

# Python quantum programming languages

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# Overview

Python  
quantum  
programming  
languages

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References

- Python based quantum programming libraries
- We tried to program the common programs (e.g. Grover's algorithm, Shor's algorithm, etc.)
- We tried compiling a simple program for different hardware platforms (i.e. with gate restrictions, etc.)
- We've written a programming guide - under an internal review

```
# Do quantum stuff
qvm = QVMConnection()
qprog = Program()

# do X on q1, q3, q7
# remember HZH is X
qprog.inst(H(1), Z(1),
    ↪ H(1))
qprog.inst(X(3))
qprog.inst(X(7))
# do measurement over
    ↪ all 8 qubits
for i in range(0, 8):
    qprog.measure(i, i)
```

# Short comparison

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## What is there

- Focussed on quantum circuits
- Apply gates to specific qubits
- Classical control in the same source code
- Python syntax is beginner friendly
- Simulators are available
- Hardware compilers are available

## What is lacking

- Lack of support for custom unitaries
- Compilers are not highly developed
- Some languages target specific hardware
- Some simulators are cloud based and require accounts
- No real quantum programming constructs (e.g. quantum if etc.)

# Long term programming languages

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References

- Don't see Python being the long term quantum language

# Types of

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References

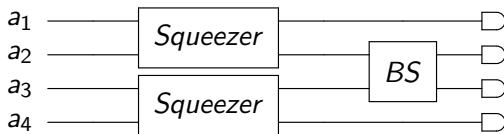


Figure: Two source HOM dip

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<sup>0</sup>These are two-mode squeezers

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