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C3XGate doesn't bind the angle parameter `CircuitError: 'Cannot bind parameters #XXXX'`

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Environment

- Qiskit Terra version: 0.19.1
- Python version: 3.8
- Operating system: Ubuntu 18.04.6 LTS

What is happening?

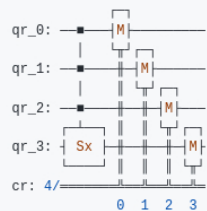
The binding of the angle parameter of the C3XGate doesn't work as expected.

If we parametrize the C3XGate with an angle parameter as in the signature in the [doc](#) `C3XGate(angle=None)`, then during binding we get the error: `CircuitError: 'Cannot bind parameters (a) not present in the circuit.'`

How can we reproduce the issue?

Running the following circuit:

```
import qiskit
from qiskit import QuantumCircuit, ClassicalRegister, QuantumRegister
from qiskit.circuit.library.standard_gates import *
from qiskit.circuit import Parameter
qr = QuantumRegister(4)
cr = ClassicalRegister(4)
qc = QuantumCircuit(qr, cr)
a = Parameter('a')
qc.append(C3XGate(angle=a), qargs=[qr[0], qr[1], qr[2], qr[3]], cargs=[])
qc.measure(qr, cr)
qc.draw(fold=-1)
```



Then we bind the parameter `a` to `0.1`. And run it.

```
qc = qc.bind_parameters({
    a: 0.1,
})
```

Output:

```
-----
CircuitError                                Traceback (most recent call last)
/tmp/ipykernel_35760/330815806.py in <module>
----> 1 qc = qc.bind_parameters({
      2     a: 0.1
      3 })

qiskit/circuit/quantumcircuit.py in bind_parameters(self, values)
    2545         "Found ParameterExpression in values; use assign_parameters() instead."
    2546     )
-> 2547     return self.assign_parameters(values)
    2548     else:
    2549         if any(isinstance(value, ParameterExpression) for value in values):

qiskit/circuit/quantumcircuit.py in assign_parameters(self, parameters, inplace)
    2500     ]
    2501     if len(params_not_in_circuit) > 0:
-> 2502         raise CircuitError(
    2503             "Cannot bind parameters ({}) not present in the circuit.".format(
    2504                 ", ".join(map(str, params_not_in_circuit))
```

Assignees

No one assigned

Labels

[bug](#) [good first issue](#) [help wanted](#)

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None yet

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No milestone

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No branches or pull requests

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CircuitError: 'Cannot bind parameters (a) not present in the circuit.'

What should happen?

The circuit should bind the parameter `a` as the `angle` parameter in the doc of the `C3XGate`.

Any suggestions?

It seems to be a problem during the initialization of the `C3XGate`, whenever it gets an `angle` parameter, it is not considered, but there is no trace of this behavior in the doc, that's why I created an ansatz with it. The code pointed below seems to confirm that the `C3XGate` can have an angle and it should become a `C3SXGate` with the corresponding angle, but the diagram of the resulting circuit is in contradiction, as the error further show.

qiskit-terra/qiskit/circuit/library/standard_gates/x.py
Line 594 in ee9d76e

```
594     return C3SXGate(label, ctrl_state, angle=angle)
```

So maybe, we should either drop the angle parameter (from code and doc) and `C3XGate` becomes a non parametrizable gate, or we convert make sure its parameter `angle` is considered and we can parametrize it.

Looking forward to listen to your point of view, thanks in advance



ANONYMOUS added the **bug** label 8 days ago

QISKIT DEV commented 8 days ago

Contributor 🗨️ ⋮

`C3XGate` is already nonparameterisable; passing an angle causes a `C3SXGate` to be constructed instead, and it should raise a `DeprecationWarning` due to passing an angle to its constructor. That said, now I think about it again, the deprecation warning is likely suppressed in normal use because it's a Terra function that calls another Terra function in a deprecated manner, so the warning may not have shown.

As it turns out, I apparently made a rough attempt to remove the `angle` keyword a few months ago ([#7209 \(comment\)](#)), but I don't remember why I didn't finish the job. Probably the Terra 0.19 rush got in the way. With the `angle` argument deprecated since 0.17, I think we're fine to fix this issue by removing it, and making the updates to `C3SXGate.inverse` that I mentioned in the linked comment. Strictly we haven't warned *quite* correctly for the `angle` parameter of `C3XGate`, but that's just more of a bug that we can fix.



1



QISKIT DEV added **good first issue** **help wanted** labels 8 days ago

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