Quantum Computing

Experimenting with Qiskit

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Agenda

Building and running the EPR circuit with Qiskit's Sampler class on:

1. the state vector simulator
2. the 'fake' backend simulator
3. a genuine quantum computer

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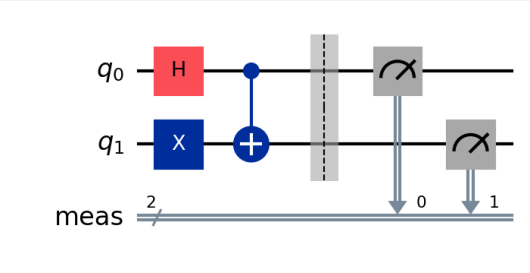
The EPR circuit that produces the state $\frac{1}{\sqrt{2}}(|01\rangle + |10\rangle)$ is:



State Vector Simulator

- It simulates **exactly** any unitary gate
- Measurement outcomes are sampled **pseudo-randomly**

- File: `EPR-simSampler.ipynb`

NB: quantum circuits ran with Sampler must ALWAYS have measurements at the end!

Fake Backend Simulator

- It simulates a quantum computer with **noise** in both unitary gates and measurement gates
- Measurement outcomes are sampled **pseudo-randomly** (with noise added)

- File: `EPR-simFake.ipynb`

Quantum Backend

- The real thing: using an IBM quantum computer!
- You need to register for a free IBM Quantum account (10 minutes of QPU time over one month)
- Follow the instructions on the Qiskit website to save your API key and instance info in your Qiskit's python environment

- File: `EPR-qSampler.ipynb`