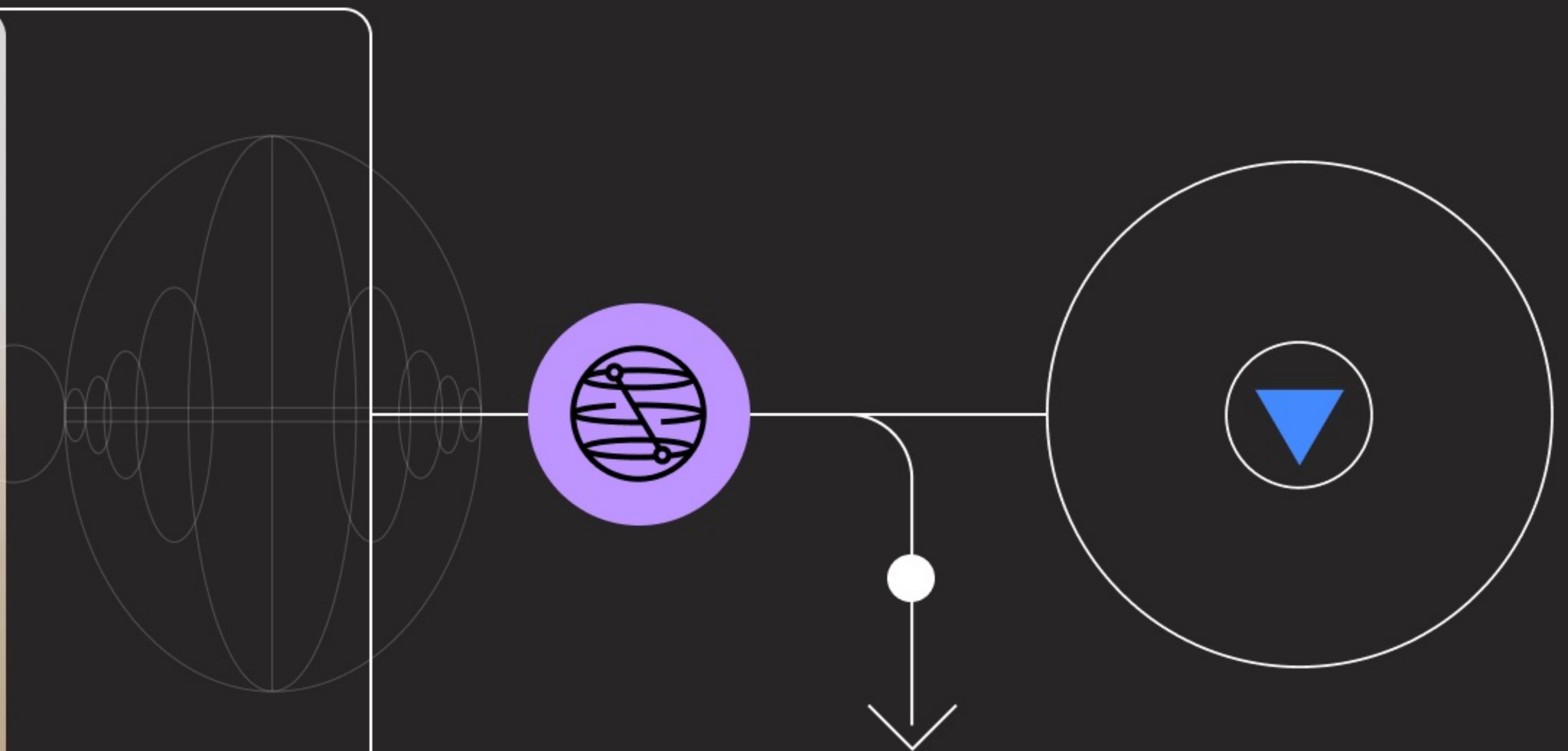
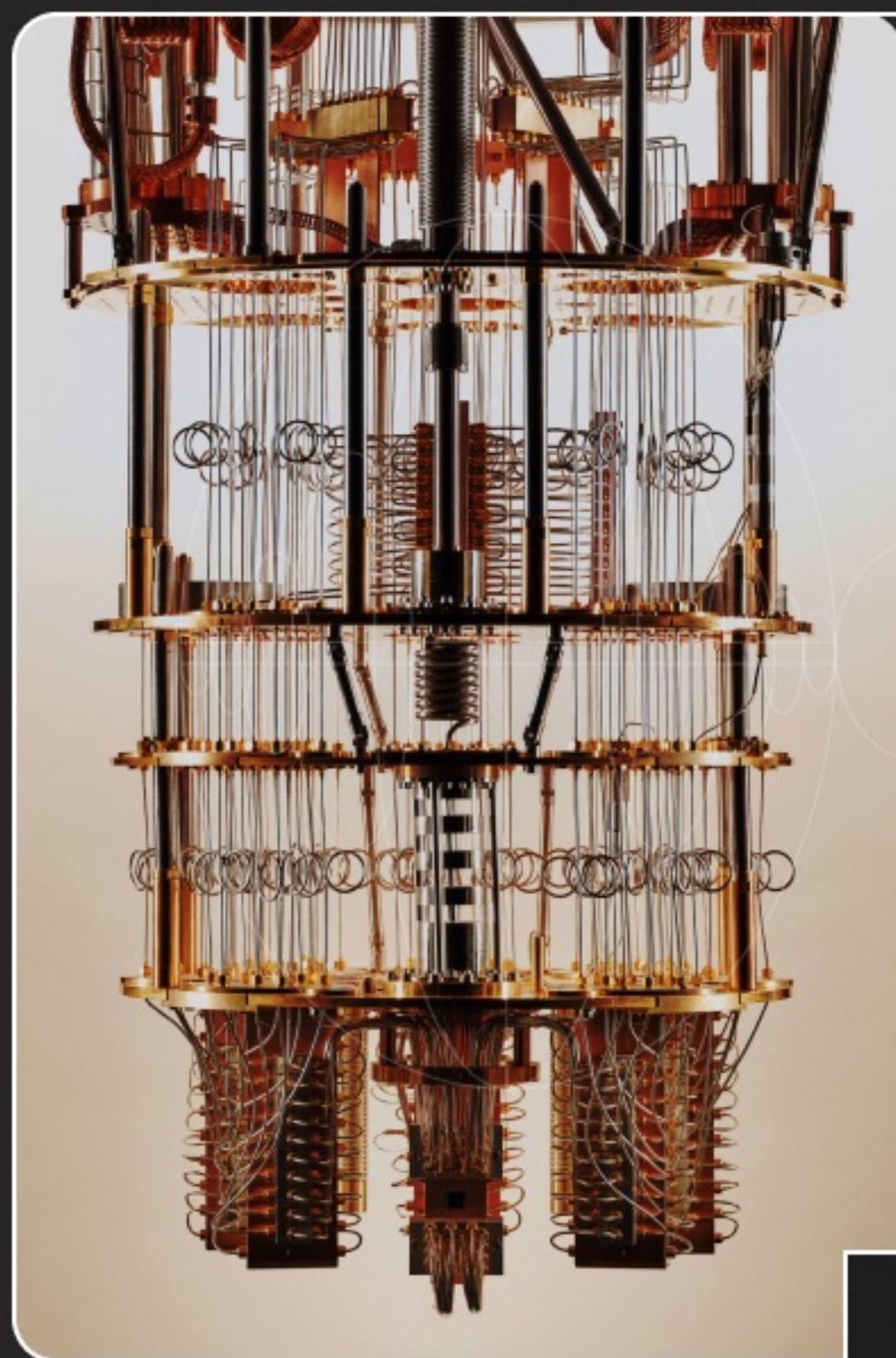


How to: program a quantum 8-ball

Step 1: Download Qiskit

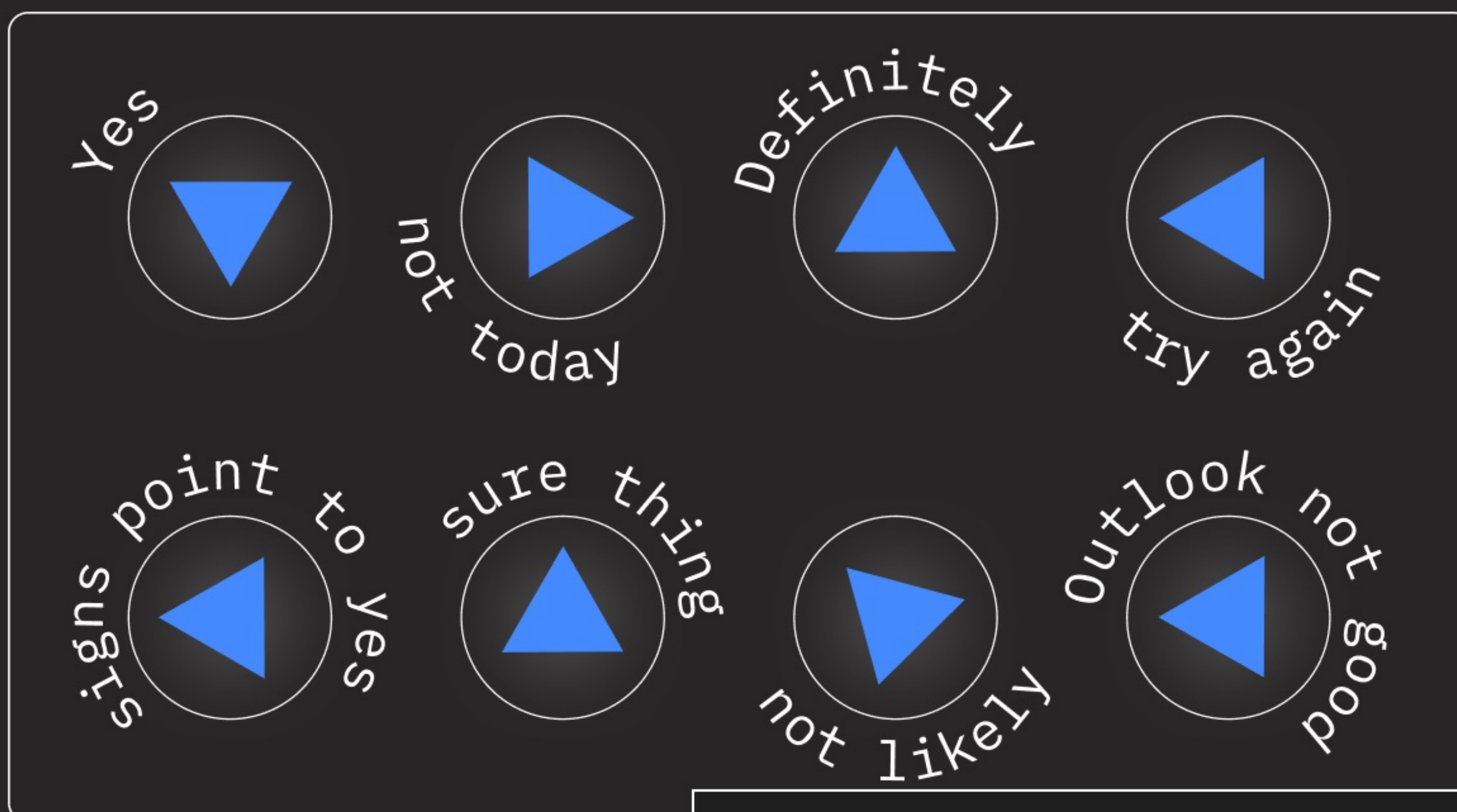
Wherever you like, whether it be a virtual cloud environment or locally.



```
[ ] # install Qiskit with visualization  
  
!pip install qiskit[visualization]  
!pip install qiskit-ibm-runtime
```


Step 2: Define your Magic 8-Ball responses

Think of eight answers to yes/no questions that will be mapped to the eight possible outcomes of the quantum circuit you will set up.

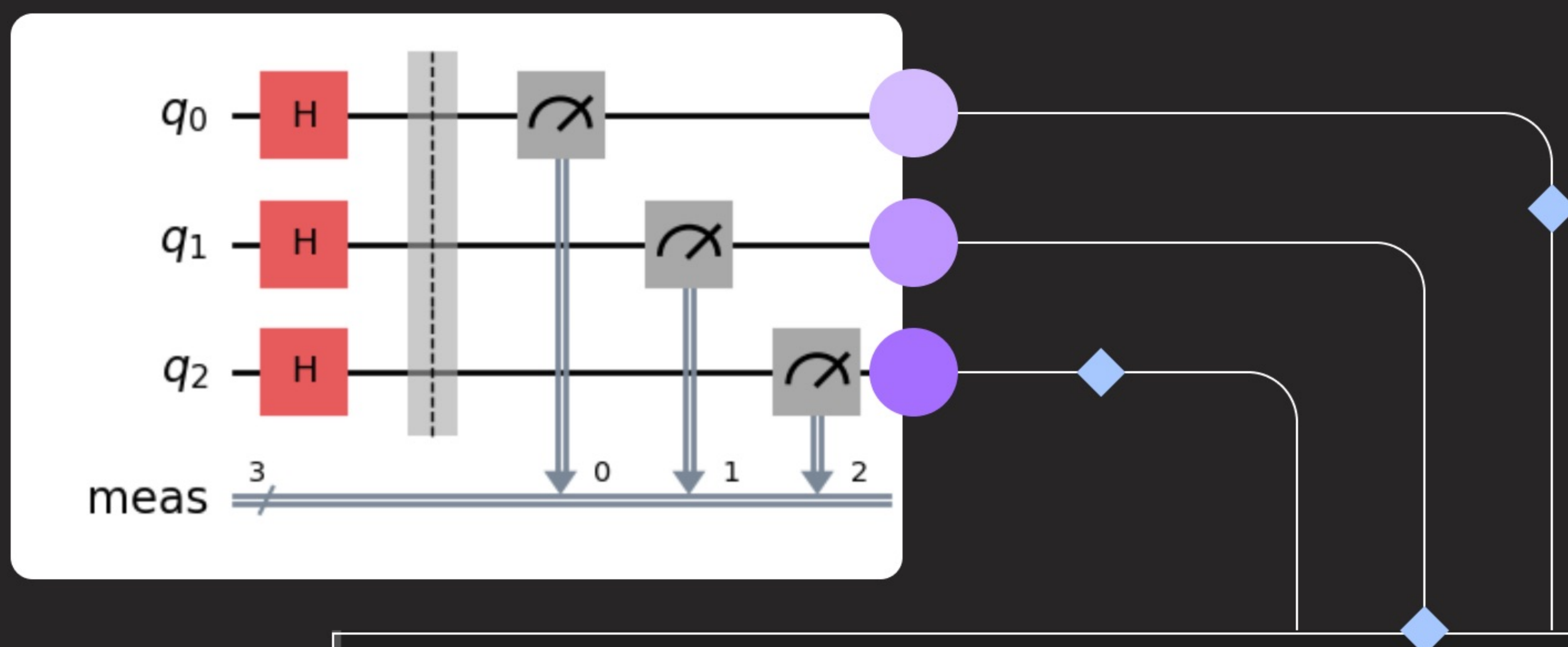


```
[1] # define Magic 8 Ball responses
```

```
responses = ["Yes",  
             "Not today",  
             "Definitely",  
             "Try again",  
             "Signs point to yes",  
             "Not likely",  
             "Sure thing!",  
             "Outlook not so good"  
            ]
```


Step 3: Set up your circuit

Place three qubits into an equal superposition.



```
# set up a Quantum circuit with 3 qubits
qc = QuantumCircuit(3)

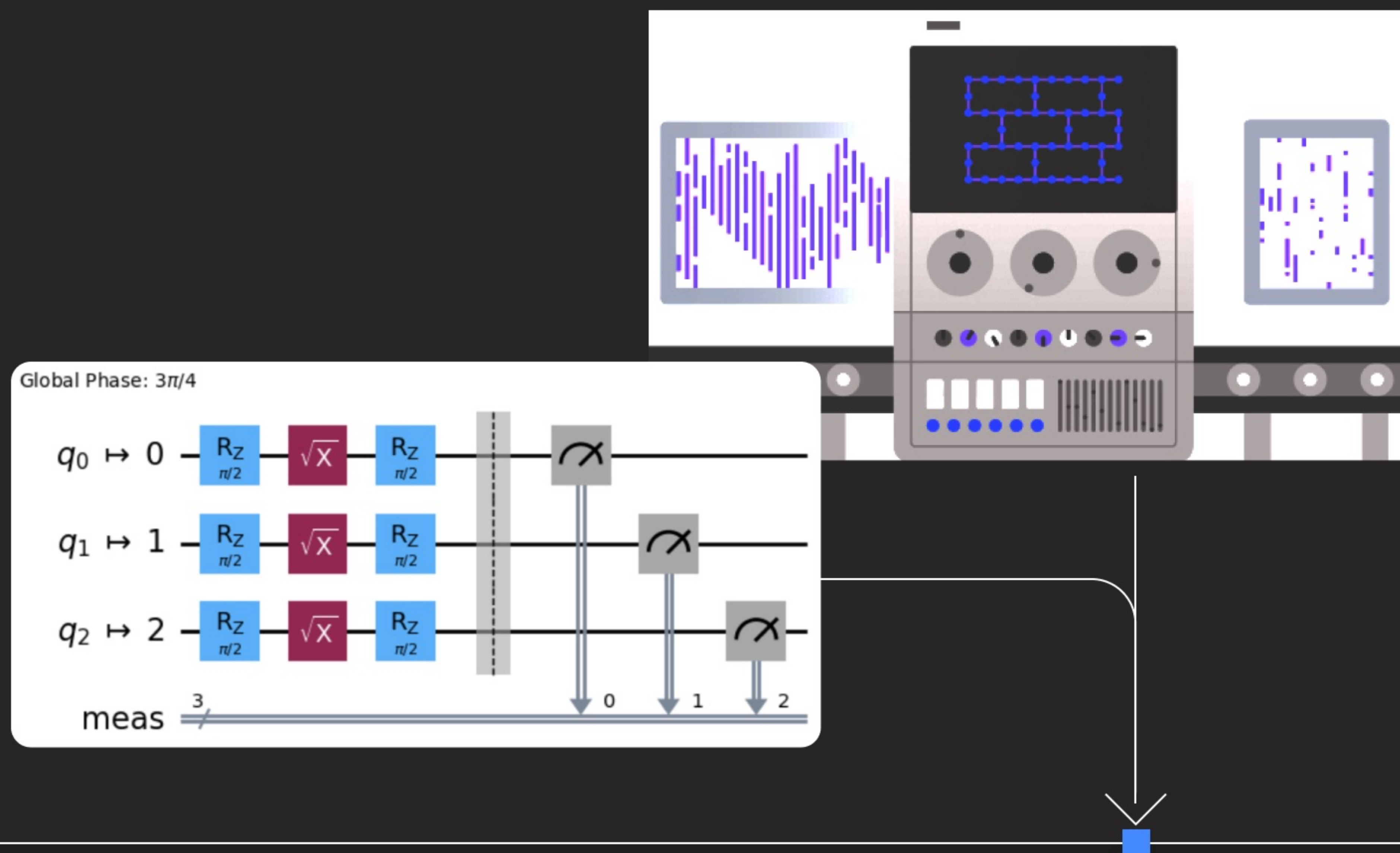
# place a Hadamard gate on qubits 0, 1, and 2
qc.h(0)
qc.h(1)
qc.h(2)

# add a measurement to your circuit
qc.measure_all()

# visualize your circuit before running it
qc.draw("mpl")
```


Step 4: Optimize your circuit

Use the Qiskit Transpiler to convert your mapped circuit into an ISA (Instruction Set Architecture) circuit – the only format executable on IBM quantum hardware.



```
# transpile circuit

pm = generate_preset_pass_manager(backend=backend, optimization_level=1)
isa_circuit = pm.run(qc)

# visualize transpiled circuit

isa_circuit.draw('mpl', idle_wires=False)
```


Step 5: Use Qiskit Runtime to run the new circuit

Think of a yes/no question to ask your Quantum Magic 8-Ball, then run the circuit one time to get your answer!

Quantum Computer Outputs

[000, 001, 010, 011, 100, 101, 110, 111]

