                                                                                         0.001,
                                                                                                         0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [28, 7, 7, 24],
                                                                    'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                         0.001,
                                                                                                         0.001,
                                                                                                         0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [36, 9, 9, 32],
                                                                    'identity_factors': [4, 4, 4, 0],
                                                                    'noise_level': [36, 18, 63, 32],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
```

0 } ,

```
'noise_prob': [ 0.001,
                                                                        0.001,
                                                                        0.001.
                                                                        0.001],
                                                       'status': True,
                                                       'type': 'depolarizing'},
                                    'odd_wires': 4},
                                  { 'gates_num': [44, 11, 11, 40],
                                    'identity_factors': [5, 5, 5, 0],
                                    'noise_level': [44, 22, 77, 40],
                                    'noise_profile': { 'noise_on_init_param': { 'status':
                                                                                 'value':
                                                        'noise_prob': [ 0.001,
                                                                        0.001,
                                                                        0.001,
                                                                        0.001],
                                                        'status': True,
                                                        'type': 'depolarizing'},
                                    'odd_wires': 4}],
              'run_time_sec': 77.34903883934021}},
{ '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': [ 0.0019047787007362745,
                                          0.7201496918445128,
                                          0.7201496918445128,
                                          0.7201496918445127,
                                          0.7226708680142584,
                                          0.8068041864232433,
                                          1.3847174673528184,
                                          1.6031895944534578,
                                          2.458865333289775,
                                          2.458865333289775,
                                          2.721120236828938,
                                          2.721120236828938,
                                          3.554687304897056,
                                          3.554687304897056,
                                          4.537252190232355,
                                          4.537252190232355,
                                          5.239770593633025,
                                          5.242363659304797,
                                          5.566731623636481,
                                          5.566731623636481,
                                          5.566731623636481,
                                          5.566731623636481,
                                          5.566731623636481,
                                          7.6484324534494865,
                                          7.6484324534494865,
                                          8.96757120343865,
                                          9.352637118466301,
                                          9.381932224950582,
                                          9.966925955531599,
                                          9.966925955531599,
                                          0.29840004251263574,
                                          0.3207087147269936,
                                          -0.22478909909228914,
                                          -1.2242611593120782,
                                          0.061748844824383295,
                                          1.9931455249507801,
                                          0.02449362327304914,
                                          -0.23402928130657288,
                                          0.3399922671860315,
                                          0.2355005268966802,
```

0.7912945290539132,

False,

0 } ,

```
-0.9147564287830934,
0.12280724330167514,
0.42016875545313104,
0.6183328009701774,
0.9098148543333162,
0.2439503202728901,
0.4941740976390827.
0.0721485641264495,
0.20051214721509877,
0.14273239312798908,
-0.03846070968482946,
0.11474641891065286,
0.1552743298359438,
-0.050455466832234855,
0.24385918138398863,
0.0646818550964626,
1.0379575003266166,
0.4438839418702803,
0.6652939620943935,
0.6574583263339632,
0.6386444070388955,
0.30923240052603657.
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079,
0.25272330748816335,
-0.05865013289270936,
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059,
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661,
0.256318263131488,
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686.
0.685008095432428,
-0.007804627058269528,
-2.9100406031766375,
-0.17918863042787767,
-0.29620353111227854.
-0.2953351498676352,
0.4434234593316091,
0.0018987515325079429,
0.5290648024022053,
0.011057994967698829.
0.03103232328752182,
-0.21693206073792237,
-0.07883582131375938,
-0.2554965378040217,
1.978711034134111.
-0.02822992907519939,
1.110830733101554,
0.04155227001102173,
0.17370289874025888,
-0.08435695708516765,
0.38686640173882947,
1.0727525781247964,
-1.4871438236674412,
0.1437881416009117,
-0.15769165641037303,
0.46096388290194723,
0.3881288491041242,
0.3113157866411551.
-0.21237825892214532,
1.3408904937177344,
```

```
-0.22654084728278404,
                                        0.09162287503278096.
                                        1.1250326534568733,
                                        0.670327239820091,
                                        -1.4911819217025961,
                                        0.8417198858779599.
                                        0.018685303562101165,
                                        -0.5955098452611822,
                                        1.37350461224772,
                                        -0.5503685346151788,
                                        0.07415629279393592.
                                        0.22396953453102358,
                                        -0.02219350017922496,
                                        2.5136787648879593,
                                        1.5560141766956836,
                                        -0.037039417521638966,
                                        -1.5578667717297374,
                                        -0.15174825264689498,
                                        -0.0075908588231686416,
                                        -0.1347910987366526,
                                        0.7535559035800633.
                                        2.9519825568174283,
                                        -0.8640992588734872,
                                        -0.486197602889753,
                                        -0.029079605859607876,
                                        0.1393557947212105,
                                        -0.03201203543340934,
                                        -0.17255788414719309,
                                        -0.6220837667998668,
                                        0.10441375911567917,
                                        0.7019930428559267,
                                        1.822960884928266,
                                        0.0010256621400676815]},
            'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                '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_noisy_time_evo_ric6_sample#9'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                  [2, 2, 2, 0],
                                                  [3, 3, 3, 0],
                                                  [4, 4, 4, 0],
                                                  [5, 5, 5, 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 \times 0 \times 1 + 0.5 \times 0 \times 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 \times 5 \times 6 + 0.5 \times 5 \times 6
'output': { 'data_points': [ [4, 2, 7, 0, -6.536182288327377],
                             [12, 6, 21, 8, -3.450081350248876],
                             [20, 10, 35, 16, -1.8650932993173603],
                             [28, 14, 49, 24, -1.0247351729167147],
                             [36, 18, 63, 32, -0.5670015302617211],
```

0.033287678968192874,

```
[44, 22, 77, 40, -0.31237897705332807]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                    'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [44, 11, 11, 40],
                                                                    'identity_factors': [5, 5, 5, 0],
                                                                   'noise_level': [44, 22, 77, 40],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
```

```
False,
```

0},

```
'noise_prob': [ 0.001,
                                                                        0.001,
                                                                        0.001,
                                                                        0.001],
                                                        'status': True,
                                                        'type': 'depolarizing'},
                                    'odd_wires': 4}],
              'run_time_sec': 79.09394240379333}},
{ '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': [ -6.331146189926128e-17,
                                          0.7069927066774304,
                                          0.7069927066774304,
                                          0.7069927066774305,
                                          0.7069927066774304,
                                          1.0044153364322925,
                                          1.0092418692996383,
                                          2.470333794214341,
                                          2.478143749866421,
                                          3.5776564981759003,
                                          3.5776564981759003,
                                          3.5776564981759003,
                                          3.61745967653339,
                                          3.6981780389472076,
                                          3.755720232685741,
                                          3.9712286023902594,
                                          3.9712286023902594,
                                          4.519037432417192,
                                          4.519037432417193,
                                          4.519037432417193,
                                          5.280953883299406,
                                          5.280953883299406,
                                          6.620356980277175,
                                          6.620356980277175,
                                          6.620356980277175,
                                          6.620356980277176,
                                          8.214004051881032,
                                          8.214004051881032,
                                          9.105951544537387,
                                          10.829366164164977,
                                          1.4490195266558639,
                                          1.145329650589643,
                                          -0.9374272684957279,
                                          -1.2910248872233119,
                                          0.9701069453007352,
                                          2.0238893871034924,
                                          -0.6731600678051081,
                                          -0.7305037462514778,
                                          0.6743483023845589,
                                          1.611766624162738,
                                          -0.162446688913207,
                                          -0.2464021583836281,
                                          1.3073653685111934,
                                          1.560629053845934,
                                          -0.09768282308379246,
                                          -0.31393750682085847,
                                          0.1625705045557987,
                                          -0.1344649185634244,
                                          -0.03516682581352061,
                                          0.15934568227883428,
                                          1.4484389719925783,
```

0.31346340320241645,

'value':

```
-1.5406853809043388,
0.3831701903776482,
0.07255447956326048,
-0.4619144712511035,
0.6220101497739178,
-0.08645510294766677,
-0.036774035023737585.
-0.02433291891195538,
1.2745777688613118,
0.806643386980706,
-0.1734465019831428,
-1.474099767063678.
-1.2534035864969235,
0.024086803725753666,
-0.5946515656594247,
3.047855036387052,
0.561263952510902.
-0.27353577574812815,
0.476385213099692,
-0.4183083264972014,
-0.07584344603997495,
-0.04004176630390785.
0.6379867024754904,
3.306912023625799,
0.6758488609505069,
-0.49379826249780634,
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808,
0.043470303912556706,
0.2301819741695647,
1.9247102260310271,
0.19401136489510468,
0.17784496580796996,
-0.12037519976757159.
0.10596613899479704,
0.02480260398862852,
0.33616247382037256,
-0.2960626605489573,
1.2038327046358004,
-0.4266046665751028,
-0.14331073423696536,
0.33240571018120446,
0.13743208352564132.
0.21308235615415505,
-0.8816113951868988,
-0.03958129872975694,
1.7385124490728345,
1.3953860705003918.
0.7193393529381484,
-0.5890148767931709,
1.6845229617798814,
-0.04059142172715042,
-0.6588344885662398.
-1.5492107393137406,
0.9886630320432893,
1.3955090248591298,
-1.7521400718196618,
-0.02012078102450614,
1.5598528019020075,
-0.041272015671692544,
0.6659176073691222,
-0.10884895615623923,
-0.8860283635501729,
-0.042494102069769425,
-0.5241060846215897,
-0.049429521011899694,
-1.6158837397685775.
-0.29703279066650246,
0.6940812648197017,
-1.0869617874060826,
-1.1891726572683667.
0.03935191545498333,
```

-1.7727595774952096,

```
-0.0005664350349098603,
                                         -1.2288438066739866,
                                         2.182693040857262.
                                        1.2648198022740724,
                                         0.636776362006322,
                                        -1.1418938134635428,
                                         0.04892386539982865.
                                        -0.6595482134655696,
                                         -0.016038133219537475,
                                         -1.53365152672916,
                                         -0.5818287115590742
                                        -0.8537662908823758.
                                        1.3418170063691075,
                                        -0.32888813707646736,
                                        -0.018460135902194714,
                                        -0.8323242421777916,
                                        1.5026664500941838.
                                        1.809610363246633,
                                         -1.5283405786971713,
                                         0.5470095670143573,
                                        -1.4753657998350065,
                                        0.8122840148585063.
                                        1.5317878779716176]},
            'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                                'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                '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_noisy_time_evo_ric6_sample#5'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                   [1, 1, 1, 0],
                                                   [2, 2, 2, 0],
                                                   [3, 3, 3, 0],
                                                   [4, 4, 4, 0],
                                                   [5, 5, 5, 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 + '
                                                           ^{\circ} 0.5 ^{\circ} X 4 ^{\circ} X 5 + 0.5 ^{\circ} Z 4 ^{\circ} Z 5 + ^{\circ}
                                                           0.5 \times 5 \times 6 + 0.5 \times 5 \times 6
'output': { 'data_points': [ [4, 2, 7, 0, -6.311563719128683],
                              [12, 6, 21, 8, -3.2712898811023576],
                              [20, 10, 35, 16, -1.7533390824025292],
                              [28, 14, 49, 24, -0.966227702270059],
                              [36, 18, 63, 32, -0.5436512754494955],
                              [44, 22, 77, 40, -0.3098340729956386]],
            'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                  'identity_factors': [0, 0, 0, 0],
                                  'noise_level': [4, 2, 7, 0],
                                  'noise_profile': { 'noise_on_init_param': { 'status':
                                                                                 'value':
                                                      'noise_prob': [ 0.001,
                                                                       0.001,
```

0.001,

False,

0 } ,

```
'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                    'noise_level': [12, 6, 21, 8],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                    'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                    'identity_factors': [4, 4, 4, 0],
                                                                    'noise_level': [36, 18, 63, 32],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [44, 11, 11, 40],
                                                                    'identity_factors': [5, 5, 5, 0],
                                                                    'noise_level': [44, 22, 77, 40],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4}],
```

'run\_time\_sec': 68.65868830680847}},

0.001],

```
{ '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': [ 0.33528943002425843,
                                         0.8608925283648261,
                                          2.8309935233222867,
                                         2.8382233121900358,
                                         2.847558790018716,
                                          2.8477263794127468,
                                          3.9337993695450666,
                                          3.9337993695450666,
                                          3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         5.127462455084763,
                                         5.128383696390232,
                                         5.132051241075024,
                                         5.132231848473024,
                                          5.132297186784173,
                                          5.132297186784173,
                                         5.132297186784173,
                                         5.132320898992942,
                                         5.134903164275234,
                                         5.734798022200061,
                                          5.734798022200061,
                                         5.734798022200061,
                                         6.71748919093495,
                                         6.71748919093495,
                                          9.773430860122208,
                                          9.791656954875775,
                                          9.791980525916317,
                                         9.804782964874805,
                                         9.947289619134542,
                                          0.6818618664375632,
                                         0.42253658736184846,
                                         0.19067339209915313,
                                         -2.314563573529872,
                                          -1.7784854373672185,
                                          -0.10945476580518654,
                                          0.08980428543050965,
                                         0.6265702304745648,
                                         -0.12016219313034968,
                                         0.005450784512528824,
                                         0.9621316606784164,
                                         -0.01940541263687908,
                                         -1.2890091107885369,
                                          -0.09216272929775945,
                                          -0.8615487717558121,
                                          0.021600758375482327,
                                         1.1068545366678577,
                                         -0.06436428812394061.
                                         -1.8186253546793636,
                                         -0.2455724158610742,
                                         0.7444478114283775,
                                         1.0647343146888184,
                                          -1.6388802958603008,
                                          -0.05032235091912311,
                                          0.7589104637111997,
                                         0.0934759886788552,
                                         0.7280377617711271,
                                         -0.10012682423470079,
                                          -2.7917715562202794,
                                         0.5843828201862561,
                                         1.2003794612588048,
                                         -0.2782652692858759,
                                         1.253725179404932,
```

```
-0.831140674623039,
-1.3898002860152843,
1.7689493816619246,
-0.768539740515663,
-0.5265628815801298,
-0.8222194498348508,
-0.4525275176973082.
0.8944486767447871,
1.1352373194126446,
0.06348552937029919,
-0.7478835175458556,
-0.44914670649658045.
0.5247278033135997,
0.5948349944294522,
-0.5743460857513,
0.873550995352649,
0.8797938271812764.
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805,
-0.4012501825920459,
-0.4763388197192611.
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537,
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616,
0.6716489600966955,
0.08900519900900147,
0.7708643633651343,
0.0944251249629154,
-0.053131619179539805,
-0.132883145931867,
0.44414428660563765,
-0.3164026614336652,
0.9835391768228284,
-0.49696354121947833,
0.3510514174127117,
-0.24991518010085176,
-0.7780713458689107,
1.3387260017849976,
0.712191280671364.
-0.4436070432657242,
1.090195713122469,
0.3876483875477464,
1.113683201871723,
0.09724940056823322.
-1.3265075307540413,
-1.8530581309545013,
0.335564434910613,
0.16061631243062188,
0.6994545842241634,
-0.0055568765936962455,
1.8148369905661879,
-0.9149620921846291,
-0.5341673651010566,
-0.6583203681162046,
-0.05148037848607484,
-0.1302834828824637,
-0.2083684341417298,
-0.7142637766159184,
0.4980789266978527,
-2.030263033934291,
-0.002330467371510849,
-0.7835259213136883,
-0.18712783689065152,
-0.271594041353006,
0.606962231033315,
0.19917323339650786,
0.581852597021436.
1.0547240409345577,
```

0.07111303544026976,

```
0.08669172360020491,
                                                                         0.8024105605127613.
                                                                         0.8315802366658298,
                                                                         1.117305276662395,
                                                                         -1.0742437197416552,
                                                                         0.30921812342286065.
                                                                         -0.06994991433225481,
                                                                         1.0419800264617582,
                                                                         1.4507701003592177,
                                                                         0.2408413974211676,
                                                                         1.6573761327725358]},
                                             'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric6_sample#2'},
                                             'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                    [1, 1, 1, 0],
                                                                                   [2, 2, 2, 0],
                                                                                    [3, 3, 3, 0],
                                                                                    [4, 4, 4, 0],
                                                                                    [5, 5, 5, 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 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.333005581610797],
                                                               [12, 6, 21, 8, -3.1651017858597426],
                                                               [20, 10, 35, 16, -1.6439583689682524],
                                                               [28, 14, 49, 24, -0.8813072530521873],
                                                               [36, 18, 63, 32, -0.48318628235120475],
                                                               [44, 22, 77, 40, -0.26793423014165196]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001.
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
```

1.4877210254684077,

```
'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [20, 5, 5, 16],
                                                                    'identity_factors': [2, 2, 2, 0],
                                                                    'noise_level': [20, 10, 35, 16],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [36, 9, 9, 32],
                                                                    'identity_factors': [4, 4, 4, 0],
                                                                    'noise_level': [36, 18, 63, 32],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0},
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.0011,
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                  { 'gates_num': [44, 11, 11, 40],
                                                                    'identity_factors': [5, 5, 5, 0],
                                                                    'noise_level': [44, 22, 77, 40],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                  'value':
0 } ,
                                                                                        'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                        'status': True,
                                                                                        'type': 'depolarizing'},
                                                                    'odd_wires': 4}],
                                             'run_time_sec': 67.50898575782776}},
                               { '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': [ 0.08591881204796584,
                           1.5026023651616802,
                           1.9179097588555833,
                           1.9179097588555831,
                           1.9179097588555831,
                           1.9179097588555831,
                           2.8800636946459592,
                           2.9523818900173797,
                           2.9523818900173797,
                           2.954896407422686,
                           3.0487820562708485,
                           3.0487820562708485,
                           3.9462134206000328,
                           3.9462134206000328,
                           5.170248653928018,
                           5.170248653928018,
                           6.5066905594049205,
                           6.5066905594049205,
                           6.5066905594049205,
                           6.914119522580601,
                           6.914119522580601.
                           6.9842551957162815,
                           7.300516913785898,
                           8.782483894556266,
                           8.782483894556266,
                           8.999633503017922,
                           8.999633503017922,
                           8.999633503017922,
                           9.414122362394847,
                           9.414122362394847,
                           0.09854676674938925,
                           -0.05173289612974198,
                           0.30094803169630163,
                           -1.1984142138894447,
                           0.08610670053567002,
                           0.2851928692216035,
                           0.26177875477440216,
                           0.11764473243628538,
                           0.3495067876706816,
                           -0.9678438601279628,
                           -0.08762050677252062,
                           0.014826088936787857,
                           -0.30347729159143555,
                           -1.1730530788097624,
                           -0.12550631929596553,
                           2.258056275075482,
                           -0.5160508087356981,
                           0.004541093619226378,
                           -0.9345420797218197,
                           0.47154522212338745,
                           -0.9129446894819914,
                           0.2768683391341781,
                           0.29975752794333804,
                           -0.16177915588279423,
                           0.6021148977823381,
                           0.35405737535162146,
                           0.8149645603473178,
                           -0.7074306860917636,
                           -0.8281028342440522.
                           -0.20840122350984505,
                           -0.19593362207831977,
                           1.2208184674045053,
                           -0.10408257731449277,
                           0.9878855326441833,
                           0.6508295623732647,
                           -0.31520021014255994,
                           -1.502007043998756,
                           -0.44913621684685756,
                           -0.2831231513937543,
                           -1.048170079126895,
                           -0.10057118739311635,
                           -0.4440190475287521,
                           0.5925479388494825,
                           0.1500100176310508,
```

```
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612,
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243.
-0.8246572495389679,
-0.28480932751570914,
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
-0.035476380392734465,
0.9940259955458774,
-0.657126951929564,
-0.4786936406484008,
1.4564140457987391,
-1.062151832750044,
-0.01496017231630948,
0.16259290081999456,
0.601493806263198.
-0.20485253219607644,
-1.2421776762345744,
1.152288606322054,
1.1883019471730756,
0.9817659575699377,
0.9653429636905305,
0.5382122852444811,
0.722384759736696,
-0.13079560936986118,
-0.9638314109375934,
-0.13358671856975504,
-0.3949417844115237,
1.01780227278121,
0.6746960094686067.
0.14295933107831804,
-0.37974724013569766,
0.3641245559377578,
0.12972678280008856.
0.5949873255000262,
0.8499370211382984,
-0.0792654431528575,
1.9402087793428133,
-0.5583113020357903.
0.6535986429024293,
1.0008805619835928,
0.16556690201288055,
1.1071973338235597,
0.07194244573338314,
-0.9146859400815048,
-0.005186820541518637,
0.4795762978809806,
0.6475066336984044,
0.11860845746693519.
0.08044881503693782,
0.5402817334108434,
1.5532870492056725,
0.36643388228039625,
1.6150985923432208.
0.22271977417212363,
-0.04956133994172771,
-0.6258533610916538,
-0.6517224443292691,
0.2594825887888975,
-0.1286341552665023,
0.48749759828242367,
-0.009813928289633511,
0.5249350004928881,
-0.01015655683116892,
-0.48671658518654837,
-0.588311268126242,
-0.25978871509233853.
0.9039610340757382,
```

1.5549616218831699,

```
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                 '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_noisy_time_evo_ric6_sample#3'},
                                              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                    [1, 1, 1, 0],
                                                                                    [2, 2, 2, 0],
                                                                                    [3, 3, 3, 0],
                                                                                    [4, 4, 4, 0],
                                                                                    [5, 5, 5, 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 + '
                                                                                           ^{\circ}0.5 X 3 X 4 + 0.5 Z 3 Z 4 + ^{\circ}
                                                                                           '0.5 X 4 X 5 + 0.5 Z 4 Z 5 + '
                                                                                           0.5 \times 5 \times 6 + 0.5 \times 5 \times 6
                                 'output': { 'data_points': [ [4, 2, 7, 0, -6.4104927992121],
                                                               [12, 6, 21, 8, -3.2577133670016694],
                                                               [20, 10, 35, 16, -1.674813432318219],
                                                               [28, 14, 49, 24, -0.8591076530612254],
                                                               [36, 18, 63, 32, -0.43058689568319575],
                                                               [44, 22, 77, 40, -0.20313281829021995]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.0011,
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
```

-0.05330158954092406]},

```
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                   'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                   'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [44, 11, 11, 40],
                                                                    'identity_factors': [5, 5, 5, 0],
                                                                   'noise_level': [44, 22, 77, 40],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                              'run_time_sec': 68.4976704120636}},
                               { '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': [ 3.750846163374531e-05,
                                                                         0.22285241391868899,
                                                                         0.26252411232084344,
                                                                         0.26252411232084344,
                                                                         0.26252411232084344,
                                                                         1.459545906754556,
                                                                         1.4595459067545562,
                                                                         1.6094835194149661,
                                                                         2.5927782099427628,
                                                                          2.5927782099427628,
```

```
2.5927782099427628,
2.5927782099427623,
3.3552499939702187,
3.3552499939702187,
5.033284106467877,
5.033284106467877,
5.056477210452712,
6.768913439946703,
6.768913439946703,
7.2782492670747585,
7.2782492670747585,
7.2782492670747585.
7.2782492670747585,
7.2782492670747585,
7.2782492670747585,
8.934198246659292,
8.937369801451712.
9.544406408519471,
9.544406408519471,
10.23170722265548,
-0.4501443853573418,
0.06519513561037263.
-0.13386490845883003,
-0.01542333988020039,
0.3988203537526196,
0.9163371790808124,
0.08159154039220383,
-0.11665429084087826,
-0.21130662780886203,
1.515236372470638,
0.4436142129357345,
-0.28780404896369716,
0.3681425383234808,
0.648176841676201,
0.3046875502986337,
0.05897820457762899,
0.09316951897603123,
1.5277657654344678,
-0.655141628591867,
0.073084468489131,
-0.11423944001370272,
0.3986898081963471,
1.0974832156349317,
1.8462557861113,
0.5998463368708868.
-0.0014214294560794885,
0.4026665434776887,
-0.03860309342262787,
0.3728818533964108,
1.7322816292529104.
0.42156018976657544,
0.9872712539907578,
0.5749190583224287,
0.1654949387796794,
1.0577776390475342.
-0.5892377479966974,
0.4324416138472369,
0.7909276553155474,
1.0132171075838867,
0.008626434202972095.
-1.4776636473003866,
-0.0743310361925915,
1.1363109745761366,
0.32003332101567866,
0.08535303128967886,
1.1165485958252095,
0.476282782575683,
0.11414859665640108,
0.8927652783900955,
0.027791184984770272,
0.8970588198442948,
-0.04579755391586939,
0.10596016247070955,
0.4721342517962854,
```

0.3142323996684511,

```
-0.0207983447823891,
                           1.3304831617683006,
                           -0.20639835153288702,
                           0.2928189752635581,
                           -0.4120973709154422,
                           -0.16251962266938982,
                           -0.928532755338732.
                           0.13709877636127538,
                           0.09386847134985479,
                           -0.9415336108192559,
                           -1.3861285848764584,
                           0.5116476525314603.
                           -1.5694556777668651,
                           0.31948518026769196,
                           -0.0136576069296156,
                           0.8752899744519326,
                           -0.448175539102687,
                           -0.8567162669878051,
                           0.737642795798484,
                           -0.5233142967805873
                           -0.020239952918795164,
                           0.9696407297918527.
                           1.064479355466651,
                           -0.43102633401249074,
                           0.3234367312145231,
                           0.02606795235445944,
                           0.2525608175326581,
                           0.09544790103129135,
                           0.30399471295861424,
                           0.6638935631613432,
                           2.095756590649309,
                           -0.5383535092385583,
                           -0.1523671776118538,
                           -0.49733805370513506,
                           1.0814777965289457,
                           -0.5541810322110113,
                           0.4702060218904802,
                           0.1941018040115748,
                           0.027389458133440587,
                           -0.6339976476553459,
                           0.824073822166477,
                           -0.8904328829691108,
                           0.5852778403101284,
                           -0.37705413851354036,
                           -0.20234246488211116,
                           0.19390975159216547,
                           -0.03854894368679599,
                           -0.5885610444718222,
                           0.2892174263372239,
                           -0.7158388932188376,
                           -0.03853087013753846,
                           0.36228239756074476,
                           0.06448164730191597,
                           0.8103021451607575,
                           0.04195704491201313,
                           2.1946244272306323,
                           1.1078290402756337,
                           -0.0920096926231485,
                           0.7957980849005134,
                           0.10683086015182242.
                           0.04139972880547422,
                           1.068477454710041,
                           1.5812878062267348,
                           1.0292383703670558,
                           1.5822631942162138]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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'},
```

```
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                   [1, 1, 1, 0],
                                                                                   [2, 2, 2, 0],
                                                                                   [3, 3, 3, 0],
                                                                                   [4, 4, 4, 0],
                                                                                   [5, 5, 5, 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, 7, 0, -6.460678265045408],
                                                               [12, 6, 21, 8, -3.2738854608106305],
                                                               [20, 10, 35, 16, -1.6974907774474757],
                                                               [28, 14, 49, 24, -0.8939947022135477],
                                                              [36, 18, 63, 32, -0.4736436630774058],
                                                              [44, 22, 77, 40, -0.24910822433441174]],
                                             'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                   'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001.
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                      'status': True,
                                                                                      'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
```

'file\_name\_prefix': 'AUTOMATE\_xy\_noisy\_time\_evo\_ric6\_sample#6'},

```
'identity_factors': [3, 3, 3, 0],
                                                                   'noise_level': [28, 14, 49, 24],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                   'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [44, 11, 11, 40],
                                                                   'identity_factors': [5, 5, 5, 0],
                                                                   'noise_level': [44, 22, 77, 40],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 67.9608006477356}},
                               { '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': [ 1.5680106786222674e-17,
                                                                         1.0238650999177359,
                                                                         1.0238650999177359,
                                                                         1.0238650999177359,
                                                                         1.7041550191762513,
                                                                         2.070931805530806.
                                                                         2.586234954306046,
                                                                         2.6265616878606783,
                                                                         2.7566136785306155,
                                                                         2.7689271757054255,
                                                                         4.271831894498143,
                                                                         4.271831894498143,
                                                                         4.271831894498143,
                                                                         5.004110362344359,
                                                                         5.004110362344359,
                                                                         5.529689350278954,
                                                                         5.529689350278954,
                                                                         5.529689350278954,
                                                                         5.5493166460873375,
                                                                         7.855838962179162,
```

7.855838962179162,

```
8.508023697610218,
8.540796404638465,
8.940056981382925.
8.940056981382925,
8.940056981382925,
8.940056981382925,
9.524293982069336.
9.524293982069336,
9.815045396471412,
0.717685470636315,
0.29125971197830336,
0.013619559122678915.
-0.46174394022911175,
-0.7802589318548062,
1.8785332138943256,
-0.07718385116900997,
-0.4181315830102034,
0.3859499067718677,
0.7218523694763775,
0.16350787496293626,
-0.06274337543165032,
1.048639096314506.
0.9454500907927006,
-0.18328208251477485,
0.5336296017995852,
0.7047960543548563,
-0.4717130073686535,
-0.14327049451726778,
0.5646728024946054,
0.1377201649736573,
1.0845662084088512,
0.7117671017527167,
1.8562916393289055,
-1.0958742208007046,
0.314756410152813,
1.0055290931424188,
-1.2653176839886926,
-0.6435463058390287,
-0.13689785210195535,
0.5185042269644529.
-0.07994120596020922,
-1.3394312085309903,
-0.01354724643952521,
-0.8508707890759795,
-0.7258020036409927.
-0.1513648764845159,
-0.5702686618598916,
-0.20804467461705725,
-0.059043388294177074,
0.9724468840137966.
1.6889388278999584,
0.19460354666786345,
1.52688995899303,
0.40690710189505636,
0.054839646577847824,
-1.9384169999074634,
-0.8955556931339368,
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788.
-0.008629533947631484,
1.3318794505555018,
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042,
0.6437292330207226,
0.02590432636550948,
0.44592066957482307,
-0.0809779454755679,
-1.1390483539597829,
0.4898473400025203.
0.11381426982162568,
```

0.6089836387514223,

```
0.17594570893388972,
                           0.012948010393531988,
                           -0.547404644839424.
                           0.028969189369927453,
                           1.1006601522977721,
                           -0.6406183594181203,
                           -0.12562720825840668,
                           2.0392738219317867,
                           0.9906966768182601,
                           0.03179376057566713,
                           1.5460159269414353,
                           -0.01674613470972367,
                           -1.1841027420803907,
                           0.24496917335434354,
                           -0.07332300856328518,
                           0.25897293698241475,
                           0.35918978324443196,
                           -0.007942172382781155,
                           0.4618323110818234,
                           -0.08547471514820712,
                           -0.5115221242285567,
                           0.4563488682048878.
                           -1.2086759202201718,
                           0.14282176979415442,
                           0.48263581465206523,
                           0.09855500655515351,
                           0.5327824526475502,
                           -0.19110982084320108,
                           -0.775795154813047,
                           -0.31907838177549175,
                           0.03477100089693282,
                           0.7436201132387485,
                           -0.022209896476399357,
                           -0.14741027177548285,
                           -0.10110024079398225,
                           0.20359400710495562,
                           -0.15623022021775929,
                           0.1964090589605299,
                           0.18042072654891128,
                           0.8910666012551952.
                           0.03518277211157266,
                           0.11858050209575345,
                           0.6912090997145024,
                           0.05142750966379351,
                           1.2523961498884204,
                           -1.1477698487953947,
                           -0.16063831357643202,
                           -1.0074319345942784,
                           0.29535289246662044,
                           -0.002280412475169233.
                           0.45599081133710123,
                           -1.6715207166067523,
                           0.3320227490012926,
                           1.5421306314740455]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric6_sample#1'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 0],
                                     [3, 3, 3, 0],
                                     [4, 4, 4, 0],
                                     [5, 5, 5, 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 \times 5 \times 6 + 0.5 \times 5 \times 6"]
                                  'output': { 'data_points': [ [4, 2, 7, 0, -6.515742960091852],
                                                                 [12, 6, 21, 8, -3.3649211100370207],
                                                                 [20, 10, 35, 16, -1.7545658776574033],
                                                                 [28, 14, 49, 24, -0.9139478342631157],
[36, 18, 63, 32, -0.4680317780831103],
                                                                 [44, 22, 77, 40, -0.22931309151635063]],
                                               'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                     'identity_factors': [0, 0, 0, 0],
                                                                     'noise_level': [4, 2, 7, 0],
                                                                     'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                    'value':
0},
                                                                                          'noise_prob': [ 0.001,
                                                                                                           0.001,
                                                                                                           0.001,
                                                                                                           0.001],
                                                                                          'status': True,
                                                                                          'type': 'depolarizing'},
                                                                     'odd_wires': 4},
                                                                   { 'gates_num': [12, 3, 3, 8],
                                                                     'identity_factors': [1, 1, 1, 0],
                                                                     'noise_level': [12, 6, 21, 8],
                                                                     'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                    'value':
0 } ,
                                                                                          'noise_prob': [ 0.001,
                                                                                                           0.001,
                                                                                                           0.001,
                                                                                                           0.0011,
                                                                                          'status': True,
                                                                                          'type': 'depolarizing'},
                                                                     'odd_wires': 4},
                                                                   { 'gates_num': [20, 5, 5, 16],
                                                                     'identity_factors': [2, 2, 2, 0],
                                                                     'noise_level': [20, 10, 35, 16],
                                                                     'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                    'value':
0 } ,
                                                                                          'noise_prob': [ 0.001,
                                                                                                           0.001,
                                                                                                           0.001.
                                                                                                           0.001],
                                                                                          'status': True,
                                                                                          'type': 'depolarizing'},
                                                                     'odd_wires': 4},
                                                                   { 'gates_num': [28, 7, 7, 24],
                                                                     'identity_factors': [3, 3, 3, 0],
                                                                     'noise_level': [28, 14, 49, 24],
                                                                     'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                    'value':
0},
                                                                                          'noise_prob': [ 0.001,
                                                                                                           0.001,
                                                                                                           0.001,
                                                                                                           0.001],
```

'status': True,

```
'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                   'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False.
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.0011,
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [44, 11, 11, 40],
                                                                   'identity_factors': [5, 5, 5, 0],
                                                                   'noise_level': [44, 22, 77, 40],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                       0.001,
                                                                                                       0.001,
                                                                                                       0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4}],
                                             'run_time_sec': 70.21013498306274}},
                               { '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': [ 0.00030922277578629,
                                                                         0.881375055029912,
                                                                         0.881375055029912,
                                                                         0.8813750550299119,
                                                                         0.9803845151714838,
                                                                         0.9803845151714838,
                                                                         1.201629973822729,
                                                                         1.2441077564052723,
                                                                         1.8660677974280824,
                                                                         1.8660677974280824,
                                                                         2.651002314516478,
                                                                         2.651002314516478,
                                                                         3.233637461790533,
                                                                         4.36384995486056,
                                                                         4.36384995486056,
                                                                         4.975714528653046,
                                                                         4.975714528653046.
                                                                         6.591840750700408,
                                                                         6.591840750700408,
                                                                         8.234009055219385,
                                                                         8.238223602720305,
                                                                         8.238223602720305,
                                                                         8.238223602720305,
                                                                         8.903406631369169,
                                                                         8.903406631369169,
                                                                         8.903406631369169,
                                                                         9.126449234760914,
                                                                         9.126449234760914,
                                                                         9.441918167657187,
                                                                         9.441918167657187,
                                                                         0.4384156956352651,
```

-0.017407483354635628,

```
-0.13579407977759564,
-0.08181457210659056,
-0.5635031413839604.
0.570197125887921,
-0.07389454022208618,
0.18950484918514415,
0.23442314823895152.
0.5187197914643009,
0.03760777637611914,
1.2080522066616035,
-0.006796933498365149,
0.7597395812711474.
0.3165595784185247,
0.09234381717322694,
-0.047116958459538144,
0.02161370846364295,
-0.3330735946096464,
-0.310519881157395,
-0.1321730433969341,
-0.32004747583182785,
0.38880240494533963,
0.5587916266845782.
-0.04068226055752174,
-0.04929253976644778,
0.7350044083650977,
-0.3347542084226466,
0.07994172439872818,
0.177027499128215,
-0.03555523462670161,
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313,
-1.8841797053563085,
-0.39250057722196113,
0.0604718224769807,
-0.15658247224402194,
1.097732135880844,
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626,
0.5767878477607333,
0.4375958673531614.
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875
-0.29954118659750983,
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533.
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
0.32920686175801595,
0.0470036094807545.
0.6942117349751494,
-0.24738597040458754,
-0.3530344251488351,
-0.7207866325012796,
0.6865004571010461,
-0.022934954570734595,
-0.4703523591474931,
0.00010065187353926284,
-0.25737840979321513.
-0.37927040299996573,
0.3323512575736423,
-0.7162822410895011,
-0.8849129065134153,
-0.02984860970928172,
```

0.9857401879405846,

```
-0.4901093246549395,
                                                                        -0.15185390643388375.
                                                                        -1.1107951730061545,
                                                                        1.1255217267520845,
                                                                        -0.36113008327046914,
                                                                        0.12498769155032201.
                                                                        1.105653484876161,
                                                                        -0.0826241142760939,
                                                                        -0.6079720837354008,
                                                                        -0.4798331114275297,
                                                                        -1.1230771992973987,
                                                                        0.13634359721928585,
                                                                        -1.0117198549615587,
                                                                        0.0420371772323395,
                                                                        0.4704689604818435,
                                                                        -0.1136051809968673,
                                                                        -0.4158299646895606,
                                                                        0.7682233881623428,
                                                                        -0.8567828943049521,
                                                                        -1.0844985071567337,
                                                                        0.8118563616911731.
                                                                        -1.0011580890685694,
                                                                        0.06773503500153778,
                                                                        -0.9972068257582826,
                                                                        0.22064841214728595,
                                                                        1.015101892093672,
                                                                        -0.023903188302909387,
                                                                        -1.5448535965900865,
                                                                        0.40727537812840897,
                                                                        0.6273868528756265,
                                                                        -0.06403282214251436,
                                                                        0.1402221940396834,
                                                                        0.011807494022614938,
                                                                        0.19970219531306482,
                                                                        -0.3159297567283321,
                                                                        0.5243897804672414,
                                                                        0.6302439365729751,
                                                                        0.4184253509022523,
                                                                        0.38422115408735924,
                                                                        0.8610939738936156,
                                                                        0.3457693810952046,
                                                                        0.19105880264763628]},
                                            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                                                'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                                                '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_noisy_time_evo_ric6_sample#10'},
                                             'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                                                  [1, 1, 1, 0],
                                                                                  [2, 2, 2, 0],
                                                                                  [3, 3, 3, 0],
                                                                                  [4, 4, 4, 0],
                                                                                  [5, 5, 5, 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 + '
```

0.13869536095324345,

```
'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, 7, 0, -6.5111758480272135],
                                                               [12, 6, 21, 8, -3.513108400075424],
                                                               [20, 10, 35, 16, -1.9256894730075684],
                                                               [28, 14, 49, 24, -1.0648100061563792],
                                                               [36, 18, 63, 32, -0.5886022016151555],
                                                               [44, 22, 77, 40, -0.3212779442729232]],
                                              'noise_details': [ { 'gates_num': [4, 1, 1, 0],
                                                                   'identity_factors': [0, 0, 0, 0],
                                                                   'noise_level': [4, 2, 7, 0],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [12, 3, 3, 8],
                                                                    'identity_factors': [1, 1, 1, 0],
                                                                   'noise_level': [12, 6, 21, 8],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [20, 5, 5, 16],
                                                                   'identity_factors': [2, 2, 2, 0],
                                                                   'noise_level': [20, 10, 35, 16],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0 } ,
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                   'odd_wires': 4},
                                                                 { 'gates_num': [28, 7, 7, 24],
                                                                    'identity_factors': [3, 3, 3, 0],
                                                                    'noise_level': [28, 14, 49, 24],
                                                                    'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
                                                                                       'noise_prob': [ 0.001,
                                                                                                        0.001,
                                                                                                        0.001,
                                                                                                        0.001],
                                                                                       'status': True,
                                                                                       'type': 'depolarizing'},
                                                                    'odd_wires': 4},
                                                                 { 'gates_num': [36, 9, 9, 32],
                                                                   'identity_factors': [4, 4, 4, 0],
                                                                   'noise_level': [36, 18, 63, 32],
                                                                   'noise_profile': { 'noise_on_init_param': { 'status':
False,
                                                                                                                 'value':
0},
```

 $^{\circ}$ 0.5 X 1 X 2 + 0.5 Z 1 Z 2 +  $^{\circ}$ 

'noise\_prob': [ 0.001,

```
0.001.
                                                                                        0.0011.
                                                                        'status': True,
                                                                        'type': 'depolarizing'},
                                                    'odd_wires': 4},
                                                  { 'gates_num': [44, 11, 11, 40],
                                                    'identity_factors': [5, 5, 5, 0],
                                                    'noise_level': [44, 22, 77, 40],
                                                    'noise_profile': { 'noise_on_init_param': { 'status':
                                                                                                  'value':
                                                                        'noise_prob': [ 0.001,
                                                                                        0.001,
                                                                                        0.001.
                                                                                        0.0011,
                                                                        'status': True,
                                                                        'type': 'depolarizing'},
                                                    'odd_wires': 4}],
                              'run_time_sec': 79.56445574760437}}],
'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': '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': 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_noisey_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 '
                                             ^{\prime}+ 1 X 3 X 4 + 1 Z 3 + 1 X 4 X 5 + 1 Z 4 + 1 X 5 X 6 + 1 Z ^{\prime}
                                             '5 + 1 Z 6',
                        'time_evolution_gate_hamiltonian_string': [ '0.5 \times 0 \times 1 + 0.5 \times 0 \times 1 + 0.5 \times 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': [ 3.5476707600867368,
                                                  2.3562053879970173,
                                                  1.7833099820235232,
                                                   2.4654982864165467,
                                                   3.6613143494662093,
                                                   3.6462371631182062,
                                                   3.2935768662401737,
                                                  3.7145398712422657,
                                                  2.5227446974102397,
                                                  2.4756634278387035],
                        'noise_details': { 'gates_num': [4, 1, 1, 0],
                                           'identity_factors': [0, 0, 0, 0],
                                           'noise_level': [4, 2, 7, 0],
                                           'noise_profile': { 'noise_on_init_param': { 'status': False,
```

False,

0 } ,

0.001,

'value': 0},

```
'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                      'status': True,
                                      'type': 'depolarizing'},
                   'odd_wires': 4},
'optimized_minimum_cost': [ -6.515742960091897,
                            -6.3330055816107915,
                            -6.410492799212151,
                            -6.4484545761945915,
                            -6.311563719128753,
                            -6.46067826504545,
                            -6.397817460329919,
                            -6.429933051303193,
                            -6.536182288327426,
                            -6.511175848027232],
'optimized_parameters': [ [ 1.5680106786222674e-17,
                            1.0238650999177359,
                            1.0238650999177359,
                            1.0238650999177359,
                            1.7041550191762513,
                            2.070931805530806,
                            2.586234954306046,
                            2.6265616878606783.
                            2.7566136785306155,
                            2.7689271757054255,
                            4.271831894498143,
                            4.271831894498143,
                            4.271831894498143,
                            5.004110362344359,
                            5.004110362344359,
                            5.529689350278954,
                            5.529689350278954,
                            5.529689350278954,
                            5.5493166460873375,
                            7.855838962179162,
                            7.855838962179162,
                            8.508023697610218,
                            8.540796404638465,
                            8.940056981382925,
                            8.940056981382925,
                            8.940056981382925,
                            8.940056981382925,
                            9.524293982069336,
                            9.524293982069336,
                            9.815045396471412,
                            0.717685470636315,
                            0.29125971197830336,
                            0.013619559122678915,
                            -0.46174394022911175,
                            -0.7802589318548062,
                            1.8785332138943256,
                            -0.07718385116900997,
                            -0.4181315830102034,
                            0.3859499067718677,
                            0.7218523694763775,
                            0.16350787496293626,
                            -0.06274337543165032,
                            1.048639096314506,
                            0.9454500907927006
                            -0.18328208251477485,
                            0.5336296017995852.
                            0.7047960543548563,
                            -0.4717130073686535,
                            -0.14327049451726778,
                            0.5646728024946054,
                            0.1377201649736573,
                            1.0845662084088512,
                            0.7117671017527167,
                            1.8562916393289055,
                            -1.0958742208007046,
                            0.314756410152813,
                            1.0055290931424188,
                            -1.2653176839886926,
                            -0.6435463058390287,
                            -0.13689785210195535,
```

0.5185042269644529,

```
-0.07994120596020922,
-1.3394312085309903,
-0.01354724643952521.
-0.8508707890759795,
-0.7258020036409927,
-0.1513648764845159,
-0.5702686618598916.
-0.20804467461705725,
-0.059043388294177074,
0.9724468840137966,
1.6889388278999584,
0.19460354666786345.
1.52688995899303,
0.40690710189505636,
0.054839646577847824,
-1.9384169999074634,
-0.8955556931339368,
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788,
-0.008629533947631484,
1.3318794505555018,
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128,
0.5067524952638964,
0.7555528952477042,
0.6437292330207226,
0.02590432636550948,
0.44592066957482307,
-0.0809779454755679,
-1.1390483539597829,
0.4898473400025203,
0.11381426982162568,
0.6089836387514223,
0.17594570893388972,
0.012948010393531988,
-0.547404644839424,
0.028969189369927453,
1.1006601522977721.
-0.6406183594181203,
-0.12562720825840668,
2.0392738219317867,
0.9906966768182601,
0.03179376057566713.
1.5460159269414353,
-0.01674613470972367,
-1.1841027420803907,
0.24496917335434354,
-0.07332300856328518.
0.25897293698241475,
0.35918978324443196,
-0.007942172382781155,
0.4618323110818234,
-0.08547471514820712.
-0.5115221242285567,
0.4563488682048878,
-1.2086759202201718,
0.14282176979415442,
0.48263581465206523.
0.09855500655515351,
0.5327824526475502,
-0.19110982084320108,
-0.775795154813047,
-0.31907838177549175,
0.03477100089693282,
0.7436201132387485,
-0.022209896476399357,
-0.14741027177548285,
-0.10110024079398225,
0.20359400710495562,
-0.15623022021775929,
0.1964090589605299,
0.18042072654891128,
0.8910666012551952,
```

```
0.03518277211157266,
 0.11858050209575345,
 0.6912090997145024.
 0.05142750966379351,
 1.2523961498884204,
 -1.1477698487953947,
 -0.16063831357643202.
 -1.0074319345942784,
 0.29535289246662044,
  -0.002280412475169233,
 0.45599081133710123,
 -1.6715207166067523,
 0.3320227490012926,
 1.5421306314740455],
[ 0.33528943002425843,
 0.8608925283648261,
 2.8309935233222867.
 2.8382233121900358,
 2.847558790018716,
  2.8477263794127468,
 3.9337993695450666,
 3.9337993695450666.
 3.9337993695450666,
 3.9337993695450666,
 3.9337993695450666,
 5.127462455084763,
 5.128383696390232,
 5.132051241075024,
 5.132231848473024,
 5.132297186784173,
 5.132297186784173,
 5.132297186784173,
 5.132320898992942,
 5.134903164275234,
 5.734798022200061,
 5.734798022200061,
 5.734798022200061,
 6.71748919093495,
 6.71748919093495,
 9.773430860122208.
 9.791656954875775,
 9.791980525916317,
 9.804782964874805,
 9.947289619134542,
 0.6818618664375632.
 0.42253658736184846,
 0.19067339209915313,
  -2.314563573529872,
  -1.7784854373672185,
 -0.10945476580518654.
 0.08980428543050965,
 0.6265702304745648,
 -0.12016219313034968,
 0.005450784512528824,
 0.9621316606784164.
 -0.01940541263687908,
  -1.2890091107885369,
  -0.09216272929775945,
 -0.8615487717558121,
 0.021600758375482327.
 1.1068545366678577,
 -0.06436428812394061,
 -1.8186253546793636,
 -0.2455724158610742,
 0.7444478114283775,
 1.0647343146888184,
  -1.6388802958603008,
 -0.05032235091912311,
 0.7589104637111997,
 0.0934759886788552,
 0.7280377617711271,
 -0.10012682423470079,
 -2.7917715562202794.
 0.5843828201862561,
```

1.2003794612588048,

```
-0.2782652692858759,
1.253725179404932,
-0.831140674623039.
-1.3898002860152843,
1.7689493816619246,
-0.768539740515663,
-0.5265628815801298.
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446,
0.06348552937029919.
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522,
-0.5743460857513,
0.873550995352649,
0.8797938271812764,
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805.
-0.4012501825920459,
-0.4763388197192611,
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279,
-0.5397649164737537,
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616,
0.6716489600966955,
0.08900519900900147,
0.7708643633651343,
0.0944251249629154,
-0.053131619179539805,
-0.132883145931867,
0.44414428660563765,
-0.3164026614336652,
0.9835391768228284,
-0.49696354121947833,
0.3510514174127117,
-0.24991518010085176,
-0.7780713458689107,
1.3387260017849976,
0.712191280671364,
-0.4436070432657242,
1.090195713122469,
0.3876483875477464,
1.113683201871723,
0.09724940056823322,
-1.3265075307540413,
-1.8530581309545013,
0.335564434910613,
0.16061631243062188,
0.6994545842241634,
-0.0055568765936962455,
1.8148369905661879,
-0.9149620921846291.
-0.5341673651010566,
-0.6583203681162046,
-0.05148037848607484,
-0.1302834828824637,
-0.2083684341417298,
-0.7142637766159184,
0.4980789266978527,
-2.030263033934291,
-0.002330467371510849,
-0.7835259213136883,
-0.18712783689065152,
-0.271594041353006,
0.606962231033315,
0.19917323339650786,
0.581852597021436,
```

```
1.0547240409345577,
 0.07111303544026976
 1.4877210254684077.
 0.08669172360020491,
 0.8024105605127613,
 0.8315802366658298,
 1.117305276662395.
 -1.0742437197416552,
 0.30921812342286065,
  -0.06994991433225481,
 1.0419800264617582,
 1.4507701003592177.
 0.2408413974211676,
 1.6573761327725358],
[ 0.08591881204796584,
 1.5026023651616802,
 1.9179097588555833,
 1.9179097588555831,
 1.9179097588555831,
 1.9179097588555831,
 2.8800636946459592,
 2.9523818900173797.
 2.9523818900173797,
 2.954896407422686,
 3.0487820562708485,
 3.0487820562708485,
 3.9462134206000328.
 3.9462134206000328,
 5.170248653928018,
 5.170248653928018,
 6.5066905594049205,
 6.5066905594049205,
 6.5066905594049205,
 6.914119522580601,
 6.914119522580601,
 6.9842551957162815,
 7.300516913785898,
 8.782483894556266,
 8.782483894556266,
 8.999633503017922.
 8.999633503017922,
 8.999633503017922,
 9.414122362394847,
 9.414122362394847,
 0.09854676674938925.
 -0.05173289612974198,
 0.30094803169630163,
  -1.1984142138894447,
 0.08610670053567002,
 0.2851928692216035,
 0.26177875477440216,
 0.11764473243628538,
 0.3495067876706816,
 -0.9678438601279628,
 -0.08762050677252062.
 0.014826088936787857,
  -0.30347729159143555,
  -1.1730530788097624,
 -0.12550631929596553,
 2.258056275075482.
 -0.5160508087356981,
 0.004541093619226378,
 -0.9345420797218197,
 0.47154522212338745,
 -0.9129446894819914,
 0.2768683391341781,
 0.29975752794333804,
 -0.16177915588279423,
 0.6021148977823381,
 0.35405737535162146,
 0.8149645603473178,
 -0.7074306860917636,
 -0.8281028342440522,
  -0.20840122350984505,
  -0.19593362207831977,
```

```
1.2208184674045053
-0.10408257731449277,
0.9878855326441833,
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756,
-0.44913621684685756.
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521,
0.5925479388494825.
0.1500100176310508,
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545,
-0.5449201592551612.
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243,
-0.8246572495389679,
-0.28480932751570914.
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
-0.035476380392734465,
0.9940259955458774,
-0.657126951929564,
-0.4786936406484008,
1.4564140457987391,
-1.062151832750044,
-0.01496017231630948,
0.16259290081999456,
0.601493806263198,
-0.20485253219607644.
-1.2421776762345744,
1.152288606322054,
1.1883019471730756,
0.9817659575699377.
0.9653429636905305,
0.5382122852444811,
0.722384759736696,
-0.13079560936986118,
-0.9638314109375934.
-0.13358671856975504,
-0.3949417844115237,
1.01780227278121,
0.6746960094686067,
0.14295933107831804.
-0.37974724013569766,
0.3641245559377578,
0.12972678280008856,
0.5949873255000262,
0.8499370211382984,
-0.0792654431528575,
1.9402087793428133,
-0.5583113020357903,
0.6535986429024293,
1.0008805619835928.
0.16556690201288055,
1.1071973338235597,
0.07194244573338314,
-0.9146859400815048,
-0.005186820541518637,
0.4795762978809806,
0.6475066336984044,
0.11860845746693519,
0.08044881503693782,
0.5402817334108434,
1.5532870492056725,
0.36643388228039625,
1.6150985923432208.
0.22271977417212363,
```

-0.04956133994172771,

```
-0.6258533610916538,
 -0.6517224443292691
 0.2594825887888975.
 -0.1286341552665023,
 0.48749759828242367,
 -0.009813928289633511,
 0.5249350004928881,
 -0.01015655683116892,
 -0.48671658518654837,
  -0.588311268126242,
 -0.25978871509233853,
 0.9039610340757382.
 1.5549616218831699,
 -0.05330158954092406],
[ 0.3773346757087749,
 0.5734233884194113,
 0.5734233884194113,
 1.2094818154974225,
 1.2528672337957094,
 1.3073966674132076,
 4.193348178434801,
 4.228670385547864.
 4.228670385547864,
 4.228670385547864,
 4.228670385547864,
 4.228670385547864,
 4.274742575727675,
 5.343872214974395,
 5.354523589318104,
 5.449133113124401,
 5.449133113124401,
 5.449133113124401,
 5.449133113124401,
 6.208341300319731,
 6.208341300319731,
 6.738723848778546,
 6.7473872692498285,
 8.515456463543387,
 8.552181104315652,
 8.552181104315652.
 8.552181104315652,
 9.363042150968939,
 9.363042150968939,
 11.478464454984158,
 -0.2683676450988651.
 -0.9370321768196137,
 0.03790413469005285,
  -0.3520989510779511,
 0.5131804204688105,
 0.767748989456867.
 -1.1529933056041268,
 1.0195402939041247,
 -0.5189860890713169,
 1.700377968800765,
 0.48912124484584857.
 1.506730848787325,
 0.4485612726223177,
 -1.6248073049289613,
 0.10079320215400162,
 1.7454590745233427.
 1.474284546585253,
 0.08837986403943651,
 1.215839965531947,
 -0.42666568442503866,
 0.04298065245990749,
  -1.495484471060033,
 0.39055472334393304,
 -0.06187227108331559,
 1.0010296249342066,
 -0.33745943355443286,
 -0.19046242319241546,
 -0.4884459619425607,
 0.8930564792122229.
 0.09947441181287657,
```

-1.4049039336860292,

```
1.0413688199593338,
0.027348986225077598,
1.5457890290583323,
0.8022774572900748,
-1.0377116853398,
0.5652694406258009,
0.9990396087940023.
-0.3409174955760714,
-0.8590373420111477,
0.3662952964918326,
0.6492392290096071,
-1.0735392409833318.
-0.620775369578654,
0.5064494688850749,
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637.
0.13897118193917846,
0.13192395570874205,
-0.560408177185694,
-0.7293430452459922,
1.2393938765994381,
0.16520016983754293,
-0.04218705839108043,
1.9844775109402493,
-0.40811731341033075,
0.40494641878472026,
0.44317505546879765,
-0.14541224425415586,
-1.3628454492957067,
0.35572573997739254,
-0.17363781014762678,
-0.21765464091811726,
0.25867396534698067,
-0.19299239511743832,
0.842583631219517,
0.01538577194684443,
-1.3780712180305699,
0.30168991607554185,
0.03816118508668757.
-0.6330896266111891,
-0.14462412237866193,
0.22751230177420415,
2.198362599080823,
0.5538971259685714,
1.6735676153080048,
0.01161307703421222,
0.15241612900647253,
-0.4114895408906573,
0.020024246948836234.
-0.361021382333633,
1.2366726872792735,
-0.8652479233612058,
-0.38157323774943186,
-1.2043495043519374.
0.03294448415473864,
1.864475600371399,
-0.048446953541905424,
1.483038428004856.
0.02119809714572118,
-0.20756566215919184,
1.2566509021622863,
0.4040298326697209,
0.0492062183426151,
0.3396501220758691,
0.09097515161528406,
-0.4545275805495163,
1.5327906096069877,
-0.47568898039994184,
```

0.7447654713950665,

```
0.7179833985093875,
 -0.03692927531761856,
 0.11509825242982577.
 0.020898935398901888,
 0.2387893529411216,
 1.5195379458286031,
 -0.5337205856413728.
 -0.5741707032781822,
 1.298358172715442,
  -0.010829860462227588,
  -1.9037204771139875,
 1.5774751765228583,
 -0.28550943128124906,
 1.5531884118568244],
[ -6.331146189926128e-17,
 0.7069927066774304,
 0.7069927066774304.
 0.7069927066774305,
 0.7069927066774304,
 1.0044153364322925,
 1.0092418692996383,
 2.470333794214341.
 2.478143749866421,
 3.5776564981759003,
 3.5776564981759003,
 3.5776564981759003,
 3.61745967653339,
 3.6981780389472076,
  3.755720232685741,
 3.9712286023902594,
 3.9712286023902594,
 4.519037432417192,
 4.519037432417193,
 4.519037432417193,
 5.280953883299406,
 5.280953883299406.
 6.620356980277175,
 6.620356980277175,
 6.620356980277175,
 6.620356980277176,
 8.214004051881032,
 8.214004051881032,
 9.105951544537387,
 10.829366164164977,
 1.4490195266558639,
 1.145329650589643,
 -0.9374272684957279,
  -1.2910248872233119,
 0.9701069453007352,
 2.0238893871034924.
 -0.6731600678051081,
 -0.7305037462514778,
 0.6743483023845589,
 1.611766624162738,
 -0.162446688913207,
 -0.2464021583836281,
 1.3073653685111934,
 1.560629053845934,
 -0.09768282308379246,
 -0.31393750682085847.
 0.1625705045557987,
 -0.1344649185634244,
 -0.03516682581352061,
 0.15934568227883428,
 1.4484389719925783,
 0.31346340320241645,
  -1.5406853809043388,
 0.3831701903776482,
 0.07255447956326048,
 -0.4619144712511035,
 0.6220101497739178,
 -0.08645510294766677,
 -0.036774035023737585.
 -0.02433291891195538,
```

1.2745777688613118,

```
0.806643386980706,
-0.1734465019831428,
-1.474099767063678,
-1.2534035864969235,
0.024086803725753666,
-0.5946515656594247,
3.047855036387052,
0.561263952510902,
-0.27353577574812815,
0.476385213099692,
-0.4183083264972014,
-0.07584344603997495.
-0.04004176630390785,
0.6379867024754904,
3.306912023625799,
0.6758488609505069,
-0.49379826249780634,
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808,
0.043470303912556706.
0.2301819741695647,
1.9247102260310271,
0.19401136489510468,
0.17784496580796996,
-0.12037519976757159,
0.10596613899479704,
0.02480260398862852,
0.33616247382037256,
-0.2960626605489573,
1.2038327046358004,
-0.4266046665751028,
-0.14331073423696536,
0.33240571018120446,
0.13743208352564132,
0.21308235615415505,
-0.8816113951868988,
-0.03958129872975694,
1.7385124490728345,
1.3953860705003918,
0.7193393529381484,
-0.5890148767931709,
1.6845229617798814,
-0.04059142172715042,
-0.6588344885662398,
-1.5492107393137406,
0.9886630320432893,
1.3955090248591298,
-1.7521400718196618,
-0.02012078102450614,
1.5598528019020075,
-0.041272015671692544,
0.6659176073691222,
-0.10884895615623923,
-0.8860283635501729,
-0.042494102069769425,
-0.5241060846215897,
-0.049429521011899694,
-1.6158837397685775.
-0.29703279066650246,
0.6940812648197017,
-1.0869617874060826,
-1.1891726572683667,
0.03935191545498333,
-1.7727595774952096,
-0.0005664350349098603,
-1.2288438066739866,
2.182693040857262,
1.2648198022740724,
0.636776362006322,
-1.1418938134635428,
0.04892386539982865,
-0.6595482134655696,
-0.016038133219537475,
```

```
-1.53365152672916,
 -0.5818287115590742,
 -0.8537662908823758.
 1.3418170063691075,
 -0.32888813707646736,
 -0.018460135902194714,
 -0.8323242421777916,
 1.5026664500941838,
 1.809610363246633,
  -1.5283405786971713,
 0.5470095670143573,
 -1.4753657998350065.
 0.8122840148585063,
 1.5317878779716176],
[ 3.750846163374531e-05,
 0.22285241391868899,
 0.26252411232084344,
 0.26252411232084344,
 0.26252411232084344,
 1.459545906754556,
 1.4595459067545562,
 1.6094835194149661.
 2.5927782099427628,
 2.5927782099427628,
 2.5927782099427628,
 2.5927782099427623,
 3.3552499939702187,
 3.3552499939702187,
 5.033284106467877,
 5.033284106467877,
 5.056477210452712,
 6.768913439946703,
 6.768913439946703,
 7.2782492670747585,
 7.2782492670747585,
 7.2782492670747585,
 7.2782492670747585,
 7.2782492670747585,
 7.2782492670747585,
 8.934198246659292,
 8.937369801451712,
 9.544406408519471,
 9.544406408519471,
 10.23170722265548,
 -0.4501443853573418,
 0.06519513561037263,
 -0.13386490845883003,
  -0.01542333988020039,
 0.3988203537526196,
 0.9163371790808124,
 0.08159154039220383,
 -0.11665429084087826,
 -0.21130662780886203,
 1.515236372470638,
 0.4436142129357345.
 -0.28780404896369716,
 0.3681425383234808,
 0.648176841676201,
 0.3046875502986337,
 0.05897820457762899.
 0.09316951897603123,
 1.5277657654344678,
 -0.655141628591867,
 0.073084468489131,
 -0.11423944001370272,
 0.3986898081963471,
 1.0974832156349317,
 1.8462557861113,
 0.5998463368708868,
 -0.0014214294560794885,
 0.4026665434776887,
 -0.03860309342262787,
 0.3728818533964108,
 1.7322816292529104,
 0.42156018976657544,
```

```
0.9872712539907578,
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974,
0.4324416138472369,
0.7909276553155474.
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866,
-0.0743310361925915,
1.1363109745761366.
0.32003332101567866,
0.08535303128967886,
1.1165485958252095,
0.476282782575683,
0.11414859665640108,
0.8927652783900955,
0.027791184984770272,
0.8970588198442948,
-0.04579755391586939,
0.10596016247070955.
0.4721342517962854,
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702,
0.2928189752635581,
-0.4120973709154422,
-0.16251962266938982,
-0.928532755338732,
0.13709877636127538,
0.09386847134985479,
-0.9415336108192559,
-1.3861285848764584,
0.5116476525314603,
-1.5694556777668651,
0.31948518026769196,
-0.0136576069296156,
0.8752899744519326,
-0.448175539102687,
-0.8567162669878051,
0.737642795798484,
-0.5233142967805873,
-0.020239952918795164.
0.9696407297918527,
1.064479355466651,
-0.43102633401249074,
0.3234367312145231,
0.02606795235445944,
0.2525608175326581,
0.09544790103129135,
0.30399471295861424,
0.6638935631613432,
2.095756590649309.
-0.5383535092385583,
-0.1523671776118538,
-0.49733805370513506,
1.0814777965289457,
-0.5541810322110113.
0.4702060218904802,
0.1941018040115748,
0.027389458133440587,
-0.6339976476553459,
0.824073822166477,
-0.8904328829691108,
0.5852778403101284,
-0.37705413851354036
-0.20234246488211116,
0.19390975159216547,
-0.03854894368679599,
-0.5885610444718222,
0.2892174263372239,
-0.7158388932188376,
-0.03853087013753846,
```

```
0.36228239756074476,
 0.06448164730191597,
 0.8103021451607575.
 0.04195704491201313,
  2.1946244272306323,
 1.1078290402756337,
 -0.0920096926231485.
 0.7957980849005134,
 0.10683086015182242,
 0.04139972880547422,
 1.068477454710041,
 1.5812878062267348,
 1.0292383703670558,
 1.5822631942162138],
[ 0.003375513600300809,
 0.4884127443235871,
 0.6719352108785641,
 0.9073170135093351,
 1.4946633690060278,
 1.5076957064847494,
 3.872917838142945,
 3.872917838142945.
 3.872917838142945,
 3.872917838142945,
 5.047622474508209,
 5.054336886650782,
 5.067626550795242,
 5.0733174878702085,
 5.094629387163461,
 5.749571576552799,
 5.7731554023304374,
 7.144946717661993,
 7.144946717661993,
 7.144946717661993,
 7.144946717661993,
 7.602314289267704,
 7.602314289267704,
 8.018775147517832,
 8.018775147517832,
 8.018775147517832.
 8.018775147517832,
 8.018775147517832,
 8.018775147517832,
 9.661071929582006,
 0.2735947252101626.
 2.471262065567802,
 0.18954222370300397,
 0.2633058348660961,
 0.07494334922808346
 1.4980157261935538.
 0.3538857424122425,
 0.26341770410626436,
 0.17174804107002956,
 -0.22912718472194316,
 0.11060714764109056,
 -0.30804859927082595,
 2.8406850614439736,
 1.0823654569610508,
 0.9668529413216363,
 1.8727663516543385.
 -0.0901659930896485,
 0.05868560690604535,
 0.24212775097742179,
 1.0092515209898247,
 -0.7556969386491817,
 0.3279350524218167,
 1.078117272505244,
 0.10391815458190773
 -0.7434930272741371,
 -1.6965388530236032,
 -1.360748554100242,
 0.34939560927302815,
 0.03188634842980519,
 -1.2447472675125983,
 0.06092342743494014,
```

```
1.017082923902293,
-1.007905562333318,
-0.8576057837691866.
0.5321038189070756,
1.300652060018237,
-1.8122591145188616,
-1.247002191580596.
1.2529274198051785,
0.3750417535596218,
0.2898066740735119,
1.589675559301449,
2.3222772390172888,
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883.
0.2658818907332787,
-0.9372958671062981,
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732,
2.008892916411081,
0.15285666374274742,
-1.782425531898792,
0.07791440554206944,
-1.28397958204954,
-0.7247696039786395,
0.5612678373457747,
-0.004762916486662008,
0.4386089298525658.
0.010283368626678616,
0.8990610129088383,
0.03840864905637026,
-1.2418081984826976,
0.33190310279028407,
0.3061008622829172,
-0.06950158836023225,
0.93859456058615,
-0.02489786142317165.
0.9927840878492759,
-0.0709710381209458,
-1.4546153026559692,
-0.6707274766895803,
1.0492831078613678,
1.59883886587945,
-0.7948795957139008,
0.011914265512354442,
0.29611851635537545,
-0.026452865362460363.
0.17911271593442915,
-0.268102313362264,
-0.31698956355176716,
0.5150163737561883,
-0.2617344493849528,
-0.08207987775663798,
-0.7031192006515304,
0.10296103394319861,
-1.3322481995457,
-0.8096620548125795,
0.22894179493051453,
-0.6404807766018014,
0.5981001234262467,
0.6725836248662437,
-0.24769451099401643,
-1.5367942204876157,
0.32496629998060117,
0.8231756699235411,
0.27229759145944715,
```

-0.4283887626472357,

```
0.6783210911797265,
 1.178917544999848,
 -0.48124012627536317,
 -0.23642700938756703,
 -0.22983768395119897,
 0.7841497681166887,
 0.5963513861028734.
 -0.8505831212819382,
 0.6516631671421783,
 0.6698405071431395,
 0.7826636181190869,
 -1.6023915303224998.
 0.6733061844063541,
 1.5755992624240989],
[ -5.647934061474703e-18,
 1.4787834906243755,
 1.478918229526628.
 1.478918229526628,
 2.0077351764243123,
  2.4302809101456218,
 2.4302809101456218,
 3.009709563144601.
 3.009709563144601,
 3.239471043198664,
 3.2405283031129133,
 3.2405283031129133,
 3.2656598154222434,
 3.5353392937639825,
 6.198713539858257,
 6.213604956994236,
 6.73397854893658,
 6.73397854893658,
 6.743547791194661,
 6.744609103740889,
 6.744609103740889,
 6.749543065628153,
 6.749543065628153,
 8.615256229309818,
 8.635090640841518,
 9.012323512360366.
 9.012323512360366,
 9.930483613907942,
 9.930483613907942,
 11.782061805135282,
 0.6870051227789642,
 0.5234095533264759,
 0.11216801162302814,
 0.044591843687496906,
 -0.747159787599118,
 1.5727279855217766,
 -0.16958009141159439,
 -0.7234855106318131,
 0.45999589631996707,
 1.3613822619347415,
 0.5234464983029046.
 0.18337466193510712,
 1.0660408011194182,
 1.2813123812864906,
 0.34899885807903364,
 1.2204971120849089.
 0.37250493843195553,
 0.3861568591798728,
 -0.4881036169368887,
 0.23720347697856276,
 0.8136369801063428,
  -0.8595161765585049,
 0.6710512785075716,
 0.5103741134651811,
 -0.48491784736765847.
 -1.939727949979543,
 0.5221979500550953,
 -0.39618913325979604,
 -0.5258671175956018.
 0.08753210163723862,
```

1.3619602585721242,

```
-1.2518915867901346,
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274,
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961.
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473,
0.4465655907565091,
-1.4308928069625704,
1.6254306194316424,
-0.16298810299835312,
-1.249293985363804,
-2.5283772945229797,
-1.0735775181393186,
-0.628541665091616,
-1.1357659634071433,
-0.5734897531715744.
-1.6096579963890296,
-0.8342055948126037,
-1.5447846874108708,
-1.1270394146554403,
0.06392732561319403,
0.7711512775812011,
-1.8472478314151175,
-0.46160141905881696,
1.8963279721150403,
-2.313663424814036,
0.060952702837845166,
-1.4971949982077863,
1.3040610818975555,
0.10605679464403613,
-1.138800572315487,
-0.03947636943653289,
0.07839455865010819,
-0.6470277815644087,
0.946101637008616,
-0.32144060478582315,
-0.6371693991779968,
0.30580409265523,
-0.2617129381706641.
0.4094287336545931,
0.49837362733711055,
-0.9058714721495094,
0.6137893604415533,
0.8546844695081749,
-0.8205470722456557,
-0.598852289145785,
0.46823811794119646,
1.2205247300232143,
0.031629319060699435.
1.1369587010491427,
0.12298062775535874,
-0.016960252964031076,
1.1127338626212067,
0.37972118532018134.
-0.1475616440844684,
0.32749925367563326,
0.030050642250761914,
0.17169542743574548,
-0.5825729547476518,
0.7052714548722974,
0.9884296874822006,
-0.500384308215816,
0.01722431287494931,
0.40290712722731054,
-0.029200452046427447,
1.2704708243944813,
2.3709704014259345,
-2.0267551524865275,
0.7347873374577798,
```

```
-0.34767223966060473,
 0.009778943736386289,
 0.221000841842164,
 -0.010995780695540691,
 -0.481889271583797,
 0.7008500159073542,
 2.3944065221124076.
 -0.08320445199579081,
 2.02470278988152,
 0.02142760118000664,
 1.6794429086669174,
 1.6046551807968945,
 0.2831685070910348,
 1.5805135598594935],
[ 0.0019047787007362745,
 0.7201496918445128,
 0.7201496918445128.
 0.7201496918445127,
 0.7226708680142584,
 0.8068041864232433,
 1.3847174673528184,
 1.6031895944534578.
 2.458865333289775,
 2.458865333289775,
 2.721120236828938,
 2.721120236828938,
 3.554687304897056,
 3.554687304897056,
  4.537252190232355,
 4.537252190232355,
 5.239770593633025,
 5.242363659304797,
 5.566731623636481,
 5.566731623636481,
 5.566731623636481,
 5.566731623636481,
 5.566731623636481,
 7.6484324534494865,
 7.6484324534494865,
 8.96757120343865.
 9.352637118466301,
 9.381932224950582,
 9.966925955531599,
 9.966925955531599,
 0.29840004251263574,
 0.3207087147269936,
  -0.22478909909228914,
  -1.2242611593120782,
 0.061748844824383295,
 1.9931455249507801.
 0.02449362327304914,
 -0.23402928130657288,
 0.3399922671860315,
 0.2355005268966802,
 0.7912945290539132.
 -0.9147564287830934,
 0.12280724330167514,
 0.42016875545313104,
 0.6183328009701774,
 0.9098148543333162.
 0.2439503202728901,
 0.4941740976390827,
 0.0721485641264495,
 0.20051214721509877.
 0.14273239312798908,
  -0.03846070968482946,
 0.11474641891065286,
 0.1552743298359438,
 -0.050455466832234855,
 0.24385918138398863,
 0.0646818550964626,
 1.0379575003266166,
 0.4438839418702803,
 0.6652939620943935,
```

0.6574583263339632,

```
0.6386444070388955,
0.30923240052603657
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079,
0.25272330748816335,
-0.05865013289270936.
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059,
0.47262902670638013.
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593,
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661,
0.256318263131488.
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428,
-0.007804627058269528,
-2.9100406031766375,
-0.17918863042787767,
-0.29620353111227854,
-0.2953351498676352,
0.4434234593316091,
0.0018987515325079429,
0.5290648024022053,
0.011057994967698829,
0.03103232328752182,
-0.21693206073792237,
-0.07883582131375938,
-0.2554965378040217,
1.978711034134111,
-0.02822992907519939,
1.110830733101554,
0.04155227001102173,
0.17370289874025888,
-0.08435695708516765,
0.38686640173882947,
1.0727525781247964,
-1.4871438236674412,
0.1437881416009117,
-0.15769165641037303,
0.46096388290194723,
0.3881288491041242,
0.3113157866411551,
-0.21237825892214532,
1.3408904937177344.
0.033287678968192874,
-0.22654084728278404,
0.09162287503278096,
1.1250326534568733,
0.670327239820091.
-1.4911819217025961,
0.8417198858779599,
0.018685303562101165,
-0.5955098452611822,
1.37350461224772,
-0.5503685346151788,
0.07415629279393592,
0.22396953453102358,
-0.02219350017922496,
2.5136787648879593,
1.5560141766956836,
-0.037039417521638966,
-1.5578667717297374,
-0.15174825264689498,
-0.0075908588231686416,
```

```
-0.1347910987366526,
 0.7535559035800633,
 2.9519825568174283,
 -0.8640992588734872,
 -0.486197602889753,
 -0.029079605859607876,
 0.1393557947212105,
 -0.03201203543340934,
 -0.17255788414719309,
  -0.6220837667998668,
 0.10441375911567917,
 0.7019930428559267,
 1.822960884928266,
 0.0010256621400676815],
[ 0.00030922277578629,
 0.881375055029912,
 0.881375055029912,
 0.8813750550299119,
 0.9803845151714838,
 0.9803845151714838,
 1.201629973822729,
 1.2441077564052723.
 1.8660677974280824,
 1.8660677974280824,
 2.651002314516478,
 2.651002314516478,
 3.233637461790533.
 4.36384995486056,
  4.36384995486056,
 4.975714528653046,
 4.975714528653046,
 6.591840750700408,
 6.591840750700408,
 8.234009055219385,
 8.238223602720305,
 8.238223602720305,
 8.238223602720305,
 8.903406631369169,
 8.903406631369169,
 8.903406631369169,
 9.126449234760914,
 9.126449234760914,
 9.441918167657187,
 9.441918167657187,
 0.4384156956352651,
 -0.017407483354635628,
  -0.13579407977759564,
  -0.08181457210659056,
  -0.5635031413839604,
 0.570197125887921,
 -0.07389454022208618,
 0.18950484918514415,
 0.23442314823895152,
 0.5187197914643009,
 0.03760777637611914.
 1.2080522066616035,
  -0.006796933498365149,
 0.7597395812711474,
 0.3165595784185247,
 0.09234381717322694.
 -0.047116958459538144,
 0.02161370846364295,
 -0.3330735946096464,
 -0.310519881157395,
 -0.1321730433969341,
  -0.32004747583182785,
 0.38880240494533963,
 0.5587916266845782,
 -0.04068226055752174,
 -0.04929253976644778,
 0.7350044083650977,
 -0.3347542084226466,
 0.07994172439872818,
 0.177027499128215,
  -0.03555523462670161,
```

```
0.33584282142298794,
-0.06474358479167515,
-0.23271669416276414,
0.27707249457309313,
-1.8841797053563085,
-0.39250057722196113,
0.0604718224769807,
-0.15658247224402194,
1.097732135880844,
-0.47958374693582667,
-0.13884788062191106,
1.2517060190766023,
0.08912037934357776,
1.8722824819152626,
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875,
-0.29954118659750983,
-2.8240783717504883.
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
0.32920686175801595,
0.0470036094807545,
0.6942117349751494,
-0.24738597040458754,
-0.3530344251488351,
-0.7207866325012796,
0.6865004571010461,
-0.022934954570734595,
-0.4703523591474931,
0.00010065187353926284,
-0.25737840979321513,
-0.37927040299996573,
0.3323512575736423,
-0.7162822410895011,
-0.8849129065134153,
-0.02984860970928172,
0.9857401879405846,
0.13869536095324345,
-0.4901093246549395,
-0.15185390643388375,
-1.1107951730061545.
1.1255217267520845,
-0.36113008327046914,
0.12498769155032201,
1.105653484876161,
-0.0826241142760939,
-0.6079720837354008,
-0.4798331114275297,
-1.1230771992973987,
0.13634359721928585,
-1.0117198549615587.
0.0420371772323395,
0.4704689604818435,
-0.1136051809968673,
-0.4158299646895606,
0.7682233881623428,
-0.8567828943049521,
-1.0844985071567337,
0.8118563616911731,
-1.0011580890685694,
0.06773503500153778,
-0.9972068257582826,
0.22064841214728595,
1.015101892093672.
-0.023903188302909387,
```

-1.5448535965900865,

```
0.40727537812840897,
                                                    0.6273868528756265,
                                                    -0.06403282214251436,
                                                    0.1402221940396834,
                                                    0.011807494022614938,
                                                    0.19970219531306482,
                                                    -0.3159297567283321,
                                                    0.5243897804672414,
                                                    0.6302439365729751,
                                                    0.4184253509022523,
                                                    0.38422115408735924,
                                                    0.8610939738936156,
                                                    0.3457693810952046,
                                                    0.19105880264763628]],
                       'run_time_sec': 68892.59480500221}}],
'zne': [ { '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': [ 3.750846163374531e-05,
                                                   0.22285241391868899,
                                                   0.26252411232084344,
                                                   0.26252411232084344,
                                                   0.26252411232084344,
                                                   1.459545906754556,
                                                   1.4595459067545562,
                                                   1.6094835194149661,
                                                   2.5927782099427628,
                                                   2.5927782099427628,
                                                   2.5927782099427628,
                                                   2.5927782099427623,
                                                   3.3552499939702187,
                                                   3.3552499939702187,
                                                   5.033284106467877,
                                                   5.033284106467877,
                                                   5.056477210452712,
                                                   6.768913439946703,
                                                   6.768913439946703,
                                                   7.2782492670747585,
                                                   7.2782492670747585,
                                                   7.2782492670747585,
                                                   7.2782492670747585.
                                                   7.2782492670747585,
                                                   7.2782492670747585,
                                                   8.934198246659292,
                                                   8.937369801451712,
                                                   9.544406408519471,
                                                   9.544406408519471,
                                                   10.23170722265548,
                                                   -0.4501443853573418,
                                                   0.06519513561037263,
                                                   -0.13386490845883003,
                                                   -0.01542333988020039,
                                                   0.3988203537526196,
                                                   0.9163371790808124,
                                                   0.08159154039220383,
                                                   -0.11665429084087826.
                                                   -0.21130662780886203,
                                                   1.515236372470638,
                                                   0.4436142129357345,
                                                   -0.28780404896369716,
                                                   0.3681425383234808,
                                                   0.648176841676201,
                                                   0.3046875502986337,
                                                   0.05897820457762899,
                                                   0.09316951897603123,
                                                   1.5277657654344678,
                                                   -0.655141628591867,
                                                   0.073084468489131,
                                                   -0.11423944001370272,
                                                   0.3986898081963471,
                                                   1.0974832156349317,
```

```
1.8462557861113,
0.5998463368708868,
-0.0014214294560794885.
0.4026665434776887,
-0.03860309342262787,
0.3728818533964108,
1.7322816292529104.
0.42156018976657544,
0.9872712539907578,
0.5749190583224287,
0.1654949387796794,
1.0577776390475342,
-0.5892377479966974,
0.4324416138472369,
0.7909276553155474,
1.0132171075838867,
0.008626434202972095,
-1.4776636473003866,
-0.0743310361925915,
1.1363109745761366,
0.32003332101567866,
0.08535303128967886.
1.1165485958252095,
0.476282782575683,
0.11414859665640108,
0.8927652783900955,
0.027791184984770272,
0.8970588198442948,
-0.04579755391586939,
0.10596016247070955,
0.4721342517962854,
0.3142323996684511,
-0.0207983447823891,
1.3304831617683006,
-0.20639835153288702,
0.2928189752635581,
-0.4120973709154422,
-0.16251962266938982,
-0.928532755338732,
0.13709877636127538.
0.09386847134985479,
-0.9415336108192559,
-1.3861285848764584,
0.5116476525314603,
-1.5694556777668651.
0.31948518026769196,
-0.0136576069296156,
0.8752899744519326,
-0.448175539102687,
-0.8567162669878051.
0.737642795798484,
-0.5233142967805873,
-0.020239952918795164,
0.9696407297918527,
1.064479355466651.
-0.43102633401249074,
0.3234367312145231,
0.02606795235445944,
0.2525608175326581,
0.09544790103129135,
0.30399471295861424,
0.6638935631613432,
2.095756590649309,
-0.5383535092385583,
-0.1523671776118538,
-0.49733805370513506,
1.0814777965289457,
-0.5541810322110113,
0.4702060218904802.
0.1941018040115748,
0.027389458133440587,
-0.6339976476553459,
0.824073822166477.
-0.8904328829691108,
```

0.5852778403101284,

```
-0.37705413851354036,
                                       -0.20234246488211116,
                                       0.19390975159216547.
                                       -0.03854894368679599,
                                       -0.5885610444718222,
                                       0.2892174263372239,
                                       -0.7158388932188376.
                                       -0.03853087013753846,
                                       0.36228239756074476,
                                       0.06448164730191597,
                                       0.8103021451607575,
                                       0.04195704491201313.
                                       2.1946244272306323,
                                       1.1078290402756337,
                                       -0.0920096926231485,
                                       0.7957980849005134,
                                       0.10683086015182242,
                                       0.04139972880547422,
                                       1.068477454710041,
                                       1.5812878062267348,
                                       1.0292383703670558,
                                       1.5822631942162138]},
            'noise_profile': { 'noise_on_init_param': { 'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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],
                                              'r': 1},
                            'def': 'ising'},
            'output': { 'draw': { 'fig_dpi': 100, 'status': False, 'type': 'png'},
                        'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric6_sample#6'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                 [1, 1, 1, 0],
                                                 [2, 2, 2, 0],
                                                 [3, 3, 3, 0],
                                                 [4, 4, 4, 0],
                                                 [5, 5, 5, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                       'constraint': True,
                                       'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.460678265045408],
                                      [12, 6, 21, 8, -3.2738854608106305],
                                      [20, 10, 35, 16, -1.6974907774474757],
                                      [28, 14, 49, 24, -0.8939947022135477],
                                      [36, 18, 63, 32, -0.4736436630774058],
                                      [44, 22, 77, 40, -0.24910822433441174]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 6.437301635742188e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.398117369264428,
                            'others': { 'beta_coeffiecients': [ 2.1894863603561845,
                                                                 -3.028013051556425.
                                                                 3.513990454892641,
                                                                 -2.4750715377939474,
                                                                 0.9551450565312212,
                                                                 -0.15553728242967432],
                                        'cost_richardson_zne': 33.37331552209775,
                                         'sorted_expectation_vals': [ -6.460678265045408,
                                                                      -3.2738854608106305,
                                                                      -1.6974907774474757,
                                                                      -0.8939947022135477,
                                                                      -0.4736436630774058,
                                                                      -0.24910822433441174],
                                         'sorted_noise': [13, 47, 81, 115, 149, 183]},
                            'sampled data': [ [4, 2, 7, 0, -6.460678265045408],
                                              [12, 6, 21, 8, -3.2738854608106305],
                                              [20, 10, 35, 16, -1.6974907774474757],
```

```
[28, 14, 49, 24, -0.8939947022135477],
                                                [36, 18, 63, 32, -0.4736436630774058],
                                                [44, 22, 77, 40, -0.24910822433441174]],
                              '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': [ 1.5680106786222674e-17,
                                         1.0238650999177359,
                                         1.0238650999177359,
                                         1.0238650999177359,
                                         1.7041550191762513,
                                         2.070931805530806,
                                         2.586234954306046,
                                         2.6265616878606783,
                                         2.7566136785306155,
                                         2.7689271757054255,
                                         4.271831894498143.
                                         4.271831894498143,
                                         4.271831894498143,
                                         5.004110362344359,
                                         5.004110362344359,
                                         5.529689350278954,
                                         5.529689350278954,
                                         5.529689350278954,
                                         5.5493166460873375,
                                         7.855838962179162,
                                         7.855838962179162,
                                         8.508023697610218,
                                         8.540796404638465,
                                         8.940056981382925,
                                         8.940056981382925,
                                         8.940056981382925,
                                         8.940056981382925,
                                         9.524293982069336,
                                         9.524293982069336,
                                         9.815045396471412,
                                         0.717685470636315,
                                         0.29125971197830336,
                                         0.013619559122678915,
                                         -0.46174394022911175,
                                         -0.7802589318548062,
                                         1.8785332138943256,
                                          -0.07718385116900997,
                                         -0.4181315830102034,
                                         0.3859499067718677,
                                         0.7218523694763775,
                                         0.16350787496293626,
                                         -0.06274337543165032,
                                         1.048639096314506,
                                         0.9454500907927006.
                                         -0.18328208251477485,
                                         0.5336296017995852,
                                         0.7047960543548563,
                                         -0.4717130073686535,
                                         -0.14327049451726778,
                                         0.5646728024946054,
                                         0.1377201649736573,
                                         1.0845662084088512,
                                         0.7117671017527167,
                                         1.8562916393289055,
                                         -1.0958742208007046,
                                         0.314756410152813,
                                         1.0055290931424188,
                                         -1.2653176839886926,
                                         -0.6435463058390287,
                                         -0.13689785210195535,
                                         0.5185042269644529,
                                         -0.07994120596020922,
                                         -1.3394312085309903,
                                         -0.01354724643952521,
```

```
-0.8508707890759795,
-0.7258020036409927,
-0.1513648764845159,
-0.5702686618598916,
-0.20804467461705725,
-0.059043388294177074,
0.9724468840137966.
1.6889388278999584,
0.19460354666786345,
1.52688995899303,
0.40690710189505636,
0.054839646577847824.
-1.9384169999074634,
-0.8955556931339368,
0.22344394192624842,
-2.4039574731682265,
-0.22903568222623788,
-0.008629533947631484,
1.3318794505555018,
-0.04476169800775707,
-0.5314892190926975,
-0.05384939938166128.
0.5067524952638964,
0.7555528952477042,
0.6437292330207226,
0.02590432636550948,
0.44592066957482307,
-0.0809779454755679,
-1.1390483539597829,
0.4898473400025203,
0.11381426982162568,
0.6089836387514223,
0.17594570893388972,
0.012948010393531988,
-0.547404644839424,
0.028969189369927453.
1.1006601522977721,
-0.6406183594181203,
-0.12562720825840668,
2.0392738219317867.
0.9906966768182601,
0.03179376057566713,
1.5460159269414353,
-0.01674613470972367,
-1.1841027420803907.
0.24496917335434354,
-0.07332300856328518,
0.25897293698241475,
0.35918978324443196,
-0.007942172382781155.
0.4618323110818234,
-0.08547471514820712,
-0.5115221242285567,
0.4563488682048878,
-1.2086759202201718,
0.14282176979415442,
0.48263581465206523,
0.09855500655515351,
0.5327824526475502,
-0.19110982084320108.
-0.775795154813047,
-0.31907838177549175,
0.03477100089693282,
0.7436201132387485,
-0.022209896476399357,
-0.14741027177548285,
-0.10110024079398225,
0.20359400710495562,
-0.15623022021775929,
0.1964090589605299,
0.18042072654891128,
0.8910666012551952,
0.03518277211157266.
0.11858050209575345,
0.6912090997145024,
```

```
0.05142750966379351,
                                          1.2523961498884204,
                                          -1.1477698487953947,
                                          -0.16063831357643202,
                                          -1.0074319345942784,
                                          0.29535289246662044,
                                          -0.002280412475169233,
                                          0.45599081133710123,
                                          -1.6715207166067523,
                                          0.3320227490012926,
                                          1.5421306314740455]},
              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                  'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                  '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_noisy_time_evo_ric6_sample#1'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                    [1, 1, 1, 0],
                                                    [2, 2, 2, 0],
                                                    [3, 3, 3, 0],
                                                    [4, 4, 4, 0],
                                                    [5, 5, 5, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.515742960091852],
                                         [12, 6, 21, 8, -3.3649211100370207],
                                         \hbox{\tt [20, 10, 35, 16, -1.7545658776574033],}
                                         [28, 14, 49, 24, -0.9139478342631157],
                                         [36, 18, 63, 32, -0.4680317780831103],
                                         [44, 22, 77, 40, -0.22931309151635063]],
                        'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.7206878662109375e-05,
              'zne_values': { 'degree': 0,
                               'extrapolated_value': -8.391918279069095,
                               'others': { 'beta_coeffiecients': [ 2.1894863603561845,
                                                                    -3.028013051556425,
                                                                    3.513990454892641,
                                                                    -2.4750715377939474,
                                                                    0.9551450565312212,
                                                                    -0.15553728242967432],
                                           'cost_richardson_zne': 33.37331552209775,
                                           'sorted_expectation_vals': [ -6.515742960091852,
                                                                         -3.3649211100370207,
                                                                         -1.7545658776574033,
                                                                         -0.9139478342631157,
                                                                         -0.4680317780831103,
                                                                         -0.22931309151635063],
                                           'sorted_noise': [13, 47, 81, 115, 149, 183]},
                               'sampled data': [ [4, 2, 7, 0, -6.515742960091852],
                                                 [12, 6, 21, 8, -3.3649211100370207],
                                                 [20, 10, 35, 16, -1.7545658776574033],
                                                 [28, 14, 49, 24, -0.9139478342631157],
                                                 [\, 36 \,,\ 18 \,,\ 63 \,,\ 32 \,,\ -0.4680317780831103 \,] \,,
                                                 [44, 22, 77, 40, -0.22931309151635063]],
                               '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': [ 0.00030922277578629,
                           0.881375055029912,
                           0.881375055029912,
                           0.8813750550299119,
                           0.9803845151714838,
                           0.9803845151714838,
                           1.201629973822729,
                           1.2441077564052723,
                           1.8660677974280824,
                           1.8660677974280824,
                           2.651002314516478,
                           2.651002314516478,
                           3.233637461790533,
                           4.36384995486056,
                           4.36384995486056,
                           4.975714528653046,
                           4.975714528653046,
                           6.591840750700408,
                           6.591840750700408,
                           8.234009055219385,
                           8.238223602720305,
                           8.238223602720305.
                           8.238223602720305,
                           8.903406631369169,
                           8.903406631369169,
                           8.903406631369169,
                           9.126449234760914.
                           9.126449234760914,
                           9.441918167657187,
                           9.441918167657187,
                           0.4384156956352651.
                           -0.017407483354635628,
                           -0.13579407977759564,
                           -0.08181457210659056,
                           -0.5635031413839604,
                           0.570197125887921,
                           -0.07389454022208618,
                           0.18950484918514415,
                           0.23442314823895152,
                           0.5187197914643009,
                           0.03760777637611914,
                           1.2080522066616035,
                           -0.006796933498365149,
                           0.7597395812711474,
                           0.3165595784185247,
                           0.09234381717322694,
                           -0.047116958459538144,
                           0.02161370846364295,
                           -0.3330735946096464,
                           -0.310519881157395,
                           -0.1321730433969341,
                           -0.32004747583182785,
                           0.38880240494533963,
                           0.5587916266845782,
                           -0.04068226055752174,
                           -0.04929253976644778,
                           0.7350044083650977,
                           -0.3347542084226466,
                           0.07994172439872818,
                           0.177027499128215.
                           -0.03555523462670161,
                           0.33584282142298794,
                           -0.06474358479167515,
                           -0.23271669416276414,
                           0.27707249457309313,
                           -1.8841797053563085,
                           -0.39250057722196113,
                           0.0604718224769807,
                           -0.15658247224402194,
                           1.097732135880844,
                           -0.47958374693582667,
                           -0.13884788062191106,
                           1.2517060190766023,
                           0.08912037934357776,
                           1.8722824819152626,
```

```
0.5767878477607333,
0.4375958673531614,
0.017187174100509652,
-1.172587468420202,
0.736957937590481,
-1.8818047463381875,
-0.29954118659750983,
-2.8240783717504883,
-0.0009188056875444823,
-0.014480253731157836,
0.8344869723837732,
-0.235921407746533,
-0.2726490308679638,
-0.4874528967327087,
0.05731267695545898,
0.32920686175801595,
0.0470036094807545,
0.6942117349751494,
-0.24738597040458754,
-0.3530344251488351,
-0.7207866325012796,
0.6865004571010461.
-0.022934954570734595,
-0.4703523591474931,
0.00010065187353926284,
-0.25737840979321513,
-0.37927040299996573,
0.3323512575736423,
-0.7162822410895011,
-0.8849129065134153,
-0.02984860970928172,
0.9857401879405846,
0.13869536095324345,
-0.4901093246549395,
-0.15185390643388375,
-1.1107951730061545,
1.1255217267520845,
-0.36113008327046914,
0.12498769155032201,
1.105653484876161,
-0.0826241142760939,
-0.6079720837354008,
-0.4798331114275297,
-1.1230771992973987,
0.13634359721928585.
-1.0117198549615587,
0.0420371772323395,
0.4704689604818435,
-0.1136051809968673,
-0.4158299646895606,
0.7682233881623428,
-0.8567828943049521,
-1.0844985071567337,
0.8118563616911731,
-1.0011580890685694,
0.06773503500153778,
-0.9972068257582826,
0.22064841214728595,
1.015101892093672,
-0.023903188302909387.
-1.5448535965900865,
0.40727537812840897,
0.6273868528756265,
-0.06403282214251436,
0.1402221940396834,
0.011807494022614938,
0.19970219531306482,
-0.3159297567283321,
0.5243897804672414,
0.6302439365729751,
0.4184253509022523,
0.38422115408735924,
0.8610939738936156,
0.3457693810952046,
```

0.19105880264763628]},

```
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                  'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                  '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_noisy_time_evo_ric6_sample#10'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                    [1, 1, 1, 0],
                                                    [2, 2, 2, 0],
                                                    [3, 3, 3, 0],
                                                    [4, 4, 4, 0],
                                                    [5, 5, 5, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                        'optimization': { 'algorithm': 'SLSQP',
                                           'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.5111758480272135],
                                         [12, 6, 21, 8, -3.513108400075424],
                                         [20, 10, 35, 16, -1.9256894730075684],
                                         [28, 14, 49, 24, -1.0648100061563792],
                                         [36, 18, 63, 32, -0.5886022016151555],
[44, 22, 77, 40, -0.3212779442729232]],
                        'degree': 0,
                       'method': 'richardson',
                        'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.7206878662109375e-05,
              'zne_values': { 'degree': 0,
                               'extrapolated_value': -8.261995894794591,
                               'others': { 'beta_coeffiecients': [ 2.1894863603561845,
                                                                     -3.028013051556425,
                                                                    3.513990454892641,
                                                                    -2.4750715377939474,
                                                                    0.9551450565312212,
                                                                    -0.15553728242967432],
                                           'cost_richardson_zne': 33.37331552209775,
                                           'sorted_expectation_vals': [ -6.5111758480272135,
                                                                         -3.513108400075424,
                                                                         -1.9256894730075684,
                                                                          -1.0648100061563792,
                                                                         -0.5886022016151555,
                                                                          -0.3212779442729232],
                                           'sorted_noise': [13, 47, 81, 115, 149, 183]},
                               'sampled data': [ [4, 2, 7, 0, -6.5111758480272135],
                                                 [12, 6, 21, 8, -3.513108400075424],
                                                 [20, 10, 35, 16, -1.9256894730075684],
                                                 [28, 14, 49, 24, -1.0648100061563792],
                                                 [36, 18, 63, 32, -0.5886022016151555],
                                                  [44, 22, 77, 40, -0.3212779442729232]],
                               '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': [ -6.331146189926128e-17,
                                          0.7069927066774304,
                                          0.7069927066774304,
                                          0.7069927066774305,
                                          0.7069927066774304.
                                          1.0044153364322925,
                                          1.0092418692996383,
                                          2.470333794214341,
                                          2.478143749866421,
                                          3.5776564981759003,
                                          3.5776564981759003,
```

```
3.5776564981759003,
3.61745967653339,
3.6981780389472076.
3.755720232685741,
3.9712286023902594,
3.9712286023902594,
4.519037432417192.
4.519037432417193,
4.519037432417193,
5.280953883299406,
5.280953883299406,
6.620356980277175.
6.620356980277175,
6.620356980277175,
6.620356980277176,
8.214004051881032,
8.214004051881032,
9.105951544537387,
10.829366164164977,
1.4490195266558639,
1.145329650589643,
-0.9374272684957279.
-1.2910248872233119,
0.9701069453007352,
2.0238893871034924,
-0.6731600678051081,
-0.7305037462514778,
0.6743483023845589,
1.611766624162738,
-0.162446688913207,
-0.2464021583836281,
1.3073653685111934,
1.560629053845934,
-0.09768282308379246,
-0.31393750682085847,
0.1625705045557987,
-0.1344649185634244,
-0.03516682581352061,
0.15934568227883428,
1.4484389719925783,
0.31346340320241645,
-1.5406853809043388,
0.3831701903776482,
0.07255447956326048,
-0.4619144712511035,
0.6220101497739178,
-0.08645510294766677,
-0.036774035023737585,
-0.02433291891195538,
1.2745777688613118,
0.806643386980706,
-0.1734465019831428,
-1.474099767063678,
-1.2534035864969235,
0.024086803725753666.
-0.5946515656594247,
3.047855036387052,
0.561263952510902,
-0.27353577574812815,
0.476385213099692.
-0.4183083264972014,
-0.07584344603997495,
-0.04004176630390785,
0.6379867024754904,
3.306912023625799,
0.6758488609505069,
-0.49379826249780634,
0.04089533617940984,
0.4062429454438471,
-0.2647421675477994,
0.1974729438666808,
0.043470303912556706,
0.2301819741695647.
1.9247102260310271,
```

0.19401136489510468,

```
0.17784496580796996,
                           -0.12037519976757159,
                           0.10596613899479704.
                           0.02480260398862852,
                           0.33616247382037256,
                          -0.2960626605489573,
                          1.2038327046358004.
                           -0.4266046665751028,
                           -0.14331073423696536,
                           0.33240571018120446,
                           0.13743208352564132,
                          0.21308235615415505.
                          -0.8816113951868988,
                           -0.03958129872975694,
                          1.7385124490728345,
                          1.3953860705003918,
                           0.7193393529381484,
                           -0.5890148767931709,
                           1.6845229617798814,
                           -0.04059142172715042,
                           -0.6588344885662398,
                          -1.5492107393137406.
                          0.9886630320432893,
                          1.3955090248591298,
                           -1.7521400718196618,
                          -0.02012078102450614,
                          1.5598528019020075,
                           -0.041272015671692544,
                           0.6659176073691222,
                           -0.10884895615623923,
                          -0.8860283635501729,
                          -0.042494102069769425,
                           -0.5241060846215897,
                           -0.049429521011899694,
                          -1.6158837397685775,
                           -0.29703279066650246.
                           0.6940812648197017,
                           -1.0869617874060826,
                           -1.1891726572683667,
                           0.03935191545498333,
                          -1.7727595774952096,
                          -0.0005664350349098603,
                           -1.2288438066739866,
                          2.182693040857262,
                          1.2648198022740724,
                          0.636776362006322,
                           -1.1418938134635428,
                           0.04892386539982865,
                           -0.6595482134655696,
                          -0.016038133219537475,
                          -1.53365152672916,
                          -0.5818287115590742,
                          -0.8537662908823758,
                          1.3418170063691075,
                          -0.32888813707646736.
                           -0.018460135902194714,
                           -0.8323242421777916,
                           1.5026664500941838,
                          1.809610363246633,
                          -1.5283405786971713.
                          0.5470095670143573,
                           -1.4753657998350065,
                          0.8122840148585063,
                          1.5317878779716176]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric6_sample#5'},
```

```
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                    [1, 1, 1, 0],
                                                   [2, 2, 2, 0],
                                                   [3, 3, 3, 0],
                                                   [4, 4, 4, 0],
                                                   [5, 5, 5, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                         'constraint': True,
                                         'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.311563719128683],
                                        [12, 6, 21, 8, -3.2712898811023576],
                                        [20, 10, 35, 16, -1.7533390824025292],
                                        [28, 14, 49, 24, -0.966227702270059],
                                        [36, 18, 63, 32, -0.5436512754494955],
                                        [44, 22, 77, 40, -0.3098340729956386]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
 'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.9114227294921875e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.15438341348946,
                              'others': { 'beta_coeffiecients': [ 2.1894863603561845,
                                                                   -3.028013051556425,
                                                                   3.513990454892641,
                                                                   -2.4750715377939474,
                                                                   0.9551450565312212,
                                                                   -0.15553728242967432],
                                          'cost_richardson_zne': 33.37331552209775,
                                          'sorted_expectation_vals': [ -6.311563719128683,
                                                                        -3.2712898811023576,
                                                                        -1.7533390824025292,
                                                                        -0.966227702270059,
                                                                        -0.5436512754494955,
                                                                        -0.3098340729956386],
                                          'sorted_noise': [13, 47, 81, 115, 149, 183]},
                              'sampled data': [ [4, 2, 7, 0, -6.311563719128683],
                                                [12, 6, 21, 8, -3.2712898811023576],
                                                [20, 10, 35, 16, -1.7533390824025292],
                                                [28, 14, 49, 24, -0.966227702270059],
                                                [36, 18, 63, 32, -0.5436512754494955],
                                                [44, 22, 77, 40, -0.3098340729956386]],
                              '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': [ 0.0019047787007362745,
                                         0.7201496918445128,
                                         0.7201496918445128,
                                         0.7201496918445127,
                                         0.7226708680142584,
                                         0.8068041864232433,
                                         1.3847174673528184.
                                         1.6031895944534578,
                                         2.458865333289775,
                                         2.458865333289775,
                                         2.721120236828938,
                                         2.721120236828938,
                                         3.554687304897056,
                                         3.554687304897056,
                                         4.537252190232355,
                                         4.537252190232355,
                                         5.239770593633025,
                                         5.242363659304797,
                                         5.566731623636481,
                                         5.566731623636481,
                                         5.566731623636481,
                                         5.566731623636481,
```

```
5.566731623636481,
7.6484324534494865,
7.6484324534494865.
8.96757120343865,
9.352637118466301,
9.381932224950582,
9.966925955531599.
9.966925955531599,
0.29840004251263574,
0.3207087147269936,
-0.22478909909228914,
-1.2242611593120782.
0.061748844824383295,
1.9931455249507801,
0.02449362327304914,
-0.23402928130657288,
0.3399922671860315.
0.2355005268966802,
0.7912945290539132,
-0.9147564287830934,
0.12280724330167514,
0.42016875545313104.
0.6183328009701774,
0.9098148543333162,
0.2439503202728901,
0.4941740976390827,
0.0721485641264495,
0.20051214721509877,
0.14273239312798908,
-0.03846070968482946,
0.11474641891065286,
0.1552743298359438,
-0.050455466832234855,
0.24385918138398863,
0.0646818550964626,
1.0379575003266166.
0.4438839418702803,
0.6652939620943935,
0.6574583263339632,
0.6386444070388955.
0.30923240052603657,
-0.34636230410321134,
0.23860747048870812,
-0.8837469955189079,
0.25272330748816335.
-0.05865013289270936,
0.324900593333006,
0.14494577696571714,
-0.2063591527406891,
0.03616506891850059.
0.47262902670638013,
-1.0341740644891497,
0.05484745701468325,
0.6503839058002072,
0.9852671145762593.
-0.15013660688285613,
-1.1623207819211936,
-0.09407804105158574,
-0.7141485635922941,
-0.20002766061477661,
0.256318263131488,
1.811390397828268,
-0.4480297381108074,
-0.0031154151062657686,
0.685008095432428,
-0.007804627058269528,
-2.9100406031766375,
-0.17918863042787767.
-0.29620353111227854,
-0.2953351498676352,
0.4434234593316091,
0.0018987515325079429,
0.5290648024022053,
0.011057994967698829,
```

0.03103232328752182,

```
-0.21693206073792237,
                           -0.07883582131375938,
                           -0.2554965378040217.
                           1.978711034134111,
                           -0.02822992907519939,
                           1.110830733101554,
                           0.04155227001102173,
                           0.17370289874025888,
                           -0.08435695708516765,
                           0.38686640173882947,
                           1.0727525781247964,
                           -1.4871438236674412.
                           0.1437881416009117,
                           -0.15769165641037303,
                           0.46096388290194723,
                           0.3881288491041242,
                           0.3113157866411551,
                           -0.21237825892214532,
                           1.3408904937177344,
                           0.033287678968192874,
                           -0.22654084728278404,
                           0.09162287503278096,
                           1.1250326534568733,
                           0.670327239820091,
                           -1.4911819217025961,
                           0.8417198858779599,
                           0.018685303562101165,
                           -0.5955098452611822,
                           1.37350461224772,
                           -0.5503685346151788,
                           0.07415629279393592,
                           0.22396953453102358,
                           -0.02219350017922496,
                           2.5136787648879593,
                           1.5560141766956836,
                           -0.037039417521638966,
                           -1.5578667717297374,
                           -0.15174825264689498
                           -0.0075908588231686416,
                           -0.1347910987366526.
                           0.7535559035800633,
                           2.9519825568174283,
                           -0.8640992588734872,
                           -0.486197602889753,
                           -0.029079605859607876,
                           0.1393557947212105,
                           -0.03201203543340934,
                           -0.17255788414719309,
                           -0.6220837667998668,
                           0.10441375911567917,
                           0.7019930428559267,
                           1.822960884928266,
                           0.0010256621400676815]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
                   '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_noisy_time_evo_ric6_sample#9'},
'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                     [1, 1, 1, 0],
                                     [2, 2, 2, 0],
                                     [3, 3, 3, 0],
                                     [4, 4, 4, 0],
                                     [5, 5, 5, 0]]},
'run': 'zne',
'state': 'dmatrix',
'vqe': { 'iteration': 1,
         'optimization': { 'algorithm': 'SLSQP',
                           'constraint': True,
```

```
'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.536182288327377],
                                        [12, 6, 21, 8, -3.450081350248876],
                                        [20, 10, 35, 16, -1.8650932993173603],
                                        [28, 14, 49, 24, -1.0247351729167147],
                                        [36, 18, 63, 32, -0.5670015302617211],
                                        [44, 22, 77, 40, -0.31237897705332807]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.744529724121094e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.374599934128453,
                              'others': { 'beta_coeffiecients': [ 2.1894863603561845,
                                                                   -3.028013051556425,
                                                                   3.513990454892641,
                                                                   -2.4750715377939474,
                                                                   0.9551450565312212,
                                                                   -0.15553728242967432],
                                           'cost_richardson_zne': 33.37331552209775,
                                           'sorted_expectation_vals': [ -6.536182288327377,
                                                                        -3.450081350248876,
                                                                        -1.8650932993173603.
                                                                        -1.0247351729167147,
                                                                        -0.5670015302617211,
                                                                        -0.31237897705332807],
                                           'sorted_noise': [13, 47, 81, 115, 149, 183]},
                              'sampled data': [ [4, 2, 7, 0, -6.536182288327377],
                                                 [12, 6, 21, 8, -3.450081350248876],
                                                [20, 10, 35, 16, -1.8650932993173603],
                                                [28, 14, 49, 24, -1.0247351729167147],
                                                [36, 18, 63, 32, -0.5670015302617211],
                                                [44, 22, 77, 40, -0.31237897705332807]],
                              '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': [ 0.33528943002425843,
                                         0.8608925283648261,
                                         2.8309935233222867.
                                         2.8382233121900358,
                                         2.847558790018716,
                                         2.8477263794127468,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         3.9337993695450666,
                                         5.127462455084763,
                                         5.128383696390232,
                                         5.132051241075024,
                                         5.132231848473024,
                                         5.132297186784173,
                                         5.132297186784173,
                                         5.132297186784173.
                                         5.132320898992942,
                                         5.134903164275234,
                                         5.734798022200061,
                                         5.734798022200061,
                                         5.734798022200061,
                                         6.71748919093495,
                                         6.71748919093495,
                                         9.773430860122208,
                                         9.791656954875775,
                                         9.791980525916317,
                                         9.804782964874805,
                                         9.947289619134542,
                                         0.6818618664375632,
                                         0.42253658736184846,
                                         0.19067339209915313,
```

```
-2.314563573529872,
-1.7784854373672185,
-0.10945476580518654.
0.08980428543050965,
0.6265702304745648,
-0.12016219313034968,
0.005450784512528824,
0.9621316606784164,
-0.01940541263687908,
-1.2890091107885369,
-0.09216272929775945,
-0.8615487717558121.
0.021600758375482327,
1.1068545366678577,
-0.06436428812394061,
-1.8186253546793636,
-0.2455724158610742.
0.7444478114283775,
1.0647343146888184,
-1.6388802958603008,
-0.05032235091912311,
0.7589104637111997.
0.0934759886788552,
0.7280377617711271,
-0.10012682423470079,
-2.7917715562202794,
0.5843828201862561,
1.2003794612588048,
-0.2782652692858759,
1.253725179404932,
-0.831140674623039,
-1.3898002860152843,
1.7689493816619246,
-0.768539740515663,
-0.5265628815801298,
-0.8222194498348508,
-0.4525275176973082,
0.8944486767447871,
1.1352373194126446,
0.06348552937029919.
-0.7478835175458556,
-0.44914670649658045,
0.5247278033135997,
0.5948349944294522,
-0.5743460857513.
0.873550995352649,
0.8797938271812764,
-0.37270941226617715,
0.20553479070949218,
0.6188766136751805.
-0.4012501825920459,
-0.4763388197192611,
-0.34431485887187113,
-1.1697954599661295,
0.5556509722807279.
-0.5397649164737537,
-0.41722730509388967,
0.9275888618509817,
0.4371362266023078,
-1.4110895986752616,
0.6716489600966955,
0.08900519900900147,
0.7708643633651343,
0.0944251249629154,
-0.053131619179539805,
-0.132883145931867,
0.44414428660563765,
-0.3164026614336652,
0.9835391768228284.
-0.49696354121947833,
0.3510514174127117,
-0.24991518010085176,
-0.7780713458689107,
1.3387260017849976,
```

0.712191280671364,

```
1.090195713122469,
                                       0.3876483875477464,
                                       1.113683201871723,
                                       0.09724940056823322,
                                       -1.3265075307540413,
                                       -1.8530581309545013.
                                       0.335564434910613,
                                       0.16061631243062188,
                                       0.6994545842241634,
                                       -0.0055568765936962455,
                                       1.8148369905661879.
                                       -0.9149620921846291,
                                       -0.5341673651010566,
                                       -0.6583203681162046,
                                       -0.05148037848607484,
                                       -0.1302834828824637,
                                       -0.2083684341417298,
                                       -0.7142637766159184,
                                       0.4980789266978527,
                                       -2.030263033934291,
                                       -0.002330467371510849.
                                       -0.7835259213136883,
                                       -0.18712783689065152,
                                       -0.271594041353006,
                                       0.606962231033315,
                                       0.19917323339650786,
                                       0.581852597021436,
                                       1.0547240409345577,
                                       0.07111303544026976,
                                       1.4877210254684077,
                                       0.08669172360020491,
                                       0.8024105605127613,
                                       0.8315802366658298,
                                       1.117305276662395,
                                       -1.0742437197416552,
                                       0.30921812342286065,
                                       -0.06994991433225481,
                                       1.0419800264617582,
                                       1.4507701003592177,
                                       0.2408413974211676,
                                       1.6573761327725358]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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': { 'fiq_dpi': 100, 'status': False, 'type': 'png'},
                        'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric6_sample#2'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                 [1, 1, 1, 0],
                                                 [2, 2, 2, 0],
                                                 [3, 3, 3, 0],
                                                 [4, 4, 4, 0],
                                                 [5, 5, 5, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                       'constraint': True,
                                       'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.333005581610797],
                                      [12, 6, 21, 8, -3.1651017858597426],
                                      [20, 10, 35, 16, -1.6439583689682524],
                                      [28, 14, 49, 24, -0.8813072530521873],
                                      [36, 18, 63, 32, -0.48318628235120475],
                                      [44, 22, 77, 40, -0.26793423014165196]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
```

-0.4436070432657242,

```
'run_time_sec': 8.177757263183594e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.297454569568384,
                              'others': { 'beta_coeffiecients': [ 2.1894863603561845,
                                                                   -3.028013051556425,
                                                                   3.513990454892641,
                                                                   -2.4750715377939474,
                                                                   0.9551450565312212,
                                                                   -0.15553728242967432],
                                           'cost_richardson_zne': 33.37331552209775,
                                           'sorted_expectation_vals': [ -6.333005581610797,
                                                                        -3.1651017858597426,
                                                                        -1.6439583689682524,
                                                                        -0.8813072530521873,
                                                                        -0.48318628235120475,
                                                                        -0.26793423014165196],
                                           'sorted_noise': [13, 47, 81, 115, 149, 183]},
                              'sampled data': [ [4, 2, 7, 0, -6.333005581610797],
                                                 [12, 6, 21, 8, -3.1651017858597426],
                                                 [20, 10, 35, 16, -1.6439583689682524],
                                                [28, 14, 49, 24, -0.8813072530521873],
                                                [36, 18, 63, 32, -0.48318628235120475],
                                                [44, 22, 77, 40, -0.26793423014165196]],
                              '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': [ 0.3773346757087749,
                                         0.5734233884194113,
                                         0.5734233884194113,
                                         1.2094818154974225,
                                         1.2528672337957094,
                                         1.3073966674132076,
                                         4.193348178434801,
                                         4.228670385547864,
                                         4.228670385547864,
                                         4.228670385547864,
                                         4.228670385547864,
                                         4.228670385547864,
                                         4.274742575727675,
                                         5.343872214974395,
                                         5.354523589318104,
                                         5.449133113124401,
                                         5.449133113124401,
                                         5.449133113124401,
                                         5.449133113124401,
                                         6.208341300319731.
                                         6.208341300319731,
                                         6.738723848778546,
                                         6.7473872692498285,
                                         8.515456463543387,
                                         8.552181104315652,
                                         8.552181104315652,
                                         8.552181104315652,
                                         9.363042150968939,
                                         9.363042150968939.
                                         11.478464454984158,
                                         -0.2683676450988651,
                                         -0.9370321768196137,
                                         0.03790413469005285,
                                         -0.3520989510779511,
                                         0.5131804204688105,
                                         0.767748989456867,
                                         -1.1529933056041268,
                                         1.0195402939041247,
                                         -0.5189860890713169,
                                         1.700377968800765,
                                         0.48912124484584857,
                                         1.506730848787325,
                                         0.4485612726223177,
                                         -1.6248073049289613,
```

```
0.10079320215400162,
1.7454590745233427,
1.474284546585253,
0.08837986403943651,
1.215839965531947,
-0.42666568442503866,
0.04298065245990749.
-1.495484471060033,
0.39055472334393304,
-0.06187227108331559,
1.0010296249342066,
-0.33745943355443286,
-0.19046242319241546,
-0.4884459619425607,
0.8930564792122229,
0.09947441181287657,
-1.4049039336860292,
1.0413688199593338,
0.027348986225077598,
1.5457890290583323,
0.8022774572900748,
-1.0377116853398.
0.5652694406258009,
0.9990396087940023,
-0.3409174955760714,
-0.8590373420111477,
0.3662952964918326,
0.6492392290096071,
-1.0735392409833318,
-0.620775369578654,
0.5064494688850749,
0.6065178361322348,
0.31795568319369283,
-0.4388081557471054,
0.07128954327413695,
-0.07460186306053893,
-1.5916050363108065,
0.40348292639904854,
0.7429600006983637,
0.13897118193917846.
0.13192395570874205,
-0.560408177185694,
-0.7293430452459922,
1.2393938765994381,
0.16520016983754293,
-0.04218705839108043,
1.9844775109402493,
-0.40811731341033075,
0.40494641878472026,
0.44317505546879765,
-0.14541224425415586,
-1.3628454492957067,
0.35572573997739254,
-0.17363781014762678,
-0.21765464091811726.
0.25867396534698067,
-0.19299239511743832,
0.842583631219517,
0.01538577194684443,
-1.3780712180305699.
0.30168991607554185,
0.03816118508668757,
-0.6330896266111891,
-0.14462412237866193,
0.22751230177420415,
2.198362599080823,
0.5538971259685714,
1.6735676153080048,
0.01161307703421222.
0.15241612900647253,
-0.4114895408906573,
0.020024246948836234,
-0.361021382333633.
1.2366726872792735,
-0.8652479233612058,
```

```
-1.2043495043519374,
                                       0.03294448415473864,
                                       1.864475600371399,
                                       -0.048446953541905424,
                                       1.483038428004856,
                                       0.02119809714572118.
                                       -0.20756566215919184,
                                       1.2566509021622863,
                                        0.4040298326697209,
                                       0.0492062183426151,
                                       0.3396501220758691.
                                       0.09097515161528406,
                                       -0.4545275805495163,
                                       1.5327906096069877,
                                       -0.47568898039994184,
                                       0.7447654713950665,
                                       0.7179833985093875,
                                        -0.03692927531761856,
                                       0.11509825242982577,
                                       0.020898935398901888,
                                       0.2387893529411216.
                                       1.5195379458286031,
                                       -0.5337205856413728,
                                       -0.5741707032781822,
                                       1.298358172715442,
                                       -0.010829860462227588,
                                        -1.9037204771139875,
                                       1.5774751765228583,
                                       -0.28550943128124906,
                                       1.5531884118568244]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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': { 'fiq_dpi': 100, 'status': False, 'type': 'png'},
                        'file_name_prefix': 'AUTOMATE_xy_noisy_time_evo_ric6_sample#4'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                  [2, 2, 2, 0],
                                                  [3, 3, 3, 0],
                                                  [4, 4, 4, 0],
                                                  [5, 5, 5, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                       'constraint': True,
                                        'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.44845457619454],
                                      [12, 6, 21, 8, -3.2446894681699203],
                                      [20, 10, 35, 16, -1.686607616211824],
                                      [28, 14, 49, 24, -0.8984323471828196],
                                      [36, 18, 63, 32, -0.4857082686875758],
                                      [44, 22, 77, 40, -0.2634879429635577]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 0.0003571510314941406,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.419819668611884,
                            'others': { 'beta_coefficients': [ 2.1894863603561845,
                                                                 -3.028013051556425,
                                                                 3.513990454892641,
                                                                 -2.4750715377939474,
                                                                 0.9551450565312212,
                                                                 -0.15553728242967432],
                                         'cost_richardson_zne': 33.37331552209775,
                                         'sorted_expectation_vals': [ -6.44845457619454,
```

-0.38157323774943186,

```
-3.2446894681699203,
                                                                        -1.686607616211824,
                                                                        -0.8984323471828196,
                                                                        -0.4857082686875758,
                                                                        -0.2634879429635577],
                                          'sorted_noise': [13, 47, 81, 115, 149, 183]},
                              'sampled data': [ [4, 2, 7, 0, -6.44845457619454],
                                                 [12, 6, 21, 8, -3.2446894681699203],
                                                 [20, 10, 35, 16, -1.686607616211824],
                                                 [28, 14, 49, 24, -0.8984323471828196],
                                                 [36, 18, 63, 32, -0.4857082686875758],
                                                 [44, 22, 77, 40, -0.2634879429635577]],
                              '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': [ 0.08591881204796584,
                                         1.5026023651616802.
                                         1.9179097588555833,
                                         1.9179097588555831,
                                         1.9179097588555831,
                                         1.9179097588555831,
                                         2.8800636946459592,
                                         2.9523818900173797,
                                         2.9523818900173797,
                                         2.954896407422686,
                                         3.0487820562708485,
                                         3.0487820562708485,
                                         3.9462134206000328,
                                         3.9462134206000328,
                                         5.170248653928018,
                                         5.170248653928018,
                                         6.5066905594049205,
                                         6.5066905594049205,
                                         6.5066905594049205,
                                         6.914119522580601,
                                         6.914119522580601,
                                         6.9842551957162815,
                                         7.300516913785898,
                                         8.782483894556266,
                                         8.782483894556266.
                                         8.999633503017922,
                                         8.999633503017922,
                                         8.999633503017922,
                                         9.414122362394847,
                                         9.414122362394847,
                                         0.09854676674938925,
                                         -0.05173289612974198,
                                         0.30094803169630163,
                                         -1.1984142138894447,
                                         0.08610670053567002,
                                         0.2851928692216035,
                                         0.26177875477440216,
                                         0.11764473243628538,
                                         0.3495067876706816,
                                         -0.9678438601279628.
                                         -0.08762050677252062,
                                         0.014826088936787857,
                                         -0.30347729159143555,
                                         -1.1730530788097624,
                                         -0.12550631929596553,
                                         2.258056275075482,
                                         -0.5160508087356981,
                                         0.004541093619226378,
                                         -0.9345420797218197,
                                         0.47154522212338745,
                                         -0.9129446894819914,
                                         0.2768683391341781,
                                         0.29975752794333804.
                                         -0.16177915588279423,
                                         0.6021148977823381,
```

```
0.35405737535162146,
0.8149645603473178,
-0.7074306860917636.
-0.8281028342440522,
-0.20840122350984505,
-0.19593362207831977,
1.2208184674045053.
-0.10408257731449277,
0.9878855326441833,
0.6508295623732647,
-0.31520021014255994,
-1.502007043998756.
-0.44913621684685756,
-0.2831231513937543,
-1.048170079126895,
-0.10057118739311635,
-0.4440190475287521.
0.5925479388494825,
0.1500100176310508,
-0.4655542365338734,
0.09847924242741647,
-0.25695620197439545.
-0.5449201592551612,
0.4987130755500597,
-0.007720607194202524,
0.7816530161823243,
-0.8246572495389679,
-0.28480932751570914,
1.8751826609713358,
-0.20740645402102328,
-0.04894031202761418,
-1.0170156037248201,
-0.035476380392734465,
0.9940259955458774,
-0.657126951929564,
-0.4786936406484008,
1.4564140457987391,
-1.062151832750044,
-0.01496017231630948,
0.16259290081999456.
0.601493806263198,
-0.20485253219607644,
-1.2421776762345744,
1.152288606322054,
1.1883019471730756,
0.9817659575699377,
0.9653429636905305,
0.5382122852444811,
0.722384759736696,
-0.13079560936986118.
-0.9638314109375934,
-0.13358671856975504,
-0.3949417844115237,
1.01780227278121,
0.6746960094686067.
0.14295933107831804,
-0.37974724013569766,
0.3641245559377578,
0.12972678280008856,
0.5949873255000262.
0.8499370211382984,
-0.0792654431528575,
1.9402087793428133,
-0.5583113020357903,
0.6535986429024293,
1.0008805619835928,
0.16556690201288055,
1.1071973338235597.
0.07194244573338314,
-0.9146859400815048,
-0.005186820541518637,
0.4795762978809806,
0.6475066336984044.
0.11860845746693519,
```

0.08044881503693782,

```
0.5402817334108434,
                                       1.5532870492056725,
                                       0.36643388228039625.
                                       1.6150985923432208,
                                       0.22271977417212363,
                                       -0.04956133994172771,
                                       -0.6258533610916538.
                                       -0.6517224443292691,
                                       0.2594825887888975,
                                       -0.1286341552665023,
                                       0.48749759828242367,
                                       -0.009813928289633511.
                                       0.5249350004928881,
                                       -0.01015655683116892,
                                       -0.48671658518654837,
                                       -0.588311268126242,
                                       -0.25978871509233853,
                                       0.9039610340757382,
                                       1.5549616218831699,
                                       -0.05330158954092406]},
            'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                               'noise_prob': [0.001, 0.001, 0.001, 0.001],
                               '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_noisy_time_evo_ric6_sample#3'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                 [1, 1, 1, 0],
                                                 [2, 2, 2, 0],
                                                 [3, 3, 3, 0],
                                                 [4, 4, 4, 0],
                                                 [5, 5, 5, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                       'constraint': True,
                                       'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.4104927992121],
                                      [12, 6, 21, 8, -3.2577133670016694],
                                      [20, 10, 35, 16, -1.674813432318219],
                                      [28, 14, 49, 24, -0.8591076530612254],
                                      [36, 18, 63, 32, -0.43058689568319575],
                                      [44, 22, 77, 40, -0.20313281829021995]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 4.601478576660156e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.309891686714744,
                            'others': { 'beta_coefficients': [ 2.1894863603561845,
                                                                 -3.028013051556425,
                                                                 3.513990454892641,
                                                                 -2.4750715377939474.
                                                                 0.9551450565312212,
                                                                 -0.15553728242967432],
                                        'cost_richardson_zne': 33.37331552209775,
                                        'sorted_expectation_vals': [ -6.4104927992121,
                                                                      -3.2577133670016694,
                                                                      -1.674813432318219,
                                                                      -0.8591076530612254,
                                                                      -0.43058689568319575
                                                                      -0.20313281829021995],
                                        'sorted_noise': [13, 47, 81, 115, 149, 183]},
                            'sampled data': [ [4, 2, 7, 0, -6.4104927992121],
                                              [12, 6, 21, 8, -3.2577133670016694],
                                              [20, 10, 35, 16, -1.674813432318219],
                                              [28, 14, 49, 24, -0.8591076530612254],
                                              [36, 18, 63, 32, -0.43058689568319575],
```

```
[44, 22, 77, 40, -0.20313281829021995]],
                              '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': [ 0.003375513600300809,
                                         0.4884127443235871,
                                         0.6719352108785641,
                                         0.9073170135093351,
                                         1.4946633690060278,
                                         1.5076957064847494,
                                         3.872917838142945,
                                         3.872917838142945,
                                         3.872917838142945,
                                         3.872917838142945,
                                         5.047622474508209,
                                         5.054336886650782,
                                         5.067626550795242.
                                         5.0733174878702085,
                                         5.094629387163461,
                                         5.749571576552799,
                                         5.7731554023304374,
                                         7.144946717661993.
                                         7.144946717661993,
                                         7.144946717661993,
                                         7.144946717661993,
                                         7.602314289267704,
                                         7.602314289267704,
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         8.018775147517832,
                                         9.661071929582006,
                                         0.2735947252101626,
                                         2.471262065567802,
                                         0.18954222370300397,
                                         0.2633058348660961,
                                         0.07494334922808346,
                                         1.4980157261935538.
                                         0.3538857424122425,
                                         0.26341770410626436,
                                         0.17174804107002956,
                                         -0.22912718472194316,
                                         0.11060714764109056,
                                         -0.30804859927082595,
                                         2.8406850614439736,
                                         1.0823654569610508,
                                         0.9668529413216363,
                                         1.8727663516543385,
                                         -0.0901659930896485,
                                         0.05868560690604535,
                                         0.24212775097742179,
                                         1.0092515209898247,
                                         -0.7556969386491817.
                                         0.3279350524218167,
                                         1.078117272505244,
                                         0.10391815458190773,
                                         -0.7434930272741371,
                                         -1.6965388530236032,
                                         -1.360748554100242,
                                         0.34939560927302815,
                                         0.03188634842980519,
                                         -1.2447472675125983,
                                         0.06092342743494014,
                                         1.017082923902293,
                                         -1.007905562333318,
                                         -0.8576057837691866,
                                         0.5321038189070756,
                                         1.300652060018237,
```

```
-1.8122591145188616,
-1.247002191580596,
1.2529274198051785.
0.3750417535596218,
0.2898066740735119,
1.589675559301449,
2.3222772390172888.
-1.568740409290771,
0.5925151941094322,
-0.20655148780097043,
-0.5059482271844034,
-0.9561046882137155,
-0.432249774596058,
1.8189144734584217,
0.6791516075394335,
-0.10885247153326365,
-2.2650870540994883,
0.2658818907332787,
-0.9372958671062981,
-1.0664167087973948,
-0.7139434901419379,
1.3816698348804732.
2.008892916411081,
0.15285666374274742,
-1.782425531898792,
0.07791440554206944,
-1.28397958204954,
-0.7247696039786395,
0.5612678373457747,
-0.004762916486662008,
0.4386089298525658,
0.010283368626678616,
0.8990610129088383,
0.03840864905637026,
-1.2418081984826976,
0.33190310279028407.
0.3061008622829172,
-0.06950158836023225,
0.93859456058615,
-0.02489786142317165.
0.9927840878492759,
-0.0709710381209458,
-1.4546153026559692,
-0.6707274766895803,
1.0492831078613678,
1.59883886587945,
-0.7948795957139008,
0.011914265512354442,
0.29611851635537545,
-0.026452865362460363.
0.17911271593442915,
-0.268102313362264,
-0.31698956355176716,
0.5150163737561883,
-0.2617344493849528.
-0.08207987775663798,
-0.7031192006515304,
0.10296103394319861,
-1.3322481995457,
-0.8096620548125795,
0.22894179493051453,
-0.6404807766018014,
0.5981001234262467,
0.6725836248662437.
-0.24769451099401643,
-1.5367942204876157,
0.32496629998060117,
0.8231756699235411,
0.27229759145944715.
-0.4283887626472357,
0.6783210911797265,
1.178917544999848,
-0.48124012627536317.
-0.23642700938756703,
```

-0.22983768395119897,

```
0.5963513861028734,
                                         -0.8505831212819382,
                                         0.6516631671421783,
                                         0.6698405071431395,
                                         0.7826636181190869,
                                         -1.6023915303224998.
                                         0.6733061844063541,
                                         1.5755992624240989]},
              'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                                 'noise_prob': [0.001, 0.001, 0.001, 0.001],
                                 '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_noisy_time_evo_ric6_sample#7'},
              'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                   [1, 1, 1, 0],
                                                   [2, 2, 2, 0],
                                                   [3, 3, 3, 0],
                                                   [4, 4, 4, 0],
                                                   [5, 5, 5, 0]]},
              'run': 'zne',
              'state': 'dmatrix',
              'vqe': { 'iteration': 1,
                       'optimization': { 'algorithm': 'SLSQP',
                                          'constraint': True,
                                          'status': False}},
              'zne': { 'data_points': [ [4, 2, 7, 0, -6.397817460329862],
                                        [12, 6, 21, 8, -3.211571673080875],
                                        [20, 10, 35, 16, -1.641958817033255],
                                        [28, 14, 49, 24, -0.8464644349040009],
                                        [36, 18, 63, 32, -0.4337371704190119],
                                        [44, 22, 77, 40, -0.216007189653039]],
                       'degree': 0,
                       'method': 'richardson',
                       'sampling': 'default'}},
  'output': { 'exact_sol': -8.566772233505624,
              'run_time_sec': 4.696846008300781e-05,
              'zne_values': { 'degree': 0,
                              'extrapolated_value': -8.33870544603468,
                              'others': { 'beta_coefficients': [ 2.1894863603561845,
                                                                   -3.028013051556425,
                                                                   3.513990454892641,
                                                                   -2.4750715377939474
                                                                   0.9551450565312212,
                                                                   -0.155537282429674321.
                                          'cost_richardson_zne': 33.37331552209775,
                                          'sorted_expectation_vals': [ -6.397817460329862,
                                                                        -3.211571673080875,
                                                                        -1.641958817033255,
                                                                        -0.8464644349040009,
                                                                        -0.4337371704190119,
                                                                        -0.216007189653039],
                                          'sorted_noise': [13, 47, 81, 115, 149, 183]},
                              'sampled data': [ [4, 2, 7, 0, -6.397817460329862],
                                                [12, 6, 21, 8, -3.211571673080875],
                                                [20, 10, 35, 16, -1.641958817033255],
                                                [28, 14, 49, 24, -0.8464644349040009],
                                                 [36, 18, 63, 32, -0.4337371704190119],
                                                [44, 22, 77, 40, -0.216007189653039]],
                              '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': [ -5.647934061474703e-18,
                                         1.4787834906243755,
```

0.7841497681166887,

```
1.478918229526628,
1.478918229526628,
2.0077351764243123,
2.4302809101456218,
2.4302809101456218,
3.009709563144601,
3.009709563144601.
3.239471043198664,
3.2405283031129133,
3.2405283031129133,
3.2656598154222434,
3.5353392937639825.
6.198713539858257,
6.213604956994236,
6.73397854893658,
6.73397854893658,
6.743547791194661.
6.744609103740889,
6.744609103740889,
6.749543065628153,
6.749543065628153,
8.615256229309818.
8.635090640841518,
9.012323512360366,
9.012323512360366,
9.930483613907942,
9.930483613907942,
11.782061805135282,
0.6870051227789642,
0.5234095533264759,
0.11216801162302814,
0.044591843687496906,
-0.747159787599118,
1.5727279855217766,
-0.16958009141159439,
-0.7234855106318131.
0.45999589631996707,
1.3613822619347415,
0.5234464983029046,
0.18337466193510712,
1.0660408011194182,
1.2813123812864906,
0.34899885807903364,
1.2204971120849089,
0.37250493843195553.
0.3861568591798728,
-0.4881036169368887,
0.23720347697856276,
0.8136369801063428,
-0.8595161765585049,
0.6710512785075716,
0.5103741134651811,
-0.48491784736765847,
-1.939727949979543,
0.5221979500550953.
-0.39618913325979604,
-0.5258671175956018,
0.08753210163723862,
1.3619602585721242,
-1.2518915867901346.
0.1520244579503878,
-1.126921262549515,
-1.1285674400831274,
-0.7045257843816373,
-0.4468310259761979,
0.6091022847926961,
0.4198375873878555,
0.5765253059135943,
-2.8026328359302406,
-1.7254430077855836,
0.37020611055835473,
0.4465655907565091,
-1.4308928069625704.
1.6254306194316424,
-0.16298810299835312,
```

```
-1.249293985363804,
                           -2.5283772945229797,
                           -1.0735775181393186,
                           -0.628541665091616,
                           -1.1357659634071433,
                           -0.5734897531715744,
                           -1.6096579963890296.
                           -0.8342055948126037,
                           -1.5447846874108708,
                           -1.1270394146554403,
                           0.06392732561319403,
                           0.7711512775812011,
                           -1.8472478314151175,
                           -0.46160141905881696,
                           1.8963279721150403,
                           -2.313663424814036,
                           0.060952702837845166,
                           -1.4971949982077863,
                           1.3040610818975555,
                           0.10605679464403613,
                           -1.138800572315487,
                           -0.03947636943653289.
                           0.07839455865010819,
                           -0.6470277815644087,
                           0.946101637008616,
                           -0.32144060478582315,
                           -0.6371693991779968,
                           0.30580409265523,
                           -0.2617129381706641,
                           0.4094287336545931,
                           0.49837362733711055,
                           -0.9058714721495094,
                           0.6137893604415533,
                           0.8546844695081749,
                           -0.8205470722456557,
                           -0.598852289145785,
                           0.46823811794119646,
                           1.2205247300232143,
                           0.031629319060699435,
                           1.1369587010491427,
                           0.12298062775535874,
                           -0.016960252964031076,
                           1.1127338626212067,
                           0.37972118532018134,
                           -0.1475616440844684,
                           0.32749925367563326,
                           0.030050642250761914,
                           0.17169542743574548,
                           -0.5825729547476518,
                           0.7052714548722974,
                           0.9884296874822006,
                           -0.500384308215816,
                           0.01722431287494931,
                           0.40290712722731054,
                           -0.029200452046427447.
                           1.2704708243944813,
                           2.3709704014259345,
                           -2.0267551524865275,
                           0.7347873374577798,
                           -0.34767223966060473,
                           0.009778943736386289,
                           0.221000841842164,
                           -0.010995780695540691,
                           -0.481889271583797,
                           0.7008500159073542,
                           2.3944065221124076,
                           -0.08320445199579081,
                           2.02470278988152.
                           0.02142760118000664,
                           1.6794429086669174,
                           1.6046551807968945,
                           0.2831685070910348,
                           1.5805135598594935]},
'noise_profile': { 'noise_on_init_param': {'status': False, 'value': 0},
                   'noise_prob': [0.001, 0.001, 0.001, 0.001],
```

```
'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_noisy_time_evo_ric6_sample#8'},
            'redundant': { 'identity_factors': [ [0, 0, 0, 0],
                                                  [1, 1, 1, 0],
                                                 [2, 2, 2, 0],
                                                 [3, 3, 3, 0],
                                                 [4, 4, 4, 0],
                                                 [5, 5, 5, 0]]},
            'run': 'zne',
            'state': 'dmatrix',
            'vqe': { 'iteration': 1,
                     'optimization': { 'algorithm': 'SLSQP',
                                        'constraint': True,
                                        'status': False}},
            'zne': { 'data_points': [ [4, 2, 7, 0, -6.429933051303131],
                                      [12, 6, 21, 8, -3.1990719612158447],
                                      [20, 10, 35, 16, -1.6351376911040885],
                                      [28, 14, 49, 24, -0.8526977600673817],
                                      [36, 18, 63, 32, -0.44953303322849647],
                                      [44, 22, 77, 40, -0.23666355366027367]],
                     'degree': 0,
                     'method': 'richardson',
                     'sampling': 'default'}},
'output': { 'exact_sol': -8.566772233505624,
            'run_time_sec': 6.842613220214844e-05,
            'zne_values': { 'degree': 0,
                            'extrapolated_value': -8.419348593542587,
                            'others': { 'beta_coefficients': [ 2.1894863603561845,
                                                                 -3.028013051556425,
                                                                 3.513990454892641,
                                                                 -2.4750715377939474,
                                                                 0.9551450565312212,
                                                                 -0.155537282429674321,
                                        'cost_richardson_zne': 33.37331552209775,
                                        'sorted_expectation_vals': [ -6.429933051303131,
                                                                      -3.1990719612158447,
                                                                      -1.6351376911040885,
                                                                      -0.8526977600673817,
                                                                      -0.44953303322849647,
                                                                      -0.23666355366027367],
                                        'sorted_noise': [13, 47, 81, 115, 149, 183]},
                            'sampled data': [ [4, 2, 7, 0, -6.429933051303131],
                                              [12, 6, 21, 8, -3.1990719612158447],
                                              [20, 10, 35, 16, -1.6351376911040885],
                                              [28, 14, 49, 24, -0.8526977600673817],
                                              [36, 18, 63, 32, -0.44953303322849647],
                                               [44, 22, 77, 40, -0.23666355366027367]],
                            'sampling': 'default'}}}]}
```