

32_Fix_Qiskit_qiskit-terra_6974

November 3, 2022

```
[ ]: from qiskit.circuit import QuantumCircuit
      from qiskit.transpiler import PassManager
      from qiskit.transpiler.passes import TemplateOptimization
      from qiskit.transpiler.passes.calibration import rzx_templates
      from qiskit.converters.circuit_to_dag import circuit_to_dag
      from qiskit.converters.dag_to_circuit import dag_to_circuit

      import numpy as np
```

1 Example 1. cx-z-cx (originally worked)

```
[ ]: test_circ = QuantumCircuit(2)
      test_circ.cx(0, 1)
      test_circ.rz(0.42, 1)
      test_circ.cx(0, 1)
      test_circ.draw()
```

```
[ ]:
      q_0:
      q_1: X Rz(0.42) X
```

```
[ ]: pass_ = TemplateOptimization(**rx_templates.rzx_templates())

      circuit_dag=circuit_to_dag(test_circ)
      passtemp = pass_.run(circuit_dag)
      opt_circ = dag_to_circuit(passtemp)
      opt_circ.draw()
```

```
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906AC70>
matching [ ] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
check if the operation are the same : True True True
forward 466 : [[0, 0], [1, 1]]
```

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Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B8F187C0>
forward 468 append match : [[0, 0], [1, 1]]
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[0, 0], [1, 1]]
backward 413 first_matches : [[0, 0], [1, 1]]
backward 445 matches : [[0, 0], [1, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x0000022097AEB820>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906AC70>
matching [] th _sublist is working..
matching 386 forward [[0, 2]]
backward 413 first_matches : [[0, 2]]
backward 445 matches : [[0, 2]]
backward 489 Candidates : []
backward 730 matches : [[0, 2]]
backward 771 matches : []
backward 445 matches : [[0, 2]]
backward 480 matches : [[0, 2]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[0, 2]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B4610>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906AC70>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 1]]
backward 413 first_matches : [[1, 1]]
backward 445 matches : [[1, 1]]
backward 489 Candidates : []
backward 702 matches : [[1, 1]]
backward 445 matches : [[1, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B4820>]

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matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906AC70>
matching [] th _sublist is working..
forward 422 candidates : [7]
in candidates : 7 match is False
check if the operation are the same : True True True
forward 466 : [[6, 0], [7, 1]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B90B45B0>
forward 468 append match : [[6, 0], [7, 1]]
forward 422 candidates : [8]
in candidates : 8 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[6, 0], [7, 1]]
backward 413 first_matches : [[6, 0], [7, 1]]
backward 445 matches : [[6, 0], [7, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B8F183A0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906AC70>
matching [] th _sublist is working..
matching 386 forward [[6, 2]]
backward 413 first_matches : [[6, 2]]
backward 445 matches : [[6, 2]]
backward 489 Candidates : []
backward 730 matches : [[6, 2]]
backward 771 matches : []
backward 445 matches : [[6, 2]]
backward 480 matches : [[6, 2]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 2]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B6770>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906AC70>
matching [0] th _sublist is working..
forward 422 candidates : [8]
in candidates : 8 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[7, 1]]
backward 413 first_matches : [[7, 1]]

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backward 445 matches : [[7, 1]]
backward 489 Candidates : []
backward 702 matches : [[7, 1]]
backward 445 matches : [[7, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B6140>]
143 optimization template :
»
q_0:                                »
                                »
q_1:  X  Rz()  √X  Rz()  √X  Rz(3)  X  Rz(-)  Rz(/2)  »
                                »
«
«q_0:                                0                                »
«                                Rzx(-)                                »
«q_1:  Rx(/2)  Rz(/2)  Rx()  1                                Rz(/2)  Rx(/2)  »
«
«
«q_0:
«
«q_1:  Rz(/2)
«
150 optimization max_matches : [[0, 0], [1, 1]]
150 optimization max_matches : [[6, 0], [7, 1]]
150 optimization max_matches : [[0, 2]]
150 optimization max_matches : [[6, 2]]
Circuit Params : [0.42]
Circuit Params : set()
Circuit Params : [0.42]
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906AF10>
matching [] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
sufficient conditions for a match to happen : False False True
matching 386 forward [[0, 0]]
backward 413 first_matches : [[0, 0]]
backward 445 matches : [[0, 0]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match

```

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object at 0x00000220B90B7E80>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906AF10>
matching [] th _sublist is working..
matching 386 forward [[0, 2]]
backward 413 first_matches : [[0, 2]]
backward 445 matches : [[0, 2]]
backward 489 Candidates : []
backward 730 matches : [[0, 2]]
backward 771 matches : []
backward 445 matches : [[0, 2]]
backward 480 matches : [[0, 2]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[0, 2]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B7BE0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906AF10>
matching [] th _sublist is working..
forward 422 candidates : [3]
in candidates : 3 match is False
sufficient conditions for a match to happen : False False True
matching 386 forward [[2, 0]]
backward 413 first_matches : [[2, 0]]
backward 445 matches : [[2, 0]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B66B0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906AF10>
matching [] th _sublist is working..
matching 386 forward [[2, 2]]
backward 413 first_matches : [[2, 2]]
backward 445 matches : [[2, 2]]
backward 489 Candidates : []
backward 730 matches : [[2, 2]]
backward 771 matches : []
backward 445 matches : [[2, 2]]
backward 480 matches : [[2, 2]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[2, 2]]
backward 445 matches : []

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matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B6EF0>]
143 optimization template :
»
q_0:                                »
                                »
q_1:  X   P()   X   P(-)   Rz(/2)   Rx(/2)   Rz(/2)   Rx()  »
                                »
«
«q_0: 0
«   Rz(-)
«q_1: 1           Rz(/2)   Rx(/2)   Rz(/2)
«
150 optimization max_matches : [[0, 0]]
150 optimization max_matches : [[0, 2]]
150 optimization max_matches : [[2, 0]]
150 optimization max_matches : [[2, 2]]
Circuit Params : []
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A810>
matching [] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
check if the operation are the same : True True True
forward 466 : [[0, 0], [1, 1]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B91206A0>
forward 468 append match : [[0, 0], [1, 1]]
forward 422 candidates : [2]
in candidates : 2 match is False
check if the operation are the same : True True True
forward 466 : [[0, 0], [1, 1], [2, 2]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9121120>

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forward 468 append match : [[0, 0], [1, 1], [2, 2]]
matching 386 forward [[0, 0], [1, 1], [2, 2]]
backward 413 first_matches : [[0, 0], [1, 1], [2, 2]]
backward 445 matches : [[0, 0], [1, 1], [2, 2]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B6DA0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A810>
matching [] th _sublist is working..
matching 386 forward [[0, 2]]
backward 413 first_matches : [[0, 2]]
backward 445 matches : [[0, 2]]
backward 489 Candidates : []
backward 730 matches : [[0, 2]]
backward 771 matches : []
backward 445 matches : [[0, 2]]
backward 480 matches : [[0, 2]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[0, 2]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9121AB0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A810>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
check if the operation are the same : True True True
forward 466 : [[1, 1], [2, 2]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9121C30>
forward 468 append match : [[1, 1], [2, 2]]
matching 386 forward [[1, 1], [2, 2]]
backward 413 first_matches : [[1, 1], [2, 2]]
backward 445 matches : [[1, 1], [2, 2]]
backward 489 Candidates : []
backward 702 matches : [[1, 1], [2, 2]]
backward 445 matches : [[1, 1], [2, 2]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B40A0>]
matching WORKING WITH <generator object TemplateMatching._sublist at

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0x00000220B906A810>
matching [] th _sublist is working..
forward 422 candidates : [3]
in candidates : 3 match is False
check if the operation are the same : True True True
forward 466 : [[2, 0], [3, 1]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9121C30>
forward 468 append match : [[2, 0], [3, 1]]
forward 422 candidates : [4]
in candidates : 4 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[2, 0], [3, 1]]
backward 413 first_matches : [[2, 0], [3, 1]]
backward 445 matches : [[2, 0], [3, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B4460>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A810>
matching [] th _sublist is working..
matching 386 forward [[2, 2]]
backward 413 first_matches : [[2, 2]]
backward 445 matches : [[2, 2]]
backward 489 Candidates : []
backward 730 matches : [[2, 2]]
backward 771 matches : []
backward 445 matches : [[2, 2]]
backward 480 matches : [[2, 2]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[2, 2]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9121DE0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A810>
matching [0] th _sublist is working..
forward 422 candidates : [4]
in candidates : 4 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[3, 1]]
backward 413 first_matches : [[3, 1]]
backward 445 matches : [[3, 1]]

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backward 489 Candidates : []
backward 702 matches : [[3, 1]]
backward 445 matches : [[3, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9121C30>]
143 optimization template :
»
q_0:                                »
                                     »
q_1:  X   Rz()   X   Rz(-)   Rz(/2)   Rx(/2)   Rz(/2)   Rx()  »
                                     »
«
«q_0: 0
«   Rz(-)
«q_1: 1           Rz(/2)   Rx(/2)   Rz(/2)
«
150 optimization max_matches : [[0, 0], [1, 1], [2, 2]]
150 optimization max_matches : [[2, 0], [3, 1]]
150 optimization max_matches : [[0, 2]]
Circuit Params : [0.42]
Circuit Params : set()
Circuit Params : [0.42]
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
161 optimization substitution_list : [<qiskit.transpiler.passes.optimization.tem
plate_matching.template_substitution.SubstitutionConfig object at
0x00000220B90B6FB0>]
162 optimization unmatched_list : []
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9118DD0>
matching [0] th _sublist is working...
forward 422 candidates : [4]
in candidates : 4 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[3, 4]]
backward 413 first_matches : [[3, 4]]
backward 445 matches : [[3, 4]]
backward 489 Candidates : []
backward 702 matches : [[3, 4]]
backward 445 matches : [[3, 4]]
backward 489 Candidates : []
backward 730 matches : [[3, 4]]
backward 771 matches : []
backward 445 matches : [[3, 4]]
backward 480 matches : [[3, 4]]
backward 445 matches : []

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backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 4]]
backward 480 matches : [[3, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91306A0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9118DD0>
matching [] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
sufficient conditions for a match to happen : False True True
matching 386 forward [[4, 3]]
backward 413 first_matches : [[4, 3]]
backward 445 matches : [[4, 3]]
backward 489 Candidates : []
backward 702 matches : [[4, 3]]
backward 445 matches : [[4, 3]]
backward 489 Candidates : []
backward 730 matches : [[4, 3]]
backward 771 matches : []
backward 445 matches : [[4, 3]]
backward 480 matches : [[4, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 3]]
backward 480 matches : [[4, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9130370>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9118DD0>
matching [0] th _sublist is working..
forward 422 candidates : []
matching 386 forward [[5, 1]]
backward 413 first_matches : [[5, 1]]

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backward 445 matches : [[5, 1]]
backward 489 Candidates : []
backward 702 matches : [[5, 1]]
backward 445 matches : [[5, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9123E50>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B990>
matching [0] th _sublist is working..
forward 422 candidates : []
matching 386 forward [[5, 4]]
backward 413 first_matches : [[5, 4]]
backward 445 matches : [[5, 4]]
backward 489 Candidates : []
backward 702 matches : [[5, 4]]
backward 445 matches : [[5, 4]]
backward 489 Candidates : []
backward 730 matches : [[5, 4]]
backward 771 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9122EC0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B990>
matching [0] th _sublist is working..
forward 422 candidates : []
forward 422 candidates : []
matching 386 forward [[5, 6]]
backward 413 first_matches : [[5, 6]]
backward 445 matches : [[5, 6]]
backward 489 Candidates : []
backward 730 matches : [[5, 6]]
backward 771 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]

```

```

backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9123BE0>]
143 optimization template :

q_0:      Ry(-)      Rx(/2) 0      Rx(- /2)
          Rzx()
q_1:  X      X      1

150 optimization max_matches : [[3, 4]]
150 optimization max_matches : [[4, 3]]
150 optimization max_matches : [[5, 1]]
150 optimization max_matches : [[5, 4]]
150 optimization max_matches : [[5, 6]]
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]

```

```

Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3, 4, 5, 6, 7, 8]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906BAE0>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 1]]
backward 413 first_matches : [[1, 1]]
backward 445 matches : [[1, 1]]
backward 489 Candidates : []
backward 702 matches : [[1, 1]]
backward 445 matches : [[1, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9122AA0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906BAE0>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 4]]
backward 413 first_matches : [[1, 4]]
backward 445 matches : [[1, 4]]
backward 489 Candidates : []
backward 702 matches : [[1, 4]]
backward 445 matches : [[1, 4]]
backward 489 Candidates : []
backward 730 matches : [[1, 4]]
backward 771 matches : []
backward 445 matches : [[1, 4]]
backward 480 matches : [[1, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 4]]
backward 480 matches : [[1, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9122DD0>]

```

```

matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906BAE0>
matching [0] th _sublist is working...
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 6]]
backward 413 first_matches : [[1, 6]]
backward 445 matches : [[1, 6]]
backward 489 Candidates : []
backward 730 matches : [[1, 6]]
backward 771 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9121900>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906BAE0>
matching [0] th _sublist is working...

```

```

matching 386 forward [[3, 8]]
backward 413 first_matches : [[3, 8]]
backward 445 matches : [[3, 8]]
backward 489 Candidates : []
backward 702 matches : [[3, 8]]
backward 445 matches : [[3, 8]]
backward 489 Candidates : []
backward 730 matches : [[3, 8]]
backward 771 matches : []
backward 445 matches : [[3, 8]]
backward 480 matches : [[3, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 8]]
backward 480 matches : [[3, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 8]]
backward 480 matches : [[3, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 8]]
backward 480 matches : [[3, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 8]]
backward 480 matches : [[3, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91213C0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906BAE0>
matching [0] th _sublist is working..
forward 422 candidates : [5]

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in candidates : 5 match is False
forward 422 TF : False
matching 386 forward [[4, 4]]
backward 413 first_matches : [[4, 4]]
backward 445 matches : [[4, 4]]
backward 489 Candidates : []
backward 702 matches : [[4, 4]]
backward 445 matches : [[4, 4]]
backward 489 Candidates : []
backward 730 matches : [[4, 4]]
backward 771 matches : []
backward 445 matches : [[4, 4]]
backward 480 matches : [[4, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 4]]
backward 480 matches : [[4, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9120880>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906BAE0>
matching [0] th _sublist is working..
matching 386 forward [[5, 8]]
backward 413 first_matches : [[5, 8]]
backward 445 matches : [[5, 8]]
backward 489 Candidates : []
backward 702 matches : [[5, 8]]
backward 445 matches : [[5, 8]]
backward 489 Candidates : []
backward 730 matches : [[5, 8]]
backward 771 matches : []
backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []

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backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9121C30>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906BAE0>
matching [] th _sublist is working..
forward 422 candidates : [7]
in candidates : 7 match is False
sufficient conditions for a match to happen : False True False
matching 386 forward [[6, 3]]
backward 413 first_matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 702 matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 730 matches : [[6, 3]]
backward 771 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []

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backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91223E0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906BAE0>
matching [0] th _sublist is working..
matching 386 forward [[7, 8]]
backward 413 first_matches : [[7, 8]]
backward 445 matches : [[7, 8]]
backward 489 Candidates : []
backward 702 matches : [[7, 8]]
backward 445 matches : [[7, 8]]
backward 489 Candidates : []
backward 730 matches : [[7, 8]]
backward 771 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []

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backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9121390>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906BAE0>
matching [0] th _sublist is working..
forward 422 candidates : [9]
in candidates : 9 match is False
forward 422 TF : False
matching 386 forward [[8, 4]]
backward 413 first_matches : [[8, 4]]
backward 445 matches : [[8, 4]]
backward 489 Candidates : []
backward 702 matches : [[8, 4]]
backward 445 matches : [[8, 4]]
backward 489 Candidates : []
backward 730 matches : [[8, 4]]
backward 771 matches : []
backward 445 matches : [[8, 4]]
backward 480 matches : [[8, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[8, 4]]
backward 480 matches : [[8, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[8, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B7E80>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906BAE0>
matching [0] th _sublist is working..
matching 386 forward [[9, 8]]
backward 413 first_matches : [[9, 8]]
backward 445 matches : [[9, 8]]
backward 489 Candidates : []
backward 702 matches : [[9, 8]]
backward 445 matches : [[9, 8]]
backward 489 Candidates : []
backward 730 matches : [[9, 8]]
backward 771 matches : []

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backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9121DB0>]
143 optimization template :
      »
q_0:  X          X  Rz( /2)  Rx( /2)  Rz( /2)  0          »
                                     Rzx(-) »
q_1:  Rx()                1          »
                                                                    »
«
«q_0:  Rz( /2)  Rx( /2)  Rz( /2)
«
«q_1:
«
150 optimization max_matches : [[1, 1]]
150 optimization max_matches : [[1, 4]]

```

```

150 optimization max_matches : [[1, 6]]
150 optimization max_matches : [[3, 8]]
150 optimization max_matches : [[4, 4]]
150 optimization max_matches : [[5, 8]]
150 optimization max_matches : [[6, 3]]
150 optimization max_matches : [[7, 8]]
150 optimization max_matches : [[8, 4]]
150 optimization max_matches : [[9, 8]]
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3, 4, 5, 6, 7, 8]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9118970>
matching [0] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
check if the operation are the same : True True True
forward 466 : [[4, 0], [5, 1]]
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B91338B0>
forward 468 append match : [[4, 0], [5, 1]]
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[4, 0], [5, 1]]
backward 413 first_matches : [[4, 0], [5, 1]]
backward 445 matches : [[4, 0], [5, 1]]

```

```

matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91336D0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9118970>
matching [0] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
sufficient conditions for a match to happen : True True True
forward 422 candidates : [5]
in candidates : 5 match is False
check if the operation are the same : True True True
forward 466 : [[4, 2], [5, 4]]
Circuit Params : [-1.5707963267948966, ParameterExpression(-0.42)]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9133A00>
forward 468 append match : [[4, 2], [5, 4]]
matching 386 forward [[4, 2], [5, 4]]
backward 413 first_matches : [[4, 2], [5, 4]]
backward 445 matches : [[4, 2], [5, 4]]
backward 489 Candidates : []
backward 730 matches : [[4, 2], [5, 4]]
backward 771 matches : []
backward 445 matches : [[4, 2], [5, 4]]
backward 480 matches : [[4, 2], [5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 2], [5, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9133CA0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A9D0>
matching [0] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
check if the operation are the same : True True True
forward 466 : [[4, 5], [5, 6]]
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9133BE0>
forward 468 append match : [[4, 5], [5, 6]]
forward 422 candidates : [6]
in candidates : 6 match is False

```

```

sufficient conditions for a match to happen : True True True
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[4, 5], [5, 6]]
backward 413 first_matches : [[4, 5], [5, 6]]
backward 445 matches : [[4, 5], [5, 6]]
backward 489 Candidates : []
backward 730 matches : [[4, 5], [5, 6]]
backward 771 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 489 Candidates : []
backward 730 matches : [[4, 5], [5, 6]]
backward 771 matches : []
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 480 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 480 matches : []
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 480 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 480 matches : []
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 480 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 480 matches : []
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 445 matches : []
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9133250>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A9D0>
matching [0] th _sublist is working..
matching 386 forward [[4, 7]]

```

```

backward 413 first_matches : [[4, 7]]
backward 445 matches : [[4, 7]]
backward 489 Candidates : []
backward 702 matches : [[4, 7]]
backward 445 matches : [[4, 7]]
backward 489 Candidates : []
backward 730 matches : [[4, 7]]
backward 771 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9121360>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A9D0>
matching [0] th _sublist is working..
matching 386 forward [[4, 8]]
backward 413 first_matches : [[4, 8]]

```



```

backward 445 matches : [[4, 8]]
backward 489 Candidates : []
backward 702 matches : [[4, 8]]
backward 445 matches : [[4, 8]]
backward 489 Candidates : []
backward 730 matches : [[4, 8]]
backward 771 matches : []
backward 445 matches : [[4, 8]]
backward 480 matches : [[4, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 8]]
backward 480 matches : [[4, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 8]]
backward 480 matches : [[4, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 8]]
backward 480 matches : [[4, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 8]]
backward 480 matches : [[4, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B6A40>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A9D0>
matching [0] th _sublist is working..
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True

```

```

matching 386 forward [[5, 1]]
backward 413 first_matches : [[5, 1]]
backward 445 matches : [[5, 1]]
backward 489 Candidates : []
backward 702 matches : [[5, 1]]
backward 445 matches : [[5, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9133B20>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A9D0>
matching [0] th _sublist is working..
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[5, 4]]
backward 413 first_matches : [[5, 4]]
backward 445 matches : [[5, 4]]
backward 489 Candidates : []
backward 702 matches : [[5, 4]]
backward 445 matches : [[5, 4]]
backward 489 Candidates : []
backward 730 matches : [[5, 4]]
backward 771 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91330A0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A9D0>
matching [0] th _sublist is working..
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True

```

```

matching 386 forward [[5, 6]]
backward 413 first_matches : [[5, 6]]
backward 445 matches : [[5, 6]]
backward 489 Candidates : []
backward 730 matches : [[5, 6]]
backward 771 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9131690>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A9D0>
matching [] th _sublist is working..
forward 422 candidates : [7]
in candidates : 7 match is False
forward 422 TF : False
matching 386 forward [[6, 3]]
backward 413 first_matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 702 matches : [[6, 3]]
backward 445 matches : [[6, 3]]

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backward 489 Candidates : []
backward 730 matches : [[6, 3]]
backward 771 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9133AF0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A9D0>
matching [0] th _sublist is working..
matching 386 forward [[7, 8]]
backward 413 first_matches : [[7, 8]]
backward 445 matches : [[7, 8]]
backward 489 Candidates : []
backward 702 matches : [[7, 8]]
backward 445 matches : [[7, 8]]
backward 489 Candidates : []
backward 730 matches : [[7, 8]]
backward 771 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []

```

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backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9133BE0>]
143 optimization template :

q_0:          0
          Rzx(-)
q_1:  X  Ry()  X  Ry(-)  Rz(- /2)  Rx()  1          Rz( /2)

150 optimization max_matches : [[4, 0], [5, 1]]
150 optimization max_matches : [[4, 2], [5, 4]]
150 optimization max_matches : [[4, 5], [5, 6]]
150 optimization max_matches : [[4, 7]]
150 optimization max_matches : [[4, 8]]
150 optimization max_matches : [[6, 3]]
150 optimization max_matches : [[7, 8]]
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
Circuit Params : [-1.5707963267948966, ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3, 4, 5, 6, 7, 8]

```

```
[ ]:
q_0: 0
      Rzx(0.42)
q_1: Rz(- /2) Rx(- /2) Rz(- /2) 1 Rx(-0.42)
      <<
<q_0:
<
<q_1: Rz(- /2) Rx(- /2) Rz(- /2) Rz(0.42)
<
```

```
[ ]: #check
inv_opt_circ = opt_circ.inverse()
inv_opt_circ.draw()
```

```
[ ]:
q_0: 0
      Rzx(-0.42)
q_1: Rz(-0.42) Rz( /2) Rx( /2) Rz( /2) Rx(0.42) 1
      <<
<q_0:
<
<q_1: Rz( /2) Rx( /2) Rz( /2)
<
```

```
[ ]: id_circ = test_circ.compose(inv_opt_circ)
id_circ.draw()
```

```
[ ]:
q_0:
      <<
      <<
q_1: X Rz(0.42) X Rz(-0.42) Rz( /2) Rx( /2) Rz( /2) >>
      >>
<
<q_0: 0
<
      Rzx(-0.42)
<q_1: Rx(0.42) 1 Rz( /2) Rx( /2) Rz( /2)
<
```

```
[ ]: import qiskit.quantum_info as qi
op = qi.Operator(id_circ)
print(op)
```

```
Operator([[[-1.+0.j, 0.+0.j, 0.+0.j, 0.+0.j],
           [ 0.+0.j, -1.+0.j, 0.+0.j, 0.+0.j],
```

```

    [ 0.+0.j,  0.+0.j, -1.+0.j,  0.+0.j],
    [ 0.+0.j,  0.+0.j,  0.+0.j, -1.+0.j]],
    input_dims=(2, 2), output_dims=(2, 2))

```

2 Example 2 : cx-z(theta)-cx-z(-theta) (originally worked)

```

[ ]: test_circ = QuantumCircuit(2)
test_circ.cx(0, 1)
test_circ.rz(0.42, 1)
test_circ.cx(0, 1)
test_circ.rz(-0.42, 1)

test_circ.draw()

```

```

[ ]:
q_0:
q_1: X   Rz(0.42)   X   Rz(-0.42)

```

```

[ ]: pass_ = TemplateOptimization(**rzx_templates.rzx_templates())

circuit_dag=circuit_to_dag(test_circ)
passtemp = pass_.run(circuit_dag)
opt_circ = dag_to_circuit(passtemp)
opt_circ.draw()

```

```

matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1B9F50>
matching [ ] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
check if the operation are the same : True True True
forward 466 : [[0, 0], [1, 1]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1BD960>
forward 468 append match : [[0, 0], [1, 1]]
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[0, 0], [1, 1]]
backward 413 first_matches : [[0, 0], [1, 1]]
backward 445 matches : [[0, 0], [1, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match

```

```

object at 0x000001C67F76DC00>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1B9F50>
matching [] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
check if the operation are the same : True True True
forward 466 : [[0, 2], [1, 3]]
Circuit Params : [-0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1CE4D0>
forward 468 append match : [[0, 2], [1, 3]]
matching 386 forward [[0, 2], [1, 3]]
backward 413 first_matches : [[0, 2], [1, 3]]
backward 445 matches : [[0, 2], [1, 3]]
backward 489 Candidates : []
backward 730 matches : [[0, 2], [1, 3]]
backward 771 matches : []
backward 445 matches : [[0, 2], [1, 3]]
backward 480 matches : [[0, 2], [1, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[0, 2], [1, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1E7850>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1B9F50>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 1]]
backward 413 first_matches : [[1, 1]]
backward 445 matches : [[1, 1]]
backward 489 Candidates : []
backward 702 matches : [[1, 1]]
backward 445 matches : [[1, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C67F775330>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1B9F50>
matching [0] th _sublist is working..
matching 386 forward [[1, 3]]

```



```

backward 413 first_matches : [[1, 3]]
backward 445 matches : [[1, 3]]
backward 489 Candidates : []
backward 730 matches : [[1, 3]]
backward 771 matches : []
backward 445 matches : [[1, 3]]
backward 480 matches : [[1, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 3]]
backward 480 matches : [[1, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1BE050>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1B9F50>
matching [] th _sublist is working..
forward 422 candidates : [7]
in candidates : 7 match is False
check if the operation are the same : True True True
forward 466 : [[6, 0], [7, 1]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1E53F0>
forward 468 append match : [[6, 0], [7, 1]]
forward 422 candidates : [8]
in candidates : 8 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[6, 0], [7, 1]]
backward 413 first_matches : [[6, 0], [7, 1]]
backward 445 matches : [[6, 0], [7, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C67F76D000>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1B9F50>
matching [] th _sublist is working..
forward 422 candidates : [7]
in candidates : 7 match is False
check if the operation are the same : True True True
forward 466 : [[6, 2], [7, 3]]

```

```

Circuit Params : [-0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1E7BB0>
forward 468 append match : [[6, 2], [7, 3]]
matching 386 forward [[6, 2], [7, 3]]
backward 413 first_matches : [[6, 2], [7, 3]]
backward 445 matches : [[6, 2], [7, 3]]
backward 489 Candidates : []
backward 730 matches : [[6, 2], [7, 3]]
backward 771 matches : []
backward 445 matches : [[6, 2], [7, 3]]
backward 480 matches : [[6, 2], [7, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 2], [7, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1E7BB0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1B9F50>
matching [0] th _sublist is working..
forward 422 candidates : [8]
in candidates : 8 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[7, 1]]
backward 413 first_matches : [[7, 1]]
backward 445 matches : [[7, 1]]
backward 489 Candidates : []
backward 702 matches : [[7, 1]]
backward 445 matches : [[7, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1D4280>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1B9F50>
matching [0] th _sublist is working..
matching 386 forward [[7, 3]]
backward 413 first_matches : [[7, 3]]
backward 445 matches : [[7, 3]]
backward 489 Candidates : []
backward 730 matches : [[7, 3]]
backward 771 matches : []
backward 445 matches : [[7, 3]]
backward 480 matches : [[7, 3]]
backward 445 matches : []

```

```

backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 3]]
backward 480 matches : [[7, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1CDE40>]
143 optimization template :
»
q_0:                                »
                                »
q_1:  X   Rz()  √X  Rz()  √X  Rz(3)  X   Rz(-)  Rz(/2)  »
                                »
«                                »
«q_0:                                »
«                                Rzx(-)  »
«q_1:  Rx(/2)  Rz(/2)  Rx()  1          Rz(/2)  Rx(/2)  »
«                                »
«
«q_0:
«
«q_1:  Rz(/2)
«
150 optimization max_matches : [[0, 0], [1, 1]]
150 optimization max_matches : [[0, 2], [1, 3]]
150 optimization max_matches : [[6, 0], [7, 1]]
150 optimization max_matches : [[6, 2], [7, 3]]
Circuit Params : [0.42]
Circuit Params : set()
Circuit Params : [-0.42]
Circuit Params : set()
Circuit Params : [0.42]
Circuit Params : set()
Circuit Params : [-0.42]
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BBBC0>
matching [] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
sufficient conditions for a match to happen : False False True

```

```

matching 386 forward [[0, 0]]
backward 413 first_matches : [[0, 0]]
backward 445 matches : [[0, 0]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1D7C10>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BBBC0>
matching [] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
sufficient conditions for a match to happen : False False True
matching 386 forward [[0, 2]]
backward 413 first_matches : [[0, 2]]
backward 445 matches : [[0, 2]]
backward 489 Candidates : []
backward 730 matches : [[0, 2]]
backward 771 matches : []
backward 445 matches : [[0, 2]]
backward 480 matches : [[0, 2]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[0, 2]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C67F4F5E40>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BBBC0>
matching [] th _sublist is working..
forward 422 candidates : [3]
in candidates : 3 match is False
sufficient conditions for a match to happen : False False True
matching 386 forward [[2, 0]]
backward 413 first_matches : [[2, 0]]
backward 445 matches : [[2, 0]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1E5C30>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BBBC0>
matching [] th _sublist is working..
forward 422 candidates : [3]
in candidates : 3 match is False
sufficient conditions for a match to happen : False False True
matching 386 forward [[2, 2]]
backward 413 first_matches : [[2, 2]]

```

```

backward 445 matches : [[2, 2]]
backward 489 Candidates : []
backward 730 matches : [[2, 2]]
backward 771 matches : []
backward 445 matches : [[2, 2]]
backward 480 matches : [[2, 2]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[2, 2]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1DDBA0>]
143 optimization template :
»
q_0:                                »
                                »
q_1:  X   P()   X   P(-)   Rz(/2)   Rx(/2)   Rz(/2)   Rx()  »
                                »
«
«q_0: 0
«   Rz(-)
«q_1: 1           Rz(/2)   Rx(/2)   Rz(/2)
«
150 optimization max_matches : [[0, 0]]
150 optimization max_matches : [[0, 2]]
150 optimization max_matches : [[2, 0]]
150 optimization max_matches : [[2, 2]]
Circuit Params : []
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB0D0>
matching [] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
check if the operation are the same : True True True
forward 466 : [[0, 0], [1, 1]]
Circuit Params : [0.42]
Circuit Params : set()

```

```

forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1DE8F0>
forward 468 append match : [[0, 0], [1, 1]]
forward 422 candidates : [2]
in candidates : 2 match is False
check if the operation are the same : True True True
forward 466 : [[0, 0], [1, 1], [2, 2]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1DEE00>
forward 468 append match : [[0, 0], [1, 1], [2, 2]]
forward 422 candidates : [3]
in candidates : 3 match is False
check if the operation are the same : True True True
forward 466 : [[0, 0], [1, 1], [2, 2], [3, 3]]
Circuit Params : [0.42, -0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1DF7F0>
forward 468 append match : [[0, 0], [1, 1], [2, 2], [3, 3]]
matching 386 forward [[0, 0], [1, 1], [2, 2], [3, 3]]
backward 413 first_matches : [[0, 0], [1, 1], [2, 2], [3, 3]]
backward 445 matches : [[0, 0], [1, 1], [2, 2], [3, 3]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1D7D60>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB0D0>
matching [] th _sublist is working...
forward 422 candidates : [1]
in candidates : 1 match is False
check if the operation are the same : True True True
forward 466 : [[0, 2], [1, 3]]
Circuit Params : [-0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1DF550>
forward 468 append match : [[0, 2], [1, 3]]
matching 386 forward [[0, 2], [1, 3]]
backward 413 first_matches : [[0, 2], [1, 3]]
backward 445 matches : [[0, 2], [1, 3]]
backward 489 Candidates : []
backward 730 matches : [[0, 2], [1, 3]]
backward 771 matches : []
backward 445 matches : [[0, 2], [1, 3]]
backward 480 matches : [[0, 2], [1, 3]]
backward 445 matches : []

```

```

backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[0, 2], [1, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1DDF00>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB0D0>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
check if the operation are the same : True True True
forward 466 : [[1, 1], [2, 2]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1DEE30>
forward 468 append match : [[1, 1], [2, 2]]
forward 422 candidates : [3]
in candidates : 3 match is False
check if the operation are the same : True True True
forward 466 : [[1, 1], [2, 2], [3, 3]]
Circuit Params : [0.42, -0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1DCA90>
forward 468 append match : [[1, 1], [2, 2], [3, 3]]
matching 386 forward [[1, 1], [2, 2], [3, 3]]
backward 413 first_matches : [[1, 1], [2, 2], [3, 3]]
backward 445 matches : [[1, 1], [2, 2], [3, 3]]
backward 489 Candidates : []
backward 702 matches : [[1, 1], [2, 2], [3, 3]]
backward 445 matches : [[1, 1], [2, 2], [3, 3]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1E7F40>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB0D0>
matching [0] th _sublist is working..
matching 386 forward [[1, 3]]
backward 413 first_matches : [[1, 3]]
backward 445 matches : [[1, 3]]
backward 489 Candidates : []
backward 730 matches : [[1, 3]]
backward 771 matches : []
backward 445 matches : [[1, 3]]
backward 480 matches : [[1, 3]]

```

```

backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 3]]
backward 480 matches : [[1, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1E5B40>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB0D0>
matching [] th _sublist is working..
forward 422 candidates : [3]
in candidates : 3 match is False
check if the operation are the same : True True True
forward 466 : [[2, 0], [3, 1]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1DFFA0>
forward 468 append match : [[2, 0], [3, 1]]
forward 422 candidates : [4]
in candidates : 4 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[2, 0], [3, 1]]
backward 413 first_matches : [[2, 0], [3, 1]]
backward 445 matches : [[2, 0], [3, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1E6440>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB0D0>
matching [] th _sublist is working..
forward 422 candidates : [3]
in candidates : 3 match is False
check if the operation are the same : True True True
forward 466 : [[2, 2], [3, 3]]
Circuit Params : [-0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1E7C10>
forward 468 append match : [[2, 2], [3, 3]]
matching 386 forward [[2, 2], [3, 3]]
backward 413 first_matches : [[2, 2], [3, 3]]

```



```

backward 445 matches : [[2, 2], [3, 3]]
backward 489 Candidates : []
backward 730 matches : [[2, 2], [3, 3]]
backward 771 matches : []
backward 445 matches : [[2, 2], [3, 3]]
backward 480 matches : [[2, 2], [3, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[2, 2], [3, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1DCD90>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB0D0>
matching [0] th _sublist is working..
forward 422 candidates : [4]
in candidates : 4 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[3, 1]]
backward 413 first_matches : [[3, 1]]
backward 445 matches : [[3, 1]]
backward 489 Candidates : []
backward 702 matches : [[3, 1]]
backward 445 matches : [[3, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1E7C10>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB0D0>
matching [0] th _sublist is working..
matching 386 forward [[3, 3]]
backward 413 first_matches : [[3, 3]]
backward 445 matches : [[3, 3]]
backward 489 Candidates : []
backward 730 matches : [[3, 3]]
backward 771 matches : []
backward 445 matches : [[3, 3]]
backward 480 matches : [[3, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 3]]
backward 480 matches : [[3, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []

```

```

backward 445 matches : [[3, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1E7130>]
143 optimization template :
»
q_0:                                »
                                »
q_1:  X   Rz()   X   Rz(-)   Rz(/2)   Rx(/2)   Rz(/2)   Rx()  »
                                »
«
«q_0: 0
«   Rz(-)
«q_1: 1           Rz(/2)   Rx(/2)   Rz(/2)
«
150 optimization max_matches : [[0, 0], [1, 1], [2, 2], [3, 3]]
150 optimization max_matches : [[0, 2], [1, 3]]
150 optimization max_matches : [[2, 0], [3, 1]]
Circuit Params : [0.42, -0.42]
Circuit Params : set()
Circuit Params : [-0.42]
Circuit Params : set()
Circuit Params : [0.42]
Circuit Params : set()
161 optimization substitution_list : [<qiskit.transpiler.passes.optimization.tem
plate_matching.template_substitution.SubstitutionConfig object at
0x000001C60C1DD480>]
162 optimization unmatched_list : []
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BAAB0>
matching [0] th _sublist is working..
forward 422 candidates : [4]
in candidates : 4 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[3, 4]]
backward 413 first_matches : [[3, 4]]
backward 445 matches : [[3, 4]]
backward 489 Candidates : []
backward 702 matches : [[3, 4]]
backward 445 matches : [[3, 4]]
backward 489 Candidates : []
backward 730 matches : [[3, 4]]
backward 771 matches : []
backward 445 matches : [[3, 4]]
backward 480 matches : [[3, 4]]
backward 445 matches : []
backward 489 Candidates : []

```

```

backward 702 matches : []
backward 445 matches : [[3, 4]]
backward 480 matches : [[3, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F4220>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BAAB0>
matching [] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
sufficient conditions for a match to happen : False True True
matching 386 forward [[4, 3]]
backward 413 first_matches : [[4, 3]]
backward 445 matches : [[4, 3]]
backward 489 Candidates : []
backward 702 matches : [[4, 3]]
backward 445 matches : [[4, 3]]
backward 489 Candidates : []
backward 730 matches : [[4, 3]]
backward 771 matches : []
backward 445 matches : [[4, 3]]
backward 480 matches : [[4, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 3]]
backward 480 matches : [[4, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F6A10>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BAAB0>
matching [0] th _sublist is working..
forward 422 candidates : []
matching 386 forward [[5, 1]]
backward 413 first_matches : [[5, 1]]
backward 445 matches : [[5, 1]]

```

```

backward 489 Candidates : []
backward 702 matches : [[5, 1]]
backward 445 matches : [[5, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F4700>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BAAB0>
matching [0] th _sublist is working..
forward 422 candidates : []
matching 386 forward [[5, 4]]
backward 413 first_matches : [[5, 4]]
backward 445 matches : [[5, 4]]
backward 489 Candidates : []
backward 702 matches : [[5, 4]]
backward 445 matches : [[5, 4]]
backward 489 Candidates : []
backward 730 matches : [[5, 4]]
backward 771 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F4A00>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BAAB0>
matching [0] th _sublist is working..
forward 422 candidates : []
matching 386 forward [[5, 6]]
backward 413 first_matches : [[5, 6]]
backward 445 matches : [[5, 6]]
backward 489 Candidates : []
backward 730 matches : [[5, 6]]
backward 771 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []

```

```

backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F65F0>]
143 optimization template :

q_0:      Ry(-)      Rx(/2) 0      Rx(- /2)
          Rzx()
q_1:  X      X      1

150 optimization max_matches : [[3, 4]]
150 optimization max_matches : [[4, 3]]
150 optimization max_matches : [[5, 1]]
150 optimization max_matches : [[5, 4]]
150 optimization max_matches : [[5, 6]]
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
161 optimization substitution_list : []

```

```

162 optimization unmatched_list : [0, 1, 2, 3, 4, 5, 6, 7]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BBD10>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 1]]
backward 413 first_matches : [[1, 1]]
backward 445 matches : [[1, 1]]
backward 489 Candidates : []
backward 702 matches : [[1, 1]]
backward 445 matches : [[1, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F6560>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BBD10>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 4]]
backward 413 first_matches : [[1, 4]]
backward 445 matches : [[1, 4]]
backward 489 Candidates : []
backward 702 matches : [[1, 4]]
backward 445 matches : [[1, 4]]
backward 489 Candidates : []
backward 730 matches : [[1, 4]]
backward 771 matches : []
backward 445 matches : [[1, 4]]
backward 480 matches : [[1, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 4]]
backward 480 matches : [[1, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F5A50>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BBD10>

```

```

matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 6]]
backward 413 first_matches : [[1, 6]]
backward 445 matches : [[1, 6]]
backward 489 Candidates : []
backward 730 matches : [[1, 6]]
backward 771 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F4CA0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BBD10>
matching [0] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
forward 422 TF : False
matching 386 forward [[4, 4]]
backward 413 first_matches : [[4, 4]]

```

```

backward 445 matches : [[4, 4]]
backward 489 Candidates : []
backward 702 matches : [[4, 4]]
backward 445 matches : [[4, 4]]
backward 489 Candidates : []
backward 730 matches : [[4, 4]]
backward 771 matches : []
backward 445 matches : [[4, 4]]
backward 480 matches : [[4, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 4]]
backward 480 matches : [[4, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F6320>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BBD10>
matching [] th _sublist is working..
forward 422 candidates : [7]
in candidates : 7 match is False
sufficient conditions for a match to happen : False True False
matching 386 forward [[6, 3]]
backward 413 first_matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 702 matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 730 matches : [[6, 3]]
backward 771 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]

```



```

backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F5A80>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BBD10>
matching [0] th _sublist is working...
forward 422 candidates : [9]
in candidates : 9 match is False
forward 422 TF : False
matching 386 forward [[8, 4]]
backward 413 first_matches : [[8, 4]]
backward 445 matches : [[8, 4]]
backward 489 Candidates : []
backward 702 matches : [[8, 4]]
backward 445 matches : [[8, 4]]
backward 489 Candidates : []
backward 730 matches : [[8, 4]]
backward 771 matches : []
backward 445 matches : [[8, 4]]
backward 480 matches : [[8, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[8, 4]]
backward 480 matches : [[8, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[8, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F7580>]
143 optimization template :
      »
q_0:  X      X  Rz(/2)  Rx(/2)  Rz(/2)  0      »
      Rzx(-) »
q_1:  Rx()      1      »
      »
«
«q_0:  Rz(/2)  Rx(/2)  Rz(/2)
«
«q_1:
«
150 optimization max_matches : [[1, 1]]
150 optimization max_matches : [[1, 4]]
150 optimization max_matches : [[1, 6]]

```

```

150 optimization max_matches : [[4, 4]]
150 optimization max_matches : [[6, 3]]
150 optimization max_matches : [[8, 4]]
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3, 4, 5, 6, 7]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB300>
matching [0] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
check if the operation are the same : True True True
forward 466 : [[4, 0], [5, 1]]
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1F6EF0>
forward 468 append match : [[4, 0], [5, 1]]
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[4, 0], [5, 1]]
backward 413 first_matches : [[4, 0], [5, 1]]
backward 445 matches : [[4, 0], [5, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1D7D60>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB300>
matching [0] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
sufficient conditions for a match to happen : True True True
forward 422 candidates : [5]
in candidates : 5 match is False
check if the operation are the same : True True True
forward 466 : [[4, 2], [5, 4]]

```

```

Circuit Params : [-1.5707963267948966, ParameterExpression(-0.42)]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1F7FD0>
forward 468 append match : [[4, 2], [5, 4]]
matching 386 forward [[4, 2], [5, 4]]
backward 413 first_matches : [[4, 2], [5, 4]]
backward 445 matches : [[4, 2], [5, 4]]
backward 489 Candidates : []
backward 730 matches : [[4, 2], [5, 4]]
backward 771 matches : []
backward 445 matches : [[4, 2], [5, 4]]
backward 480 matches : [[4, 2], [5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 2], [5, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F92A0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB300>
matching [0] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
check if the operation are the same : True True True
forward 466 : [[4, 5], [5, 6]]
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x000001C60C1F9510>
forward 468 append match : [[4, 5], [5, 6]]
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[4, 5], [5, 6]]
backward 413 first_matches : [[4, 5], [5, 6]]
backward 445 matches : [[4, 5], [5, 6]]
backward 489 Candidates : []
backward 730 matches : [[4, 5], [5, 6]]
backward 771 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 489 Candidates : []
backward 730 matches : [[4, 5], [5, 6]]
backward 771 matches : []
backward 445 matches : []
backward 489 Candidates : []

```

```

backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 480 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 480 matches : []
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 480 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 480 matches : []
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 480 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 480 matches : []
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F79D0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB300>
matching [0] th _sublist is working...
matching 386 forward [[4, 7]]
backward 413 first_matches : [[4, 7]]
backward 445 matches : [[4, 7]]
backward 489 Candidates : []
backward 730 matches : [[4, 7]]
backward 771 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]

```

```

backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F7C10>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB300>
matching [0] th _sublist is working..
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[5, 1]]
backward 413 first_matches : [[5, 1]]
backward 445 matches : [[5, 1]]
backward 489 Candidates : []
backward 702 matches : [[5, 1]]
backward 445 matches : [[5, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F7CA0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB300>
matching [0] th _sublist is working..
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[5, 4]]
backward 413 first_matches : [[5, 4]]
backward 445 matches : [[5, 4]]

```

```

backward 489 Candidates : []
backward 702 matches : [[5, 4]]
backward 445 matches : [[5, 4]]
backward 489 Candidates : []
backward 730 matches : [[5, 4]]
backward 771 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F6110>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB300>
matching [0] th _sublist is working..
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[5, 6]]
backward 413 first_matches : [[5, 6]]
backward 445 matches : [[5, 6]]
backward 489 Candidates : []
backward 730 matches : [[5, 6]]
backward 771 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []

```

```

backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F5450>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x000001C60C1BB300>
matching [] th _sublist is working..
forward 422 candidates : [7]
in candidates : 7 match is False
forward 422 TF : False
matching 386 forward [[6, 3]]
backward 413 first_matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 702 matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 730 matches : [[6, 3]]
backward 771 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x000001C60C1F7FD0>]
143 optimization template :

```

q_0:

0

```

                                Rzx(-)
q_1: X Ry() X Ry(-) Rz(- /2) Rx() 1 Rz( /2)

150 optimization max_matches : [[4, 0], [5, 1]]
150 optimization max_matches : [[4, 2], [5, 4]]
150 optimization max_matches : [[4, 5], [5, 6]]
150 optimization max_matches : [[4, 7]]
150 optimization max_matches : [[6, 3]]
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
Circuit Params : [-1.5707963267948966, ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3, 4, 5, 6, 7]

```

```

[ ]:
q_0: 0
      Rzx(0.42)
q_1: Rz(- /2) Rx(- /2) Rz(- /2) 1 Rx(-0.42)
      »
«
«q_0:
«
«q_1: Rz(- /2) Rx(- /2) Rz(- /2)
«

```

```

[ ]: #check
inv_opt_circ = opt_circ.inverse()
inv_opt_circ.draw()

id_circ = test_circ.compose(inv_opt_circ)
id_circ.draw()

```

```

[ ]:
q_0:
      »
      »
q_1: X Rz(0.42) X Rz(-0.42) Rz( /2) Rx( /2) Rz( /2) »
      »
«
«q_0: 0
«      Rzx(-0.42)

```



```

«q_1:  Rx(0.42)  1          Rz( /2)  Rx( /2)  Rz( /2)
«

```

```
[ ]: import qiskit.quantum_info as qi
```

```

op = qi.Operator(id_circ)
print(op)

```

```

Operator([[[-1.+0.j,  0.+0.j,  0.+0.j,  0.+0.j],
           [ 0.+0.j, -1.+0.j,  0.+0.j,  0.+0.j],
           [ 0.+0.j,  0.+0.j, -1.+0.j,  0.+0.j],
           [ 0.+0.j,  0.+0.j,  0.+0.j, -1.+0.j]],
          input_dims=(2, 2), output_dims=(2, 2))

```

3 Example 3 : cx-z(theta)-cx-z(pi/2) (Bug)

```
[ ]: test_circ = QuantumCircuit(2)
test_circ.cx(0, 1)
test_circ.rz(0.42, 1)
test_circ.cx(0, 1)
test_circ.rz(np.pi/2, 1)

test_circ.draw()

```

```
[ ]:
```

```

q_0:

q_1:  X   Rz(0.42)  X   Rz( /2)

```

```
[ ]: pass_ = TemplateOptimization(**rzx_templates.rzx_templates())
```

```

circuit_dag=circuit_to_dag(test_circ)
passtemp = pass_.run(circuit_dag)
opt_circ = dag_to_circuit(passtemp)
opt_circ.draw()

```

```

matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B911A340>
matching [ ] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
check if the operation are the same :  True True True
forward 466 : [[0, 0], [1, 1]]
Circuit Params :  [0.42]
Circuit Params :  set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at

```

```

0x00000220B9133400>
forward 468 append match : [[0, 0], [1, 1]]
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[0, 0], [1, 1]]
backward 413 first_matches : [[0, 0], [1, 1]]
backward 445 matches : [[0, 0], [1, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9130A60>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B7D0>
matching [] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
check if the operation are the same : True True True
forward 466 : [[0, 2], [1, 3]]
Circuit Params : [1.5707963267948966]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9132200>
forward 468 append match : [[0, 2], [1, 3]]
matching 386 forward [[0, 2], [1, 3]]
backward 413 first_matches : [[0, 2], [1, 3]]
backward 445 matches : [[0, 2], [1, 3]]
backward 489 Candidates : []
backward 730 matches : [[0, 2], [1, 3]]
backward 771 matches : []
backward 445 matches : [[0, 2], [1, 3]]
backward 480 matches : [[0, 2], [1, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[0, 2], [1, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9131FF0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B7D0>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 1]]
backward 413 first_matches : [[1, 1]]
backward 445 matches : [[1, 1]]

```

```

backward 489 Candidates : []
backward 702 matches : [[1, 1]]
backward 445 matches : [[1, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9133040>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B7D0>
matching [0] th _sublist is working..
matching 386 forward [[1, 3]]
backward 413 first_matches : [[1, 3]]
backward 445 matches : [[1, 3]]
backward 489 Candidates : []
backward 730 matches : [[1, 3]]
backward 771 matches : []
backward 445 matches : [[1, 3]]
backward 480 matches : [[1, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 3]]
backward 480 matches : [[1, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9132AD0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B7D0>
matching [] th _sublist is working..
forward 422 candidates : [7]
in candidates : 7 match is False
check if the operation are the same : True True True
forward 466 : [[6, 0], [7, 1]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9146170>
forward 468 append match : [[6, 0], [7, 1]]
forward 422 candidates : [8]
in candidates : 8 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[6, 0], [7, 1]]
backward 413 first_matches : [[6, 0], [7, 1]]
backward 445 matches : [[6, 0], [7, 1]]

```

```

matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9123940>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B7D0>
matching [] th _sublist is working..
forward 422 candidates : [7]
in candidates : 7 match is False
check if the operation are the same : True True True
forward 466 : [[6, 2], [7, 3]]
Circuit Params : [1.5707963267948966]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9132B90>
forward 468 append match : [[6, 2], [7, 3]]
matching 386 forward [[6, 2], [7, 3]]
backward 413 first_matches : [[6, 2], [7, 3]]
backward 445 matches : [[6, 2], [7, 3]]
backward 489 Candidates : []
backward 730 matches : [[6, 2], [7, 3]]
backward 771 matches : []
backward 445 matches : [[6, 2], [7, 3]]
backward 480 matches : [[6, 2], [7, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 2], [7, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9146890>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B7D0>
matching [0] th _sublist is working..
forward 422 candidates : [8]
in candidates : 8 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[7, 1]]
backward 413 first_matches : [[7, 1]]
backward 445 matches : [[7, 1]]
backward 489 Candidates : []
backward 702 matches : [[7, 1]]
backward 445 matches : [[7, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9132DA0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B7D0>

```

```

matching [0] th _sublist is working..
matching 386 forward [[7, 3]]
backward 413 first_matches : [[7, 3]]
backward 445 matches : [[7, 3]]
backward 489 Candidates : []
backward 730 matches : [[7, 3]]
backward 771 matches : []
backward 445 matches : [[7, 3]]
backward 480 matches : [[7, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 3]]
backward 480 matches : [[7, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9131570>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B7D0>
matching [0] th _sublist is working..
matching 386 forward [[8, 3]]
backward 413 first_matches : [[8, 3]]
backward 445 matches : [[8, 3]]
backward 489 Candidates : []
backward 730 matches : [[8, 3]]
backward 771 matches : []
backward 445 matches : [[8, 3]]
backward 480 matches : [[8, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[8, 3]]
backward 480 matches : [[8, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[8, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9132D10>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B7D0>

```

```

matching [0] th _sublist is working..
matching 386 forward [[10, 3]]
backward 413 first_matches : [[10, 3]]
backward 445 matches : [[10, 3]]
backward 489 Candidates : []
backward 730 matches : [[10, 3]]
backward 771 matches : []
backward 445 matches : [[10, 3]]
backward 480 matches : [[10, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[10, 3]]
backward 480 matches : [[10, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[10, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9132440>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B7D0>
matching [0] th _sublist is working..
matching 386 forward [[13, 3]]
backward 413 first_matches : [[13, 3]]
backward 445 matches : [[13, 3]]
backward 489 Candidates : []
backward 730 matches : [[13, 3]]
backward 771 matches : []
backward 445 matches : [[13, 3]]
backward 480 matches : [[13, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[13, 3]]
backward 480 matches : [[13, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[13, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9130AF0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B7D0>

```

```

matching [0] th _sublist is working..
matching 386 forward [[15, 3]]
backward 413 first_matches : [[15, 3]]
backward 445 matches : [[15, 3]]
backward 489 Candidates : []
backward 730 matches : [[15, 3]]
backward 771 matches : []
backward 445 matches : [[15, 3]]
backward 480 matches : [[15, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[15, 3]]
backward 480 matches : [[15, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[15, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9067D90>]
143 optimization template :
»
q_0:                                     »
                                     »
q_1:  X   Rz()  √X  Rz()  √X  Rz(3)  X   Rz(-)  Rz(/2)  »
                                     »
«                                     »
«q_0:                                     »
«                                     Rz(-)  »
«q_1:  Rx(/2)  Rz(/2)  Rx()  1          Rz(/2)  Rx(/2)  »
«                                     »
«
«q_0:
«
«q_1:  Rz(/2)
«
150 optimization max_matches : [[0, 0], [1, 1]]
150 optimization max_matches : [[0, 2], [1, 3]]
150 optimization max_matches : [[6, 0], [7, 1]]
150 optimization max_matches : [[6, 2], [7, 3]]
150 optimization max_matches : [[8, 3]]
150 optimization max_matches : [[10, 3]]
150 optimization max_matches : [[13, 3]]
150 optimization max_matches : [[15, 3]]
Circuit Params : [0.42]
Circuit Params : set()

```

```

Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [0.42]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91192A0>
matching [] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
sufficient conditions for a match to happen : False False True
matching 386 forward [[0, 0]]
backward 413 first_matches : [[0, 0]]
backward 445 matches : [[0, 0]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9157010>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91192A0>
matching [] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
sufficient conditions for a match to happen : False False True
matching 386 forward [[0, 2]]
backward 413 first_matches : [[0, 2]]
backward 445 matches : [[0, 2]]
backward 489 Candidates : []
backward 730 matches : [[0, 2]]
backward 771 matches : []
backward 445 matches : [[0, 2]]
backward 480 matches : [[0, 2]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[0, 2]]
backward 445 matches : []
matching 401 backward

```



```

[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9155480>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91192A0>
matching [] th _sublist is working..
forward 422 candidates : [3]
in candidates : 3 match is False
sufficient conditions for a match to happen : False False True
matching 386 forward [[2, 0]]
backward 413 first_matches : [[2, 0]]
backward 445 matches : [[2, 0]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9156A40>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91192A0>
matching [] th _sublist is working..
forward 422 candidates : [3]
in candidates : 3 match is False
sufficient conditions for a match to happen : False False True
matching 386 forward [[2, 2]]
backward 413 first_matches : [[2, 2]]
backward 445 matches : [[2, 2]]
backward 489 Candidates : []
backward 730 matches : [[2, 2]]
backward 771 matches : []
backward 445 matches : [[2, 2]]
backward 480 matches : [[2, 2]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[2, 2]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9156BF0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91192A0>
matching [0] th _sublist is working..
matching 386 forward [[4, 3]]
backward 413 first_matches : [[4, 3]]
backward 445 matches : [[4, 3]]
backward 489 Candidates : []
backward 730 matches : [[4, 3]]
backward 771 matches : []
backward 445 matches : [[4, 3]]
backward 480 matches : [[4, 3]]
backward 445 matches : []

```

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backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 3]]
backward 480 matches : [[4, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9156950>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91192A0>
matching [0] th _sublist is working..
matching 386 forward [[6, 3]]
backward 413 first_matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 730 matches : [[6, 3]]
backward 771 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9154D30>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91192A0>
matching [0] th _sublist is working..
matching 386 forward [[9, 3]]
backward 413 first_matches : [[9, 3]]
backward 445 matches : [[9, 3]]
backward 489 Candidates : []
backward 730 matches : [[9, 3]]
backward 771 matches : []
backward 445 matches : [[9, 3]]
backward 480 matches : [[9, 3]]
backward 445 matches : []

```

```

backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 3]]
backward 480 matches : [[9, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9156CB0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91192A0>
matching [0] th _sublist is working..
matching 386 forward [[11, 3]]
backward 413 first_matches : [[11, 3]]
backward 445 matches : [[11, 3]]
backward 489 Candidates : []
backward 730 matches : [[11, 3]]
backward 771 matches : []
backward 445 matches : [[11, 3]]
backward 480 matches : [[11, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[11, 3]]
backward 480 matches : [[11, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[11, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9156200>]
143 optimization template :
»
q_0:                                »
                                »
q_1:  X   P()   X   P(-)   Rz(/2)   Rx(/2)   Rz(/2)   Rx()  »
                                »
«
«q_0: 0
«      Rzx(-)
«q_1: 1          Rz(/2)   Rx(/2)   Rz(/2)
«
150 optimization max_matches : [[0, 0]]

```

```

150 optimization max_matches : [[0, 2]]
150 optimization max_matches : [[2, 0]]
150 optimization max_matches : [[2, 2]]
150 optimization max_matches : [[4, 3]]
150 optimization max_matches : [[6, 3]]
150 optimization max_matches : [[9, 3]]
150 optimization max_matches : [[11, 3]]
Circuit Params : []
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
Circuit Params : []
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9119EE0>
matching [] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
check if the operation are the same : True True True
forward 466 : [[0, 0], [1, 1]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B91645E0>
forward 468 append match : [[0, 0], [1, 1]]
forward 422 candidates : [2]
in candidates : 2 match is False
check if the operation are the same : True True True
forward 466 : [[0, 0], [1, 1], [2, 2]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9156590>
forward 468 append match : [[0, 0], [1, 1], [2, 2]]
forward 422 candidates : [3]
in candidates : 3 match is False

```

```

check if the operation are the same : True True True
forward 466 : [[0, 0], [1, 1], [2, 2], [3, 3]]
Circuit Params : [0.42, 1.5707963267948966]
Circuit Params : set()
forward 480 template None
forward 422 TF : False
matching 386 forward [[0, 0], [1, 1], [2, 2]]
backward 413 first_matches : [[0, 0], [1, 1], [2, 2]]
backward 445 matches : [[0, 0], [1, 1], [2, 2]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9155600>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B610>
matching [] th _sublist is working..
forward 422 candidates : [1]
in candidates : 1 match is False
check if the operation are the same : True True True
forward 466 : [[0, 2], [1, 3]]
Circuit Params : [1.5707963267948966]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9132AD0>
forward 468 append match : [[0, 2], [1, 3]]
matching 386 forward [[0, 2], [1, 3]]
backward 413 first_matches : [[0, 2], [1, 3]]
backward 445 matches : [[0, 2], [1, 3]]
backward 489 Candidates : []
backward 730 matches : [[0, 2], [1, 3]]
backward 771 matches : []
backward 445 matches : [[0, 2], [1, 3]]
backward 480 matches : [[0, 2], [1, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[0, 2], [1, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9165D80>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B610>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
check if the operation are the same : True True True
forward 466 : [[1, 1], [2, 2]]
Circuit Params : [0.42]

```

```

Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9165990>
forward 468 append match : [[1, 1], [2, 2]]
forward 422 candidates : [3]
in candidates : 3 match is False
check if the operation are the same : True True True
forward 466 : [[1, 1], [2, 2], [3, 3]]
Circuit Params : [0.42, 1.5707963267948966]
Circuit Params : set()
forward 480 template None
forward 422 TF : False
matching 386 forward [[1, 1], [2, 2]]
backward 413 first_matches : [[1, 1], [2, 2]]
backward 445 matches : [[1, 1], [2, 2]]
backward 489 Candidates : []
backward 702 matches : [[1, 1], [2, 2]]
backward 445 matches : [[1, 1], [2, 2]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9145BA0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B610>
matching [0] th _sublist is working..
matching 386 forward [[1, 3]]
backward 413 first_matches : [[1, 3]]
backward 445 matches : [[1, 3]]
backward 489 Candidates : []
backward 730 matches : [[1, 3]]
backward 771 matches : []
backward 445 matches : [[1, 3]]
backward 480 matches : [[1, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 3]]
backward 480 matches : [[1, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B76D0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B610>
matching [] th _sublist is working..

```

```

forward 422 candidates : [3]
in candidates : 3 match is False
check if the operation are the same : True True True
forward 466 : [[2, 0], [3, 1]]
Circuit Params : [0.42]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9155F30>
forward 468 append match : [[2, 0], [3, 1]]
forward 422 candidates : [4]
in candidates : 4 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[2, 0], [3, 1]]
backward 413 first_matches : [[2, 0], [3, 1]]
backward 445 matches : [[2, 0], [3, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9147430>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B610>
matching [] th _sublist is working..
forward 422 candidates : [3]
in candidates : 3 match is False
check if the operation are the same : True True True
forward 466 : [[2, 2], [3, 3]]
Circuit Params : [1.5707963267948966]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9165DE0>
forward 468 append match : [[2, 2], [3, 3]]
matching 386 forward [[2, 2], [3, 3]]
backward 413 first_matches : [[2, 2], [3, 3]]
backward 445 matches : [[2, 2], [3, 3]]
backward 489 Candidates : []
backward 730 matches : [[2, 2], [3, 3]]
backward 771 matches : []
backward 445 matches : [[2, 2], [3, 3]]
backward 480 matches : [[2, 2], [3, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[2, 2], [3, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91672B0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B610>

```

```

matching [0] th _sublist is working..
forward 422 candidates : [4]
in candidates : 4 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[3, 1]]
backward 413 first_matches : [[3, 1]]
backward 445 matches : [[3, 1]]
backward 489 Candidates : []
backward 702 matches : [[3, 1]]
backward 445 matches : [[3, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9147550>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B610>
matching [0] th _sublist is working..
matching 386 forward [[3, 3]]
backward 413 first_matches : [[3, 3]]
backward 445 matches : [[3, 3]]
backward 489 Candidates : []
backward 730 matches : [[3, 3]]
backward 771 matches : []
backward 445 matches : [[3, 3]]
backward 480 matches : [[3, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 3]]
backward 480 matches : [[3, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91465C0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B610>
matching [0] th _sublist is working..
matching 386 forward [[4, 3]]
backward 413 first_matches : [[4, 3]]
backward 445 matches : [[4, 3]]
backward 489 Candidates : []
backward 730 matches : [[4, 3]]
backward 771 matches : []
backward 445 matches : [[4, 3]]
backward 480 matches : [[4, 3]]

```



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backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 3]]
backward 480 matches : [[4, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91321A0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B610>
matching [0] th _sublist is working..
matching 386 forward [[6, 3]]
backward 413 first_matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 730 matches : [[6, 3]]
backward 771 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9146890>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B610>
matching [0] th _sublist is working..
matching 386 forward [[9, 3]]
backward 413 first_matches : [[9, 3]]
backward 445 matches : [[9, 3]]
backward 489 Candidates : []
backward 730 matches : [[9, 3]]
backward 771 matches : []
backward 445 matches : [[9, 3]]
backward 480 matches : [[9, 3]]

```

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backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 3]]
backward 480 matches : [[9, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9157C40>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906B610>
matching [0] th _sublist is working..
matching 386 forward [[11, 3]]
backward 413 first_matches : [[11, 3]]
backward 445 matches : [[11, 3]]
backward 489 Candidates : []
backward 730 matches : [[11, 3]]
backward 771 matches : []
backward 445 matches : [[11, 3]]
backward 480 matches : [[11, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[11, 3]]
backward 480 matches : [[11, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[11, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91452D0>]
143 optimization template :
»
q_0:                                     »
                                     »
q_1:  X   Rz()   X   Rz(-)   Rz(/2)   Rx(/2)   Rz(/2)   Rx()  »
                                     »
«
«q_0:  0
«      Rzx(-)
«q_1:  1           Rz(/2)   Rx(/2)   Rz(/2)
«

```

```

150 optimization max_matches : [[0, 0], [1, 1], [2, 2]]
150 optimization max_matches : [[0, 2], [1, 3]]
150 optimization max_matches : [[2, 0], [3, 1]]
150 optimization max_matches : [[3, 3]]
150 optimization max_matches : [[4, 3]]
150 optimization max_matches : [[6, 3]]
150 optimization max_matches : [[9, 3]]
150 optimization max_matches : [[11, 3]]
Circuit Params : [0.42]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [0.42]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
161 optimization substitution_list : [<qiskit.transpiler.passes.optimization.tem
plate_matching.template_substitution.SubstitutionConfig object at
0x00000220B9131570>]
162 optimization unmatched_list : [3]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9119310>
matching [0] th _sublist is working..
forward 422 candidates : [4]
in candidates : 4 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[3, 4]]
backward 413 first_matches : [[3, 4]]
backward 445 matches : [[3, 4]]
backward 489 Candidates : []
backward 702 matches : [[3, 4]]
backward 445 matches : [[3, 4]]
backward 489 Candidates : []
backward 730 matches : [[3, 4]]
backward 771 matches : []
backward 445 matches : [[3, 4]]
backward 480 matches : [[3, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []

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backward 445 matches : [[3, 4]]
backward 480 matches : [[3, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9145F30>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9119310>
matching [] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
sufficient conditions for a match to happen : False True True
matching 386 forward [[4, 3]]
backward 413 first_matches : [[4, 3]]
backward 445 matches : [[4, 3]]
backward 489 Candidates : []
backward 702 matches : [[4, 3]]
backward 445 matches : [[4, 3]]
backward 489 Candidates : []
backward 730 matches : [[4, 3]]
backward 771 matches : []
backward 445 matches : [[4, 3]]
backward 480 matches : [[4, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 3]]
backward 480 matches : [[4, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B67A0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9119310>
matching [0] th _sublist is working..
forward 422 candidates : []
matching 386 forward [[5, 1]]
backward 413 first_matches : [[5, 1]]
backward 445 matches : [[5, 1]]
backward 489 Candidates : []

```

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backward 702 matches : [[5, 1]]
backward 445 matches : [[5, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9144B20>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9119310>
matching [0] th _sublist is working..
forward 422 candidates : []
matching 386 forward [[5, 4]]
backward 413 first_matches : [[5, 4]]
backward 445 matches : [[5, 4]]
backward 489 Candidates : []
backward 702 matches : [[5, 4]]
backward 445 matches : [[5, 4]]
backward 489 Candidates : []
backward 730 matches : [[5, 4]]
backward 771 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B67D0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9119310>
matching [0] th _sublist is working..
forward 422 candidates : []
forward 422 candidates : []
forward 422 candidates : []
matching 386 forward [[5, 6]]
backward 413 first_matches : [[5, 6]]
backward 445 matches : [[5, 6]]
backward 489 Candidates : []
backward 730 matches : [[5, 6]]
backward 771 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []

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backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B4400>]
143 optimization template :

q_0:      Ry(-)      Rx(/2) 0      Rx(- /2)
          Rzx()
q_1:  X      X      1

150 optimization max_matches : [[3, 4]]
150 optimization max_matches : [[4, 3]]
150 optimization max_matches : [[5, 1]]
150 optimization max_matches : [[5, 4]]
150 optimization max_matches : [[5, 6]]
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]
Circuit Params : set()

```

```

161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 1]]
backward 413 first_matches : [[1, 1]]
backward 445 matches : [[1, 1]]
backward 489 Candidates : []
backward 702 matches : [[1, 1]]
backward 445 matches : [[1, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B6260>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [0] th _sublist is working..
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 4]]
backward 413 first_matches : [[1, 4]]
backward 445 matches : [[1, 4]]
backward 489 Candidates : []
backward 702 matches : [[1, 4]]
backward 445 matches : [[1, 4]]
backward 489 Candidates : []
backward 730 matches : [[1, 4]]
backward 771 matches : []
backward 445 matches : [[1, 4]]
backward 480 matches : [[1, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 4]]
backward 480 matches : [[1, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B7280>]
matching WORKING WITH <generator object TemplateMatching._sublist at

```

```

0x00000220B91186D0>
matching [0] th _sublist is working...
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
forward 422 candidates : [2]
in candidates : 2 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[1, 6]]
backward 413 first_matches : [[1, 6]]
backward 445 matches : [[1, 6]]
backward 489 Candidates : []
backward 730 matches : [[1, 6]]
backward 771 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 480 matches : [[1, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[1, 6]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B7AC0>]
matching WORKING WITH <generator object TemplateMatching._sublist at

```



```
0x00000220B91186D0>
matching [0] th _sublist is working...
matching 386 forward [[3, 8]]
backward 413 first_matches : [[3, 8]]
backward 445 matches : [[3, 8]]
backward 489 Candidates : []
backward 702 matches : [[3, 8]]
backward 445 matches : [[3, 8]]
backward 489 Candidates : []
backward 702 matches : [[3, 8]]
backward 445 matches : [[3, 8]]
backward 489 Candidates : []
backward 730 matches : [[3, 8]]
backward 771 matches : []
backward 445 matches : [[3, 8]]
backward 480 matches : [[3, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 8]]
backward 480 matches : [[3, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 8]]
backward 480 matches : [[3, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 8]]
backward 480 matches : [[3, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 8]]
backward 480 matches : [[3, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
```

```
object at 0x00000220B90B76D0>
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [0] th _sublist is working..
matching 386 forward [[3, 9]]
backward 413 first_matches : [[3, 9]]
backward 445 matches : [[3, 9]]
backward 489 Candidates : []
backward 702 matches : [[3, 9]]
backward 445 matches : [[3, 9]]
backward 489 Candidates : []
backward 702 matches : [[3, 9]]
backward 445 matches : [[3, 9]]
backward 489 Candidates : []
backward 730 matches : [[3, 9]]
backward 771 matches : []
backward 445 matches : [[3, 9]]
backward 480 matches : [[3, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 9]]
backward 480 matches : [[3, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 9]]
backward 480 matches : [[3, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 9]]
backward 480 matches : [[3, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 9]]
backward 480 matches : [[3, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 9]]
backward 480 matches : [[3, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[3, 9]]
backward 445 matches : []
```

```

matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B5E70>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [0] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
forward 422 TF : False
matching 386 forward [[4, 4]]
backward 413 first_matches : [[4, 4]]
backward 445 matches : [[4, 4]]
backward 489 Candidates : []
backward 702 matches : [[4, 4]]
backward 445 matches : [[4, 4]]
backward 489 Candidates : []
backward 730 matches : [[4, 4]]
backward 771 matches : []
backward 445 matches : [[4, 4]]
backward 480 matches : [[4, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 4]]
backward 480 matches : [[4, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B4190>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [0] th _sublist is working..
matching 386 forward [[5, 8]]
backward 413 first_matches : [[5, 8]]
backward 445 matches : [[5, 8]]
backward 489 Candidates : []
backward 702 matches : [[5, 8]]
backward 445 matches : [[5, 8]]
backward 489 Candidates : []
backward 702 matches : [[5, 8]]
backward 445 matches : [[5, 8]]
backward 489 Candidates : []
backward 730 matches : [[5, 8]]
backward 771 matches : []

```

```

backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 8]]
backward 480 matches : [[5, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B7880>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [0] th _sublist is working..
matching 386 forward [[5, 9]]
backward 413 first_matches : [[5, 9]]
backward 445 matches : [[5, 9]]
backward 489 Candidates : []
backward 702 matches : [[5, 9]]
backward 445 matches : [[5, 9]]
backward 489 Candidates : []
backward 702 matches : [[5, 9]]
backward 445 matches : [[5, 9]]
backward 489 Candidates : []

```

```

backward 730 matches : [[5, 9]]
backward 771 matches : []
backward 445 matches : [[5, 9]]
backward 480 matches : [[5, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 9]]
backward 480 matches : [[5, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 9]]
backward 480 matches : [[5, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 9]]
backward 480 matches : [[5, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 9]]
backward 480 matches : [[5, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 9]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B7E50>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [] th _sublist is working..
forward 422 candidates : [7]
in candidates : 7 match is False
sufficient conditions for a match to happen : False True False
matching 386 forward [[6, 3]]
backward 413 first_matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 702 matches : [[6, 3]]

```

```

backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 730 matches : [[6, 3]]
backward 771 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B7DC0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [0] th _sublist is working...
matching 386 forward [[7, 8]]
backward 413 first_matches : [[7, 8]]
backward 445 matches : [[7, 8]]
backward 489 Candidates : []
backward 702 matches : [[7, 8]]
backward 445 matches : [[7, 8]]
backward 489 Candidates : []
backward 702 matches : [[7, 8]]
backward 445 matches : [[7, 8]]
backward 489 Candidates : []
backward 730 matches : [[7, 8]]
backward 771 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []

```

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backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B6230>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [0] th _sublist is working..
matching 386 forward [[7, 9]]
backward 413 first_matches : [[7, 9]]
backward 445 matches : [[7, 9]]
backward 489 Candidates : []
backward 702 matches : [[7, 9]]
backward 445 matches : [[7, 9]]
backward 489 Candidates : []
backward 702 matches : [[7, 9]]
backward 445 matches : [[7, 9]]
backward 489 Candidates : []
backward 730 matches : [[7, 9]]
backward 771 matches : []
backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]

```

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backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 9]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B7970>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [0] th _sublist is working...
forward 422 candidates : [9]
in candidates : 9 match is False
forward 422 TF : False
matching 386 forward [[8, 4]]
backward 413 first_matches : [[8, 4]]
backward 445 matches : [[8, 4]]
backward 489 Candidates : []
backward 702 matches : [[8, 4]]
backward 445 matches : [[8, 4]]
backward 489 Candidates : []
backward 730 matches : [[8, 4]]
backward 771 matches : []
backward 445 matches : [[8, 4]]
backward 480 matches : [[8, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[8, 4]]
backward 480 matches : [[8, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []

```



```
backward 445 matches : [[8, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B6620>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [0] th _sublist is working..
matching 386 forward [[9, 8]]
backward 413 first_matches : [[9, 8]]
backward 445 matches : [[9, 8]]
backward 489 Candidates : []
backward 702 matches : [[9, 8]]
backward 445 matches : [[9, 8]]
backward 489 Candidates : []
backward 702 matches : [[9, 8]]
backward 445 matches : [[9, 8]]
backward 489 Candidates : []
backward 730 matches : [[9, 8]]
backward 771 matches : []
backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 480 matches : [[9, 8]]
backward 445 matches : []
```

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backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B4160>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B91186D0>
matching [0] th _sublist is working..
matching 386 forward [[9, 9]]
backward 413 first_matches : [[9, 9]]
backward 445 matches : [[9, 9]]
backward 489 Candidates : []
backward 702 matches : [[9, 9]]
backward 445 matches : [[9, 9]]
backward 489 Candidates : []
backward 702 matches : [[9, 9]]
backward 445 matches : [[9, 9]]
backward 489 Candidates : []
backward 730 matches : [[9, 9]]
backward 771 matches : []
backward 445 matches : [[9, 9]]
backward 480 matches : [[9, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 9]]
backward 480 matches : [[9, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 9]]
backward 480 matches : [[9, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 9]]
backward 480 matches : [[9, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 9]]
backward 480 matches : [[9, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 9]]

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backward 480 matches : [[9, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[9, 9]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B90B5840>]
143 optimization template :
      »
q_0:  X          X  Rz( /2)  Rx( /2)  Rz( /2)  0          »
      Rzx(-) »
q_1:  Rx( )          1          »
      »
«
«q_0:  Rz( /2)  Rx( /2)  Rz( /2)
«
«q_1:
«
150 optimization max_matches : [[1, 1]]
150 optimization max_matches : [[1, 4]]
150 optimization max_matches : [[1, 6]]
150 optimization max_matches : [[3, 8]]
150 optimization max_matches : [[3, 9]]
150 optimization max_matches : [[4, 4]]
150 optimization max_matches : [[5, 8]]
150 optimization max_matches : [[5, 9]]
150 optimization max_matches : [[6, 3]]
150 optimization max_matches : [[7, 8]]
150 optimization max_matches : [[7, 9]]
150 optimization max_matches : [[8, 4]]
150 optimization max_matches : [[9, 8]]
150 optimization max_matches : [[9, 9]]
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()

```

```

Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [1.5707963267948966]
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B9119230>
matching [0] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
check if the operation are the same : True True True
forward 466 : [[4, 0], [5, 1]]
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9133190>
forward 468 append match : [[4, 0], [5, 1]]
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[4, 0], [5, 1]]
backward 413 first_matches : [[4, 0], [5, 1]]
backward 445 matches : [[4, 0], [5, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91331C0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A3B0>
matching [0] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
sufficient conditions for a match to happen : True True True
forward 422 candidates : [5]
in candidates : 5 match is False
check if the operation are the same : True True True
forward 466 : [[4, 2], [5, 4]]
Circuit Params : [-1.5707963267948966, ParameterExpression(-0.42)]

```

```

Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B9133070>
forward 468 append match : [[4, 2], [5, 4]]
matching 386 forward [[4, 2], [5, 4]]
backward 413 first_matches : [[4, 2], [5, 4]]
backward 445 matches : [[4, 2], [5, 4]]
backward 489 Candidates : []
backward 730 matches : [[4, 2], [5, 4]]
backward 771 matches : []
backward 445 matches : [[4, 2], [5, 4]]
backward 480 matches : [[4, 2], [5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 2], [5, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9132B90>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A3B0>
matching [0] th _sublist is working..
forward 422 candidates : [5]
in candidates : 5 match is False
check if the operation are the same : True True True
forward 466 : [[4, 5], [5, 6]]
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
forward 480 template <qiskit.dagcircuit.dagdependency.DAGDependency object at
0x00000220B91337C0>
forward 468 append match : [[4, 5], [5, 6]]
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[4, 5], [5, 6]]
backward 413 first_matches : [[4, 5], [5, 6]]
backward 445 matches : [[4, 5], [5, 6]]
backward 489 Candidates : []
backward 730 matches : [[4, 5], [5, 6]]
backward 771 matches : []
backward 445 matches : [[4, 5], [5, 6]]

```

```

backward 489 Candidates : []
backward 730 matches : [[4, 5], [5, 6]]
backward 771 matches : []
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 480 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 480 matches : []
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 480 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 480 matches : []
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 480 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 480 matches : []
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 5], [5, 6]]
backward 445 matches : []
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91339A0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A3B0>
matching [0] th _sublist is working..
matching 386 forward [[4, 7]]
backward 413 first_matches : [[4, 7]]
backward 445 matches : [[4, 7]]
backward 489 Candidates : []
backward 702 matches : [[4, 7]]
backward 445 matches : [[4, 7]]
backward 489 Candidates : []
backward 702 matches : [[4, 7]]
backward 445 matches : [[4, 7]]
backward 489 Candidates : []
backward 730 matches : [[4, 7]]
backward 771 matches : []

```

```

backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 480 matches : [[4, 7]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 7]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9133D90>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A3B0>
matching [0] th _sublist is working..
matching 386 forward [[4, 8]]
backward 413 first_matches : [[4, 8]]
backward 445 matches : [[4, 8]]
backward 489 Candidates : []
backward 702 matches : [[4, 8]]
backward 445 matches : [[4, 8]]
backward 489 Candidates : []
backward 702 matches : [[4, 8]]
backward 445 matches : [[4, 8]]
backward 489 Candidates : []

```

```

backward 730 matches : [[4, 8]]
backward 771 matches : []
backward 445 matches : [[4, 8]]
backward 480 matches : [[4, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 8]]
backward 480 matches : [[4, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 8]]
backward 480 matches : [[4, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 8]]
backward 480 matches : [[4, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 8]]
backward 480 matches : [[4, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[4, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9130430>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A3B0>
matching [0] th _sublist is working..
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[5, 1]]
backward 413 first_matches : [[5, 1]]
backward 445 matches : [[5, 1]]
backward 489 Candidates : []
backward 702 matches : [[5, 1]]

```



```

backward 445 matches : [[5, 1]]
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91337F0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A3B0>
matching [0] th _sublist is working..
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[5, 4]]
backward 413 first_matches : [[5, 4]]
backward 445 matches : [[5, 4]]
backward 489 Candidates : []
backward 702 matches : [[5, 4]]
backward 445 matches : [[5, 4]]
backward 489 Candidates : []
backward 730 matches : [[5, 4]]
backward 771 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 480 matches : [[5, 4]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 4]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9132890>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A3B0>
matching [0] th _sublist is working..
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
forward 422 candidates : [6]
in candidates : 6 match is False
sufficient conditions for a match to happen : True True True
matching 386 forward [[5, 6]]
backward 413 first_matches : [[5, 6]]

```

```

backward 445 matches : [[5, 6]]
backward 489 Candidates : []
backward 730 matches : [[5, 6]]
backward 771 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 480 matches : [[5, 6]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[5, 6]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9133C10>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A3B0>
matching [] th _sublist is working..
forward 422 candidates : [7]
in candidates : 7 match is False
forward 422 TF : False
matching 386 forward [[6, 3]]
backward 413 first_matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 702 matches : [[6, 3]]
backward 445 matches : [[6, 3]]
backward 489 Candidates : []
backward 730 matches : [[6, 3]]

```

```

backward 771 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 480 matches : [[6, 3]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[6, 3]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B91337C0>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A3B0>
matching [0] th _sublist is working..
matching 386 forward [[7, 8]]
backward 413 first_matches : [[7, 8]]
backward 445 matches : [[7, 8]]
backward 489 Candidates : []
backward 702 matches : [[7, 8]]
backward 445 matches : [[7, 8]]
backward 489 Candidates : []
backward 702 matches : [[7, 8]]
backward 445 matches : [[7, 8]]
backward 489 Candidates : []
backward 730 matches : [[7, 8]]
backward 771 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]

```

```

backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 480 matches : [[7, 8]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 8]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9131990>]
matching WORKING WITH <generator object TemplateMatching._sublist at
0x00000220B906A3B0>
matching [0] th _sublist is working..
matching 386 forward [[7, 9]]
backward 413 first_matches : [[7, 9]]
backward 445 matches : [[7, 9]]
backward 489 Candidates : []
backward 702 matches : [[7, 9]]
backward 445 matches : [[7, 9]]
backward 489 Candidates : []
backward 702 matches : [[7, 9]]
backward 445 matches : [[7, 9]]
backward 489 Candidates : []
backward 730 matches : [[7, 9]]
backward 771 matches : []
backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []

```

```

backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 9]]
backward 480 matches : [[7, 9]]
backward 445 matches : []
backward 489 Candidates : []
backward 702 matches : []
backward 445 matches : [[7, 9]]
backward 445 matches : []
matching 401 backward
[<qiskit.transpiler.passes.optimization.template_matching.backward_match.Match
object at 0x00000220B9133070>]
143 optimization template :

q_0:          0
              Rzx(-)
q_1:  X   Ry()  X   Ry(-)  Rz(- /2)  Rx()  1          Rz( /2)

150 optimization max_matches : [[4, 0], [5, 1]]
150 optimization max_matches : [[4, 2], [5, 4]]
150 optimization max_matches : [[4, 5], [5, 6]]
150 optimization max_matches : [[4, 7]]
150 optimization max_matches : [[4, 8]]
150 optimization max_matches : [[6, 3]]
150 optimization max_matches : [[7, 8]]
150 optimization max_matches : [[7, 9]]
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
Circuit Params : [-1.5707963267948966, ParameterExpression(-0.42)]
Circuit Params : set()
Circuit Params : [-1.5707963267948966, -1.5707963267948966]
Circuit Params : set()
Circuit Params : [-1.5707963267948966]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()
Circuit Params : [ParameterExpression(0.42)]
Circuit Params : set()

```

```
Circuit Params : [1.5707963267948966]
Circuit Params : set()
161 optimization substitution_list : []
162 optimization unmatched_list : [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
```

```
[ ]: >>>
q_0: 0 >>
      Rzx(0.42) >>
q_1: Rz(- /2) Rx(- /2) Rz(- /2) 1 Rx(-0.42) >>
      >>
<<
<<q_0:
<<
<<q_1: Rz(- /2) Rx(- /2) Rz(- /2) Rz(0.42) Rz( /2)
<<
```

```
[ ]: #check
inv_opt_circ = opt_circ.inverse()
inv_opt_circ.draw()

id_circ = test_circ.compose(inv_opt_circ)
id_circ.draw()
```

```
[ ]: >>>
q_0: >>
      >>
q_1: X Rz(0.42) X Rz( /2) Rz(- /2) Rz(-0.42) Rz( /2) >>
      >>
<< >>
<<q_0: 0 >>
<<      Rzx(-0.42) >>
<<q_1: Rx( /2) Rz( /2) Rx(0.42) 1 Rz( /2) Rx( /2) >>
<< >>
<<
<<q_0:
<<
<<q_1: Rz( /2)
<<
```

```
[ ]: import qiskit.quantum_info as qi

op = qi.Operator(id_circ)
print(op)
```

```
Operator([[[-1.+0.j, 0.+0.j, 0.+0.j, 0.+0.j],
           [ 0.+0.j, -1.+0.j, 0.+0.j, 0.+0.j],
           [ 0.+0.j, 0.+0.j, -1.+0.j, 0.+0.j],
           [ 0.+0.j, 0.+0.j, 0.+0.j, -1.+0.j]]],
```

```
input_dims=(2, 2), output_dims=(2, 2))
```

```
[ ]:
```