

Many Shots, Many QPUs: How to Distribute Quantum Computing?

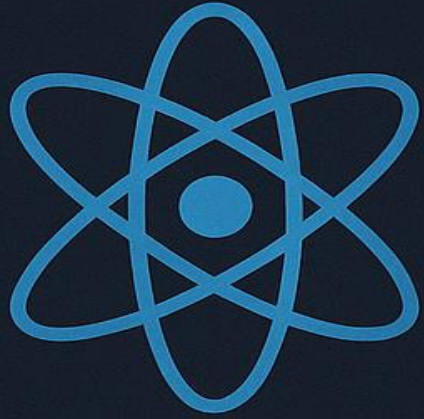
Giuseppe Bisicchia

PhD Student in Computer Science

e-mail: giuseppe.bisicchia@phd.unipi.it

Home page: <https://pages.di.unipi.it/bisicchia/>

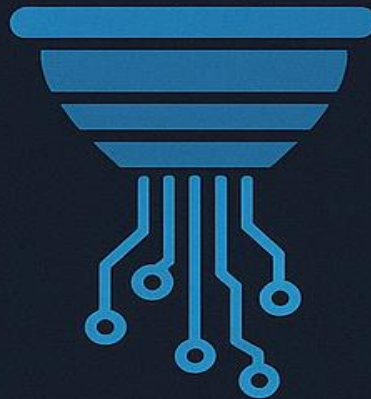




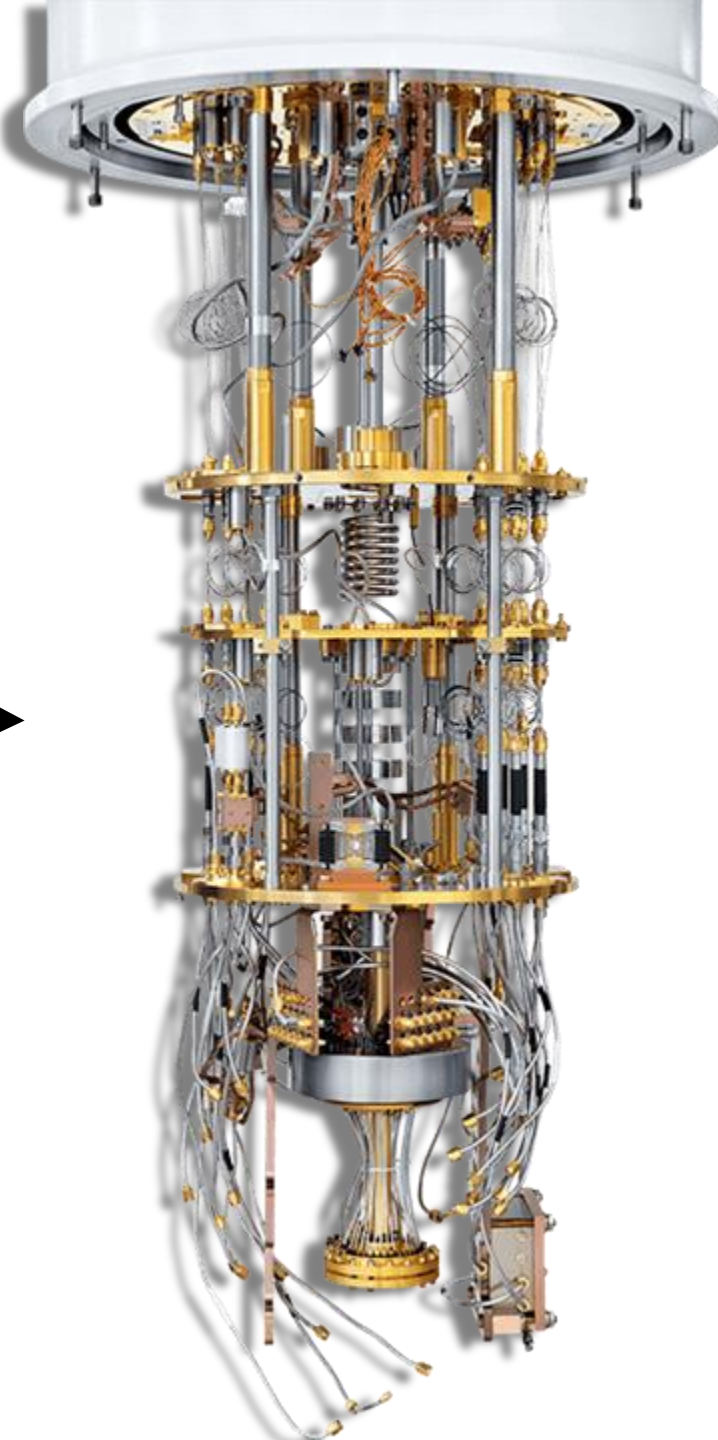
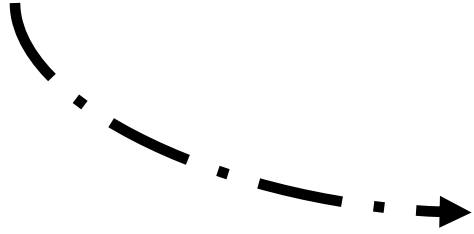
QUANTUM COMPUTING CRASH COURSE

01

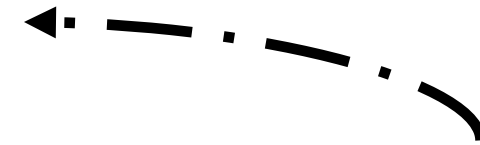
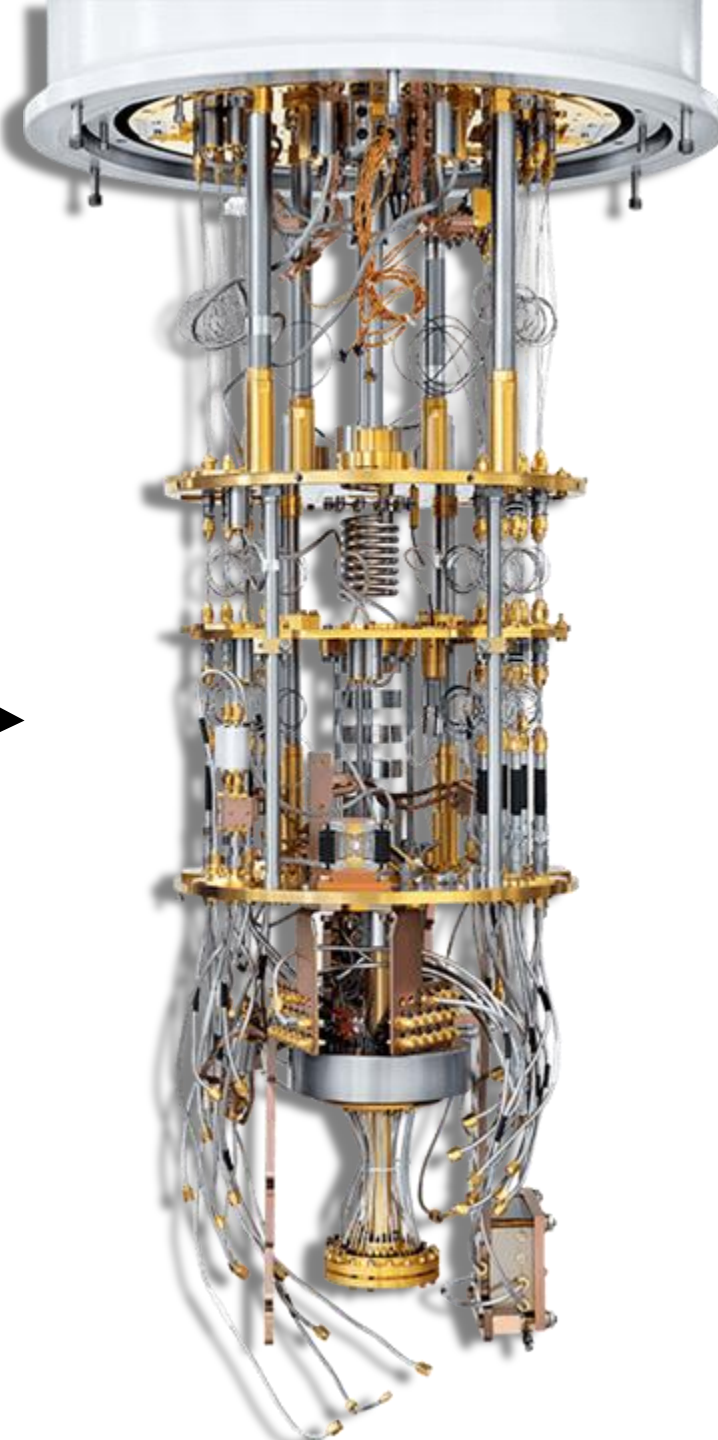
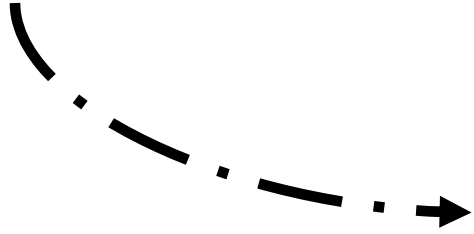
01



THIS IS A QUANTUM
COMPUTER OR QUANTUM
PROCESS UNIT (QPU)

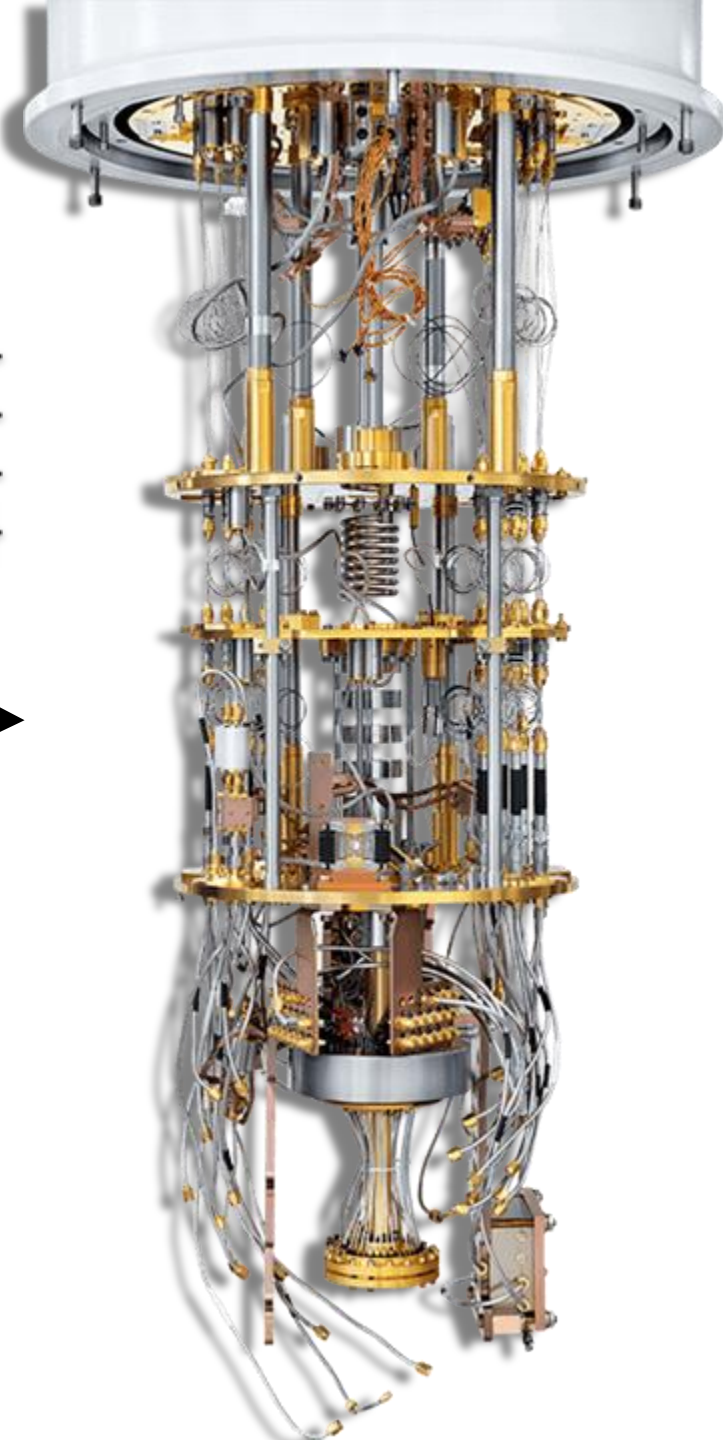


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PROCESS UNIT (QPU)

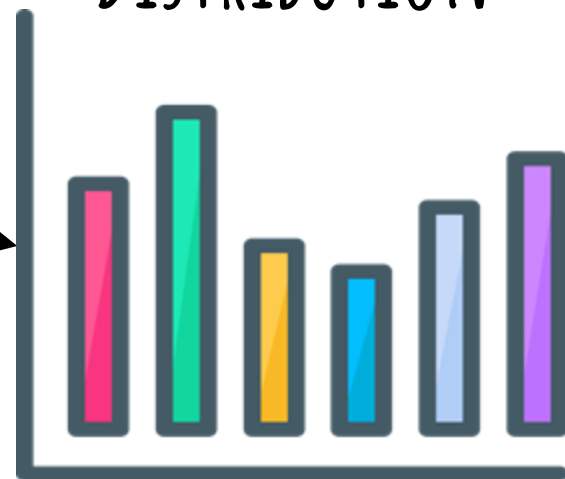


A QPU IS A PROBABILISTIC,
NOISY MACHINE

QUANTUM PROGRAM



PROBABILITY DISTRIBUTION



NOISE MAY ALTER THE OBSERVED DISTRIBUTION IN AN UNFORESEEABLE WAY

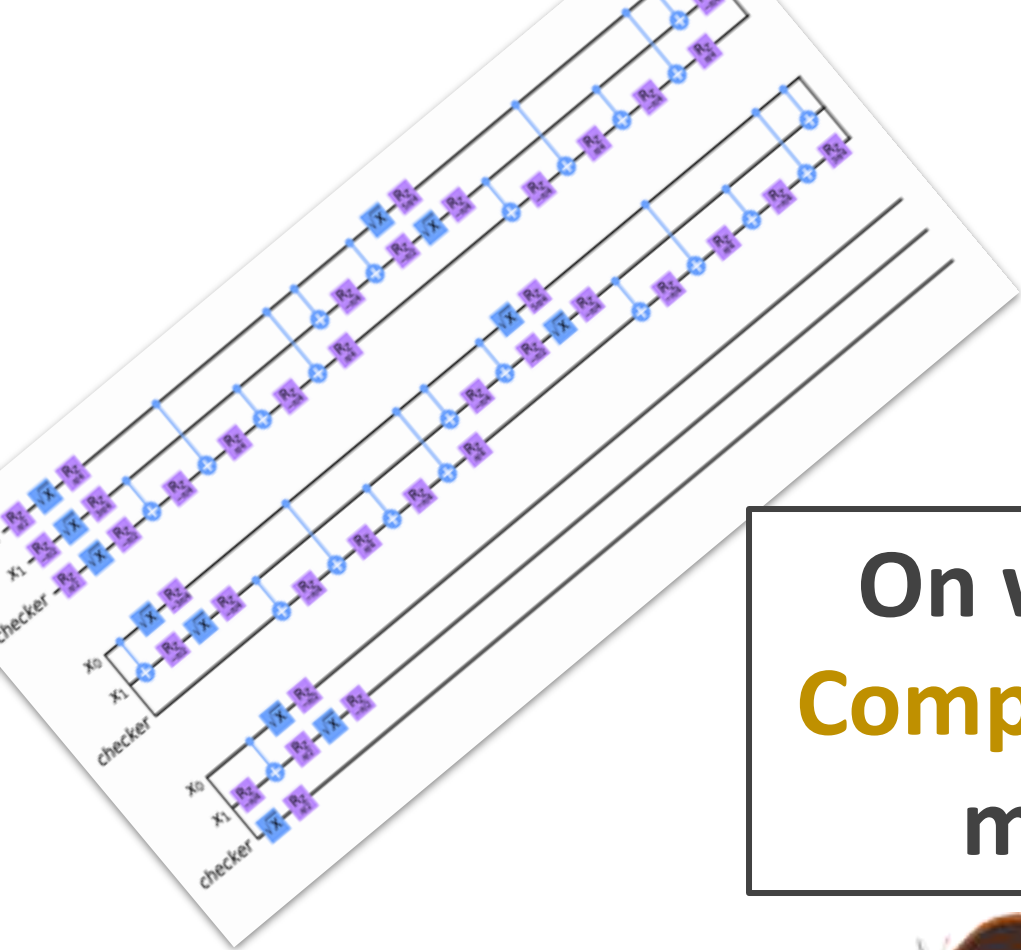




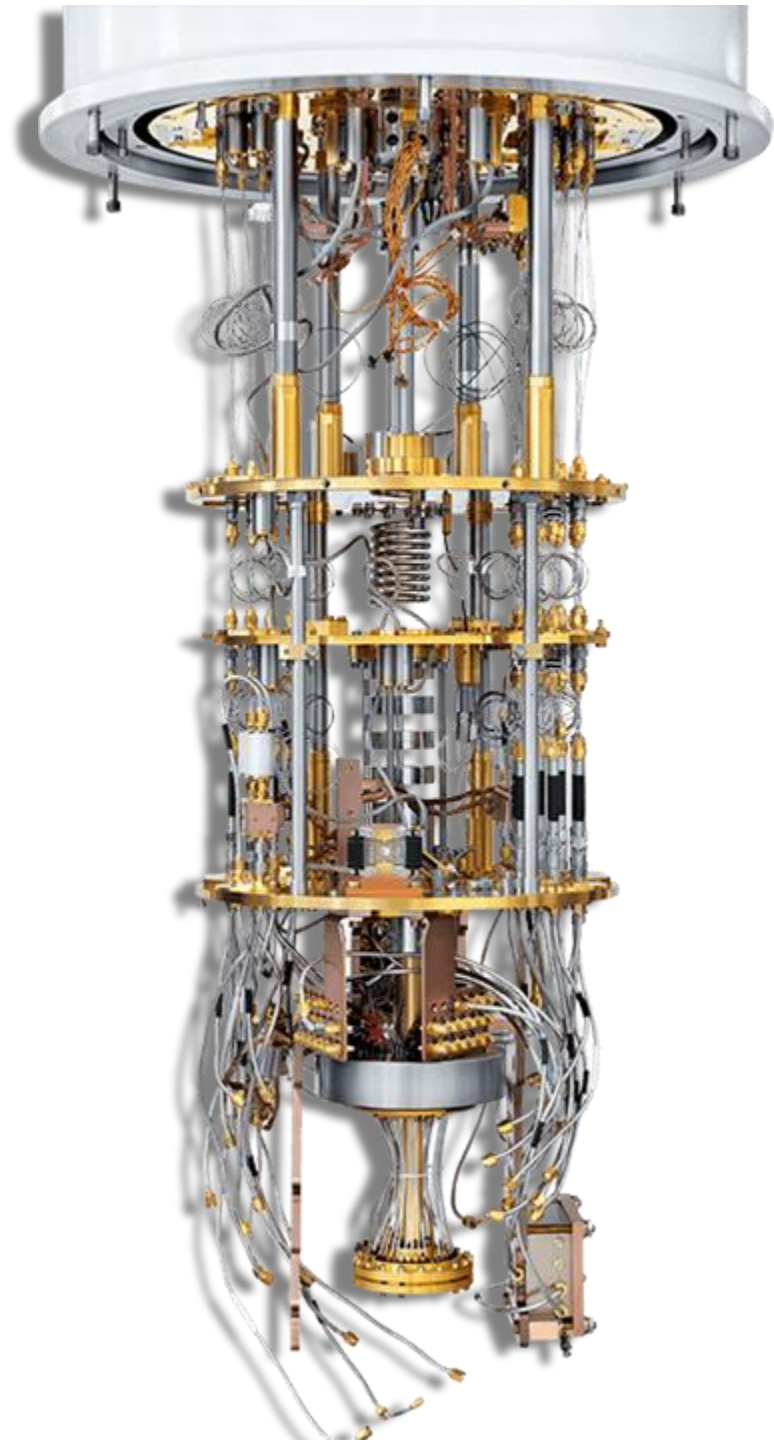
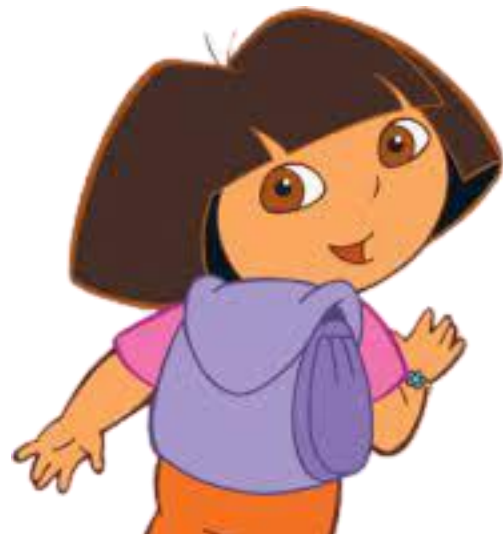
GOOD!

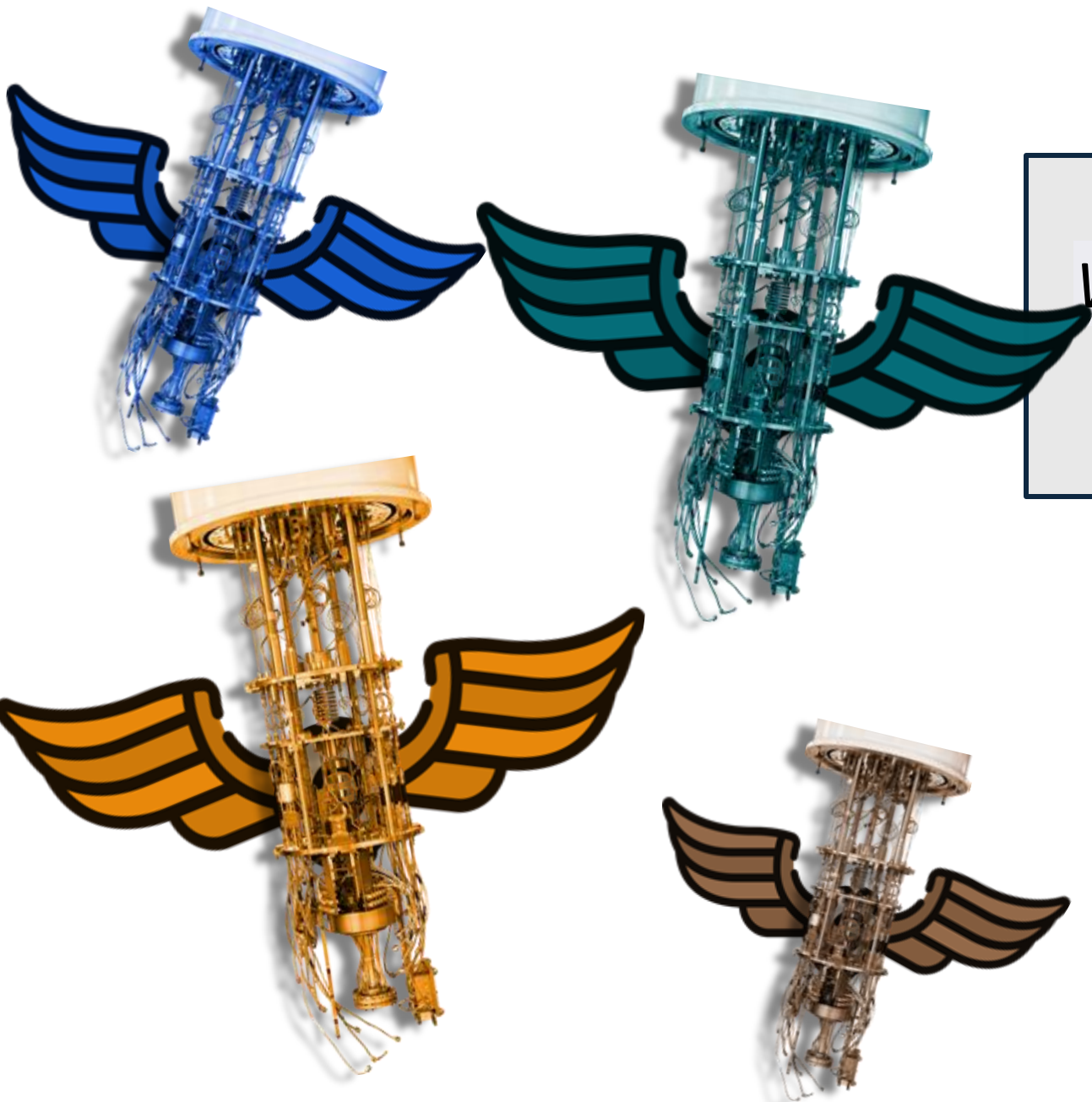


**NOW YOU ARE
READY!**



On which **Quantum**
Computer should I **run**
my **algorithm**?

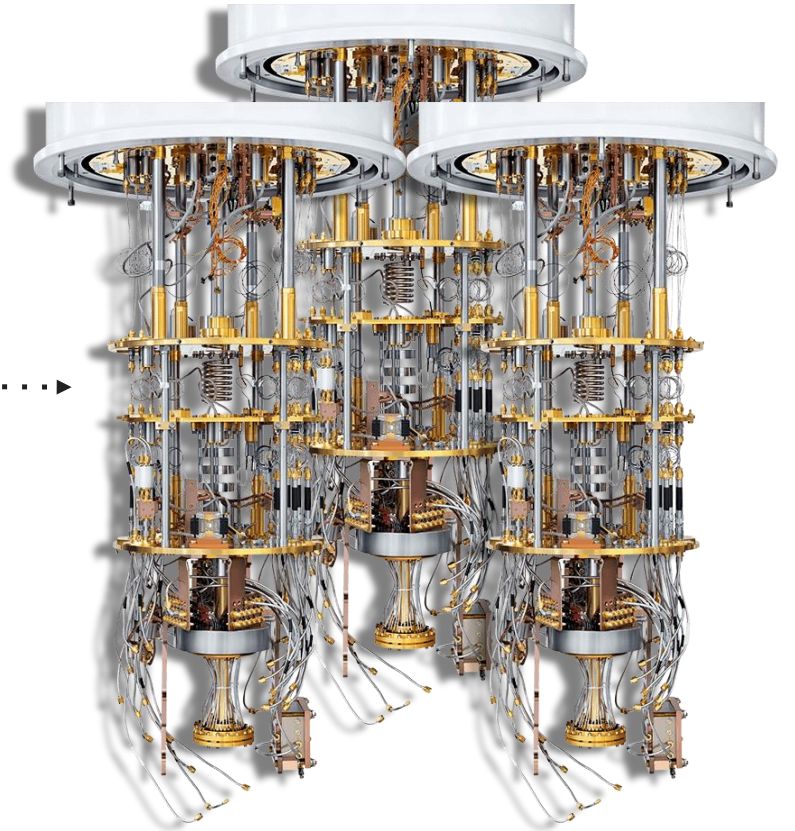
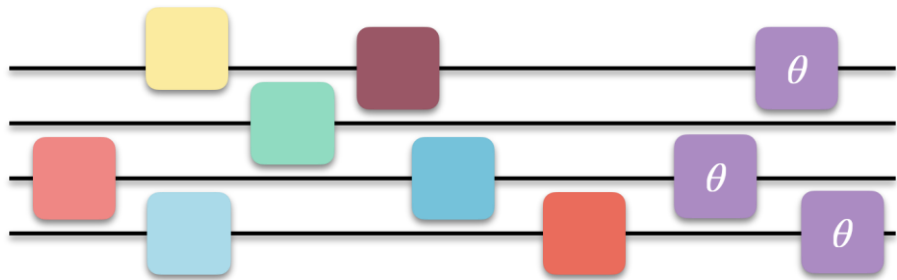




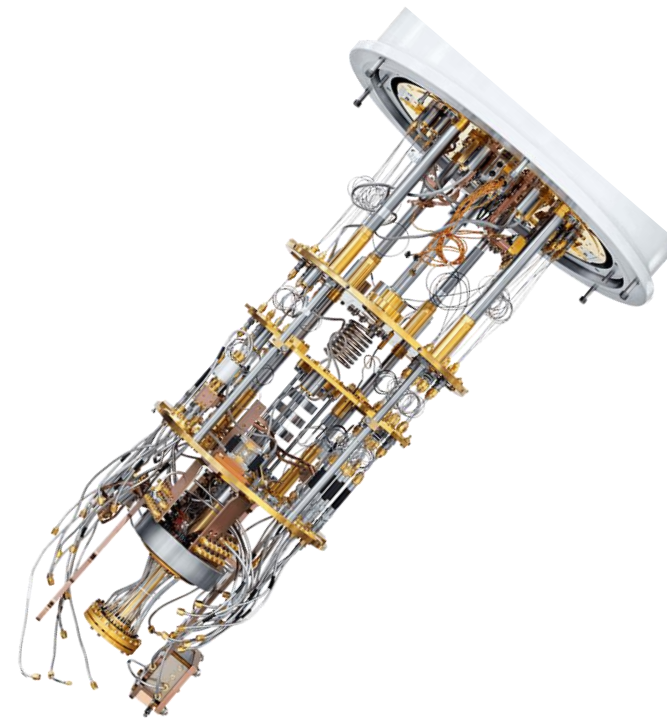
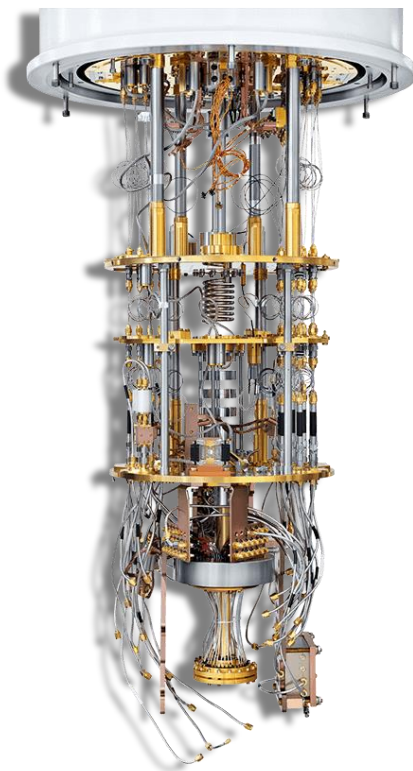
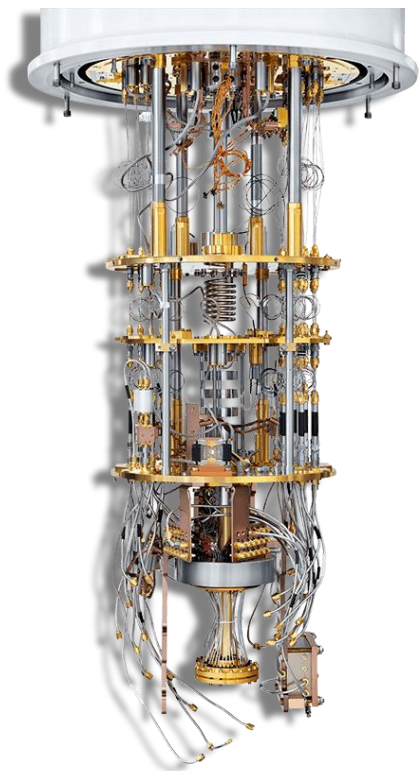
*Why do I have to **choose only**
one Quantum Computer?*



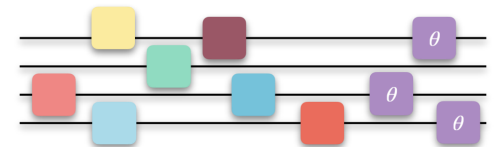
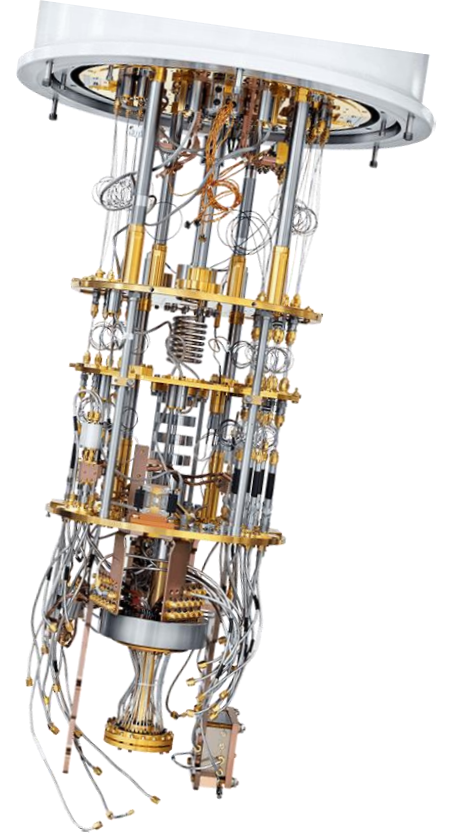
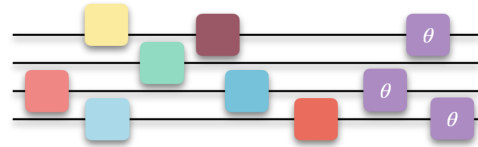
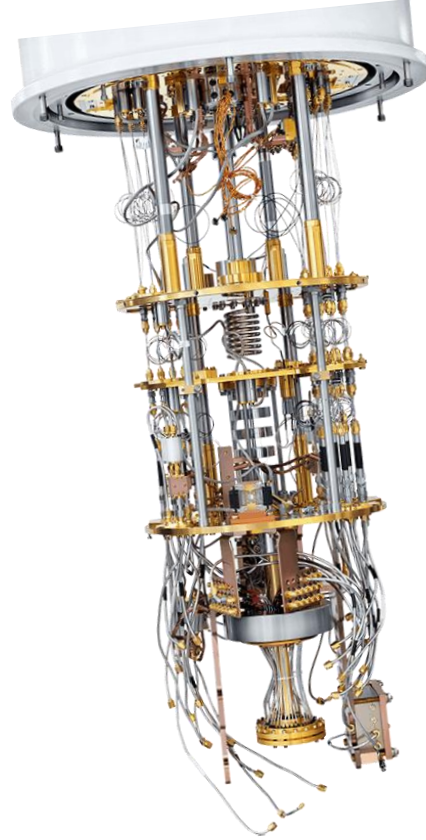
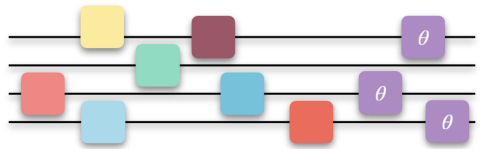
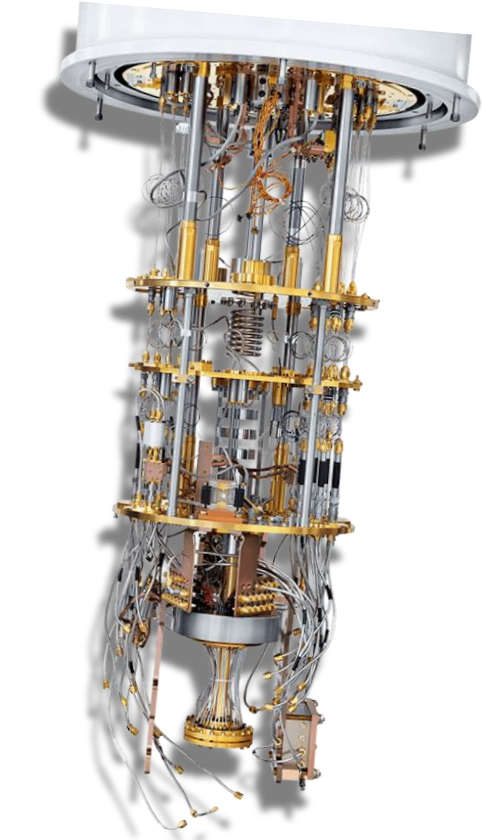
INSTEAD OF CHOOSING JUST A SINGLE QPU



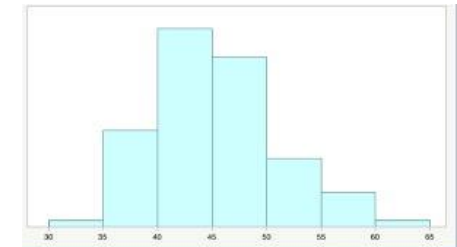
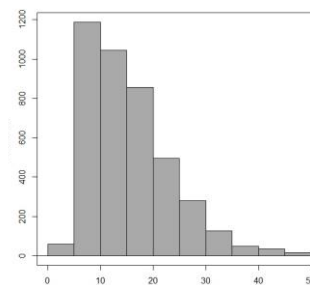
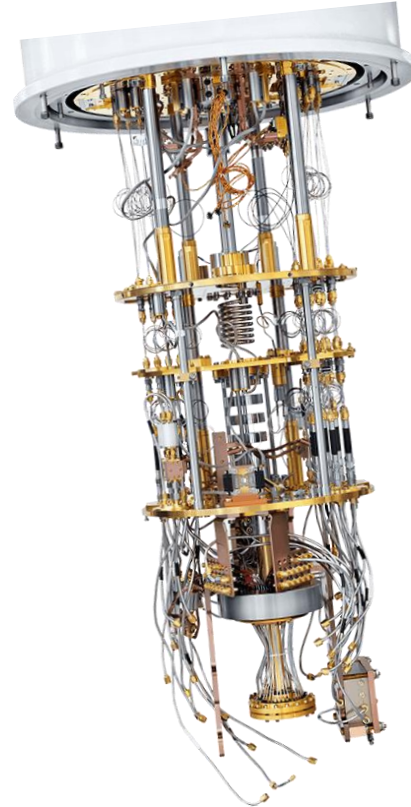
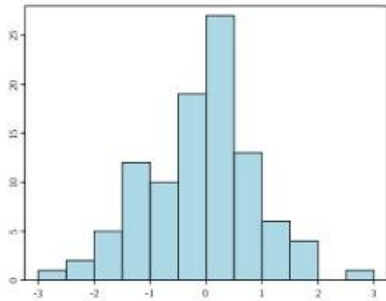
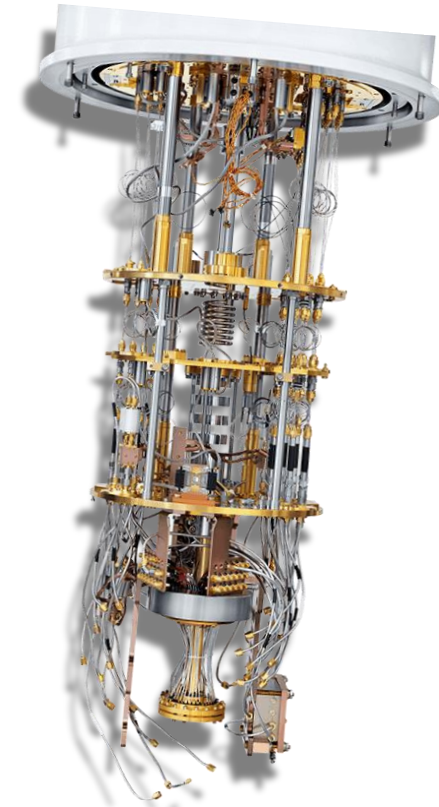
AND RUN ALL SHOTS ON IT



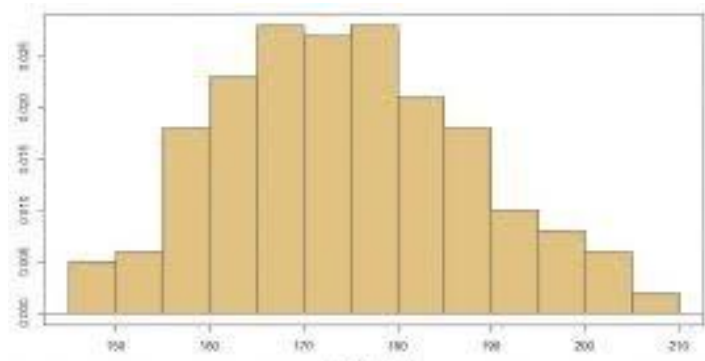
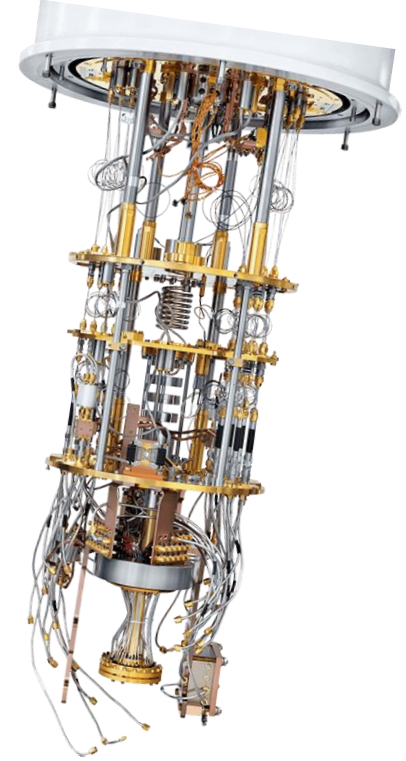
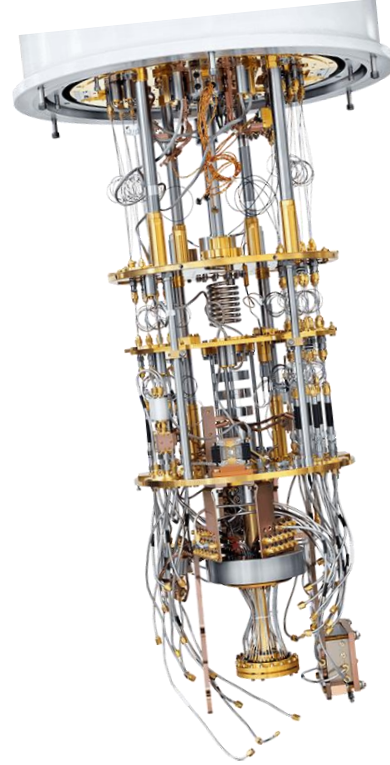
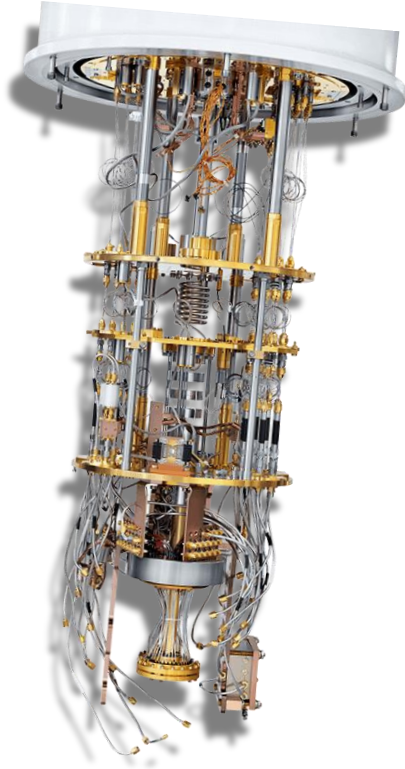
WE CAN DISTRIBUTE THE SHOTS ON MULTIPLE QPUS



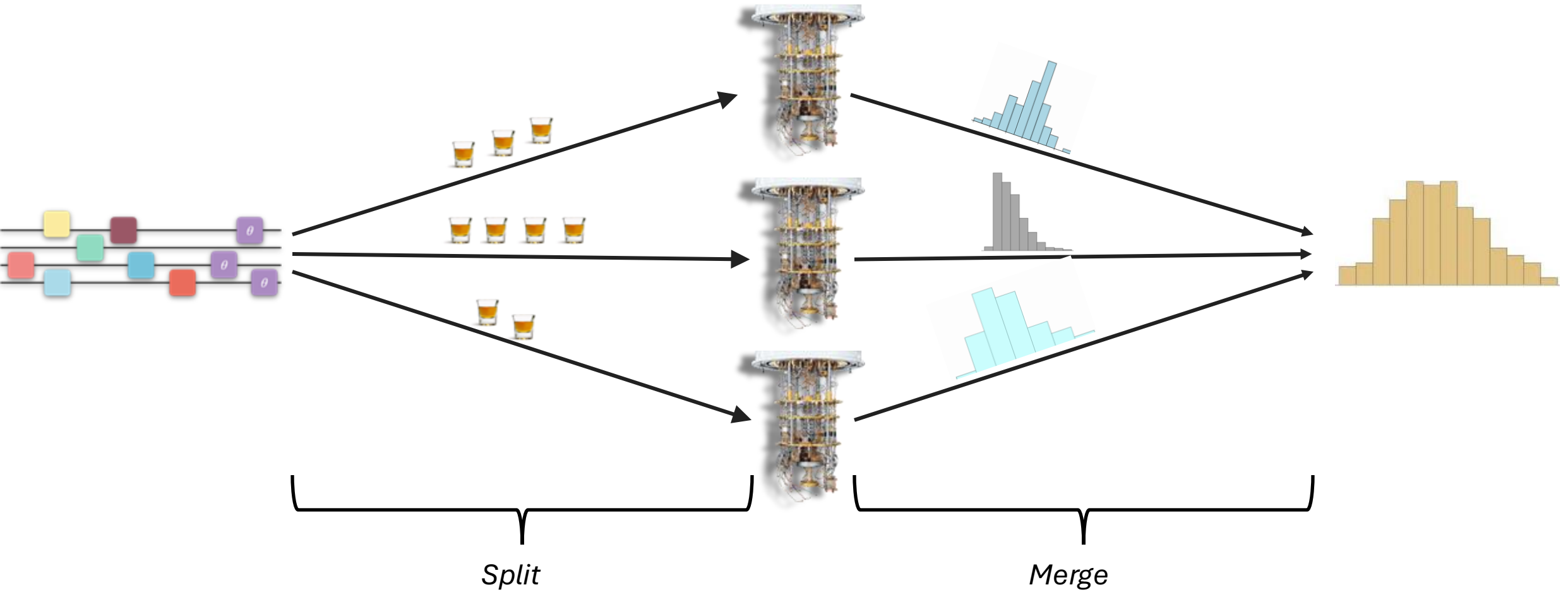
COLLECT THE PARTIAL OUTPUT DISTRIBUTIONS



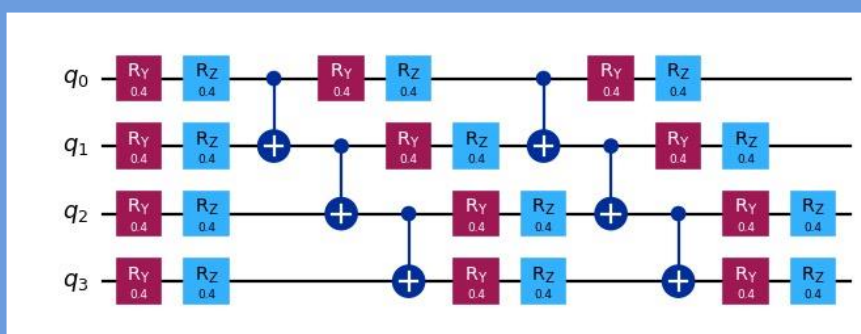
AND THEN MERGE THEM IN THE FINAL OUTPUT



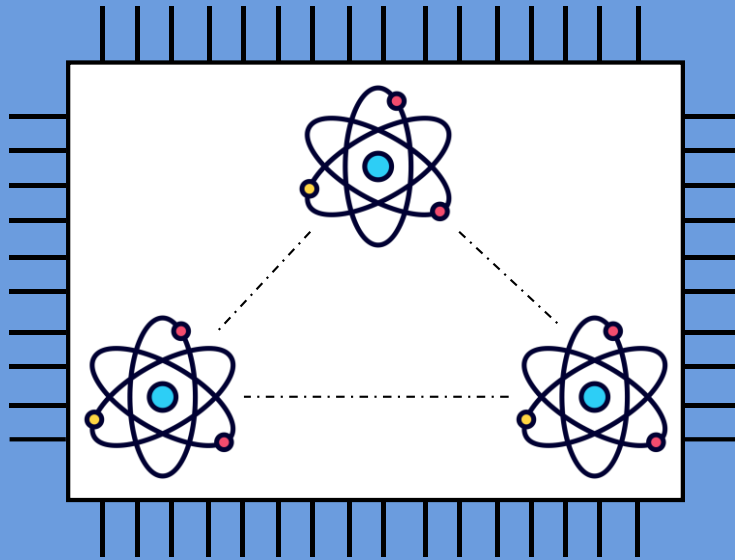
THIS IS THE SHOT-WISE APPROACH



4 Qubits

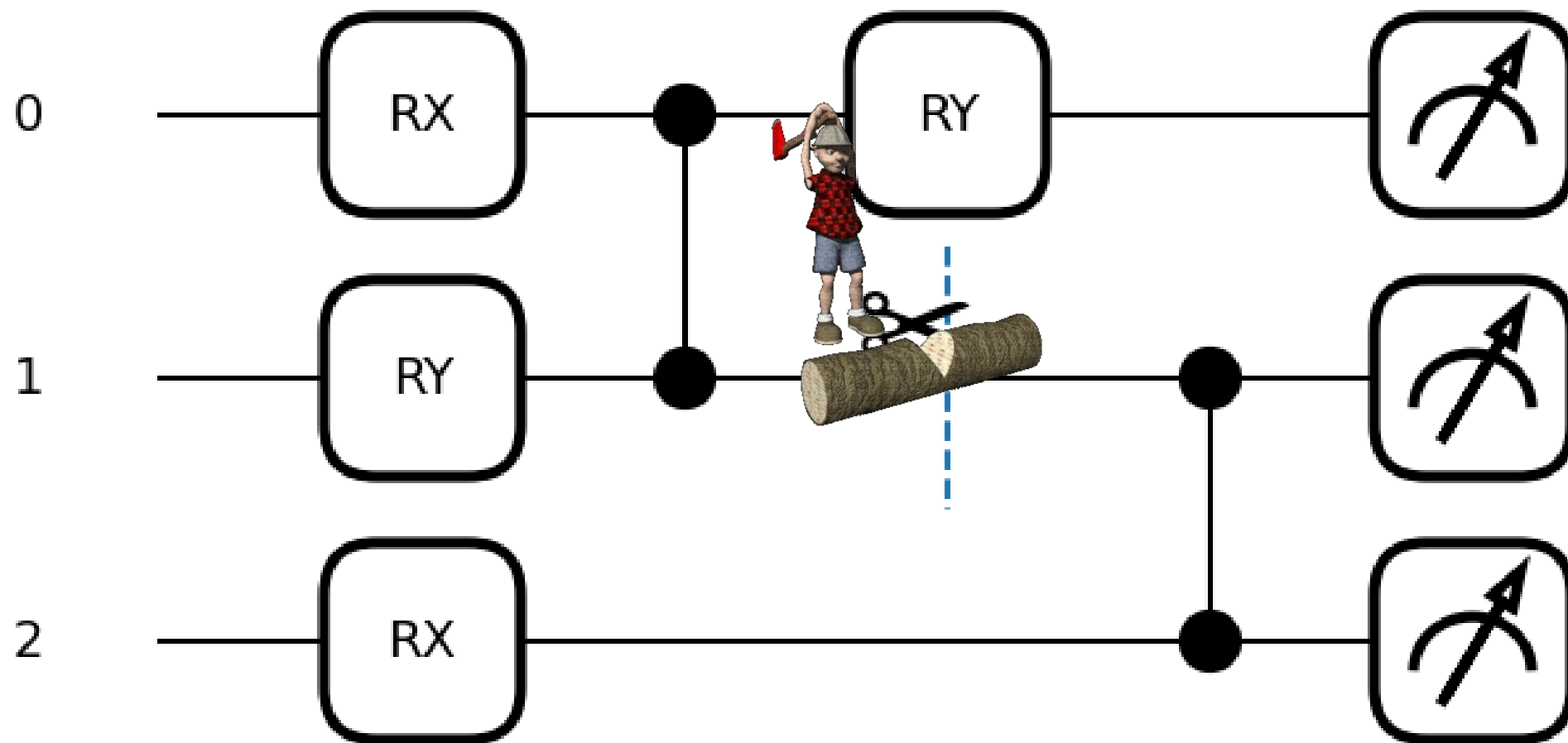


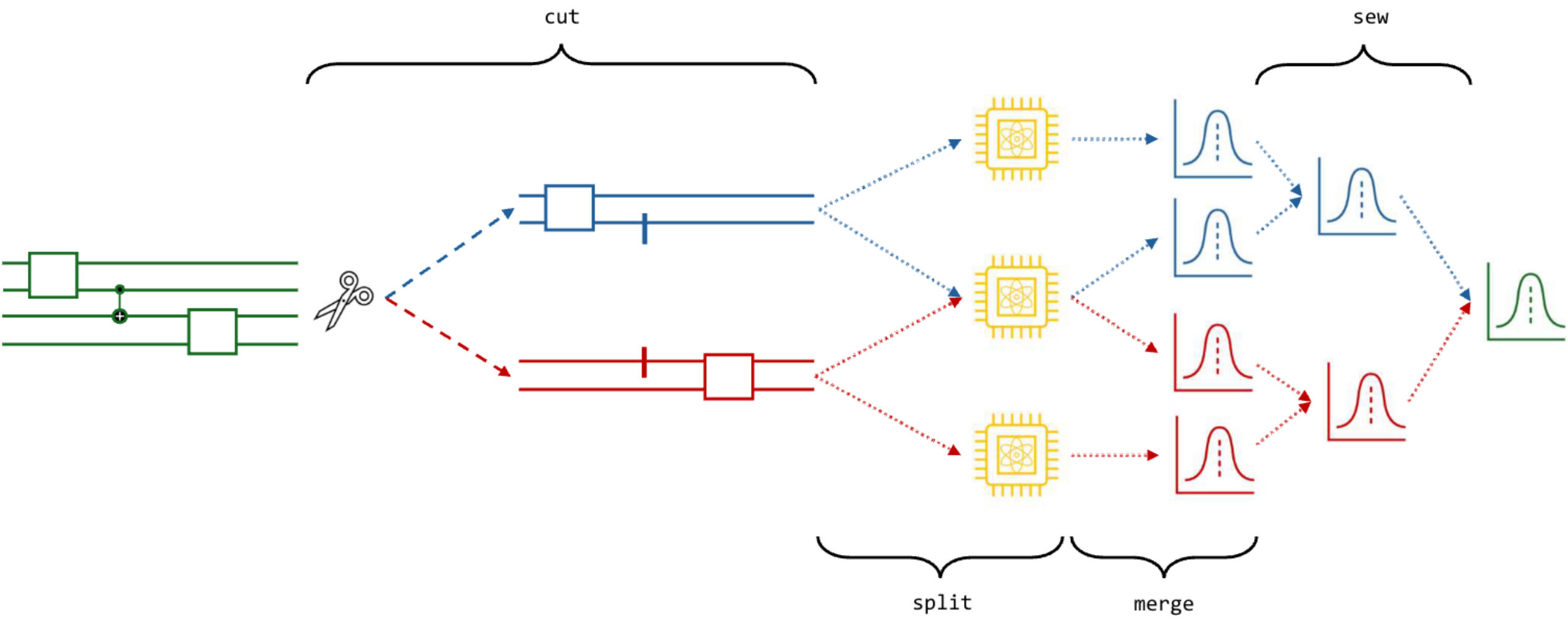
3 Qubits

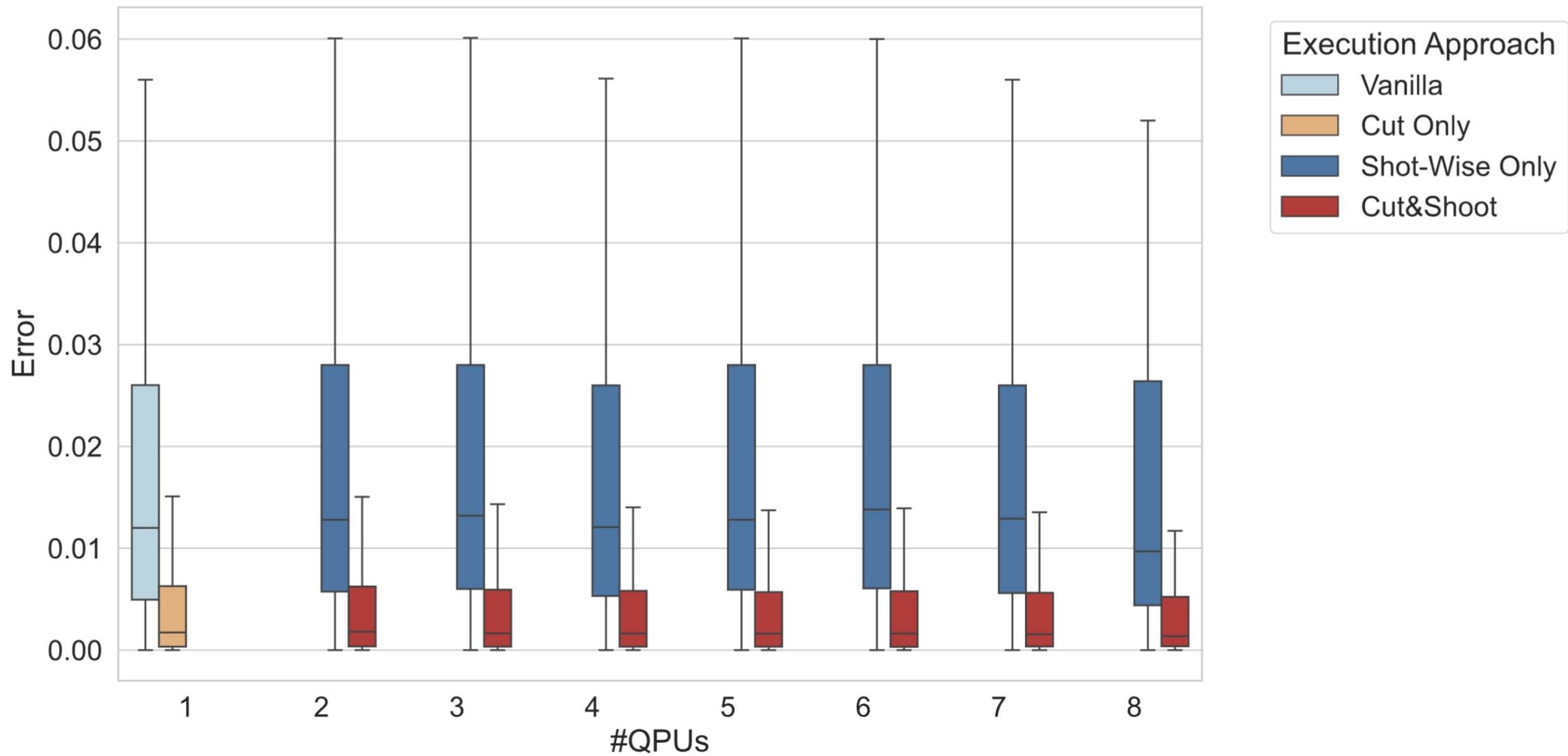


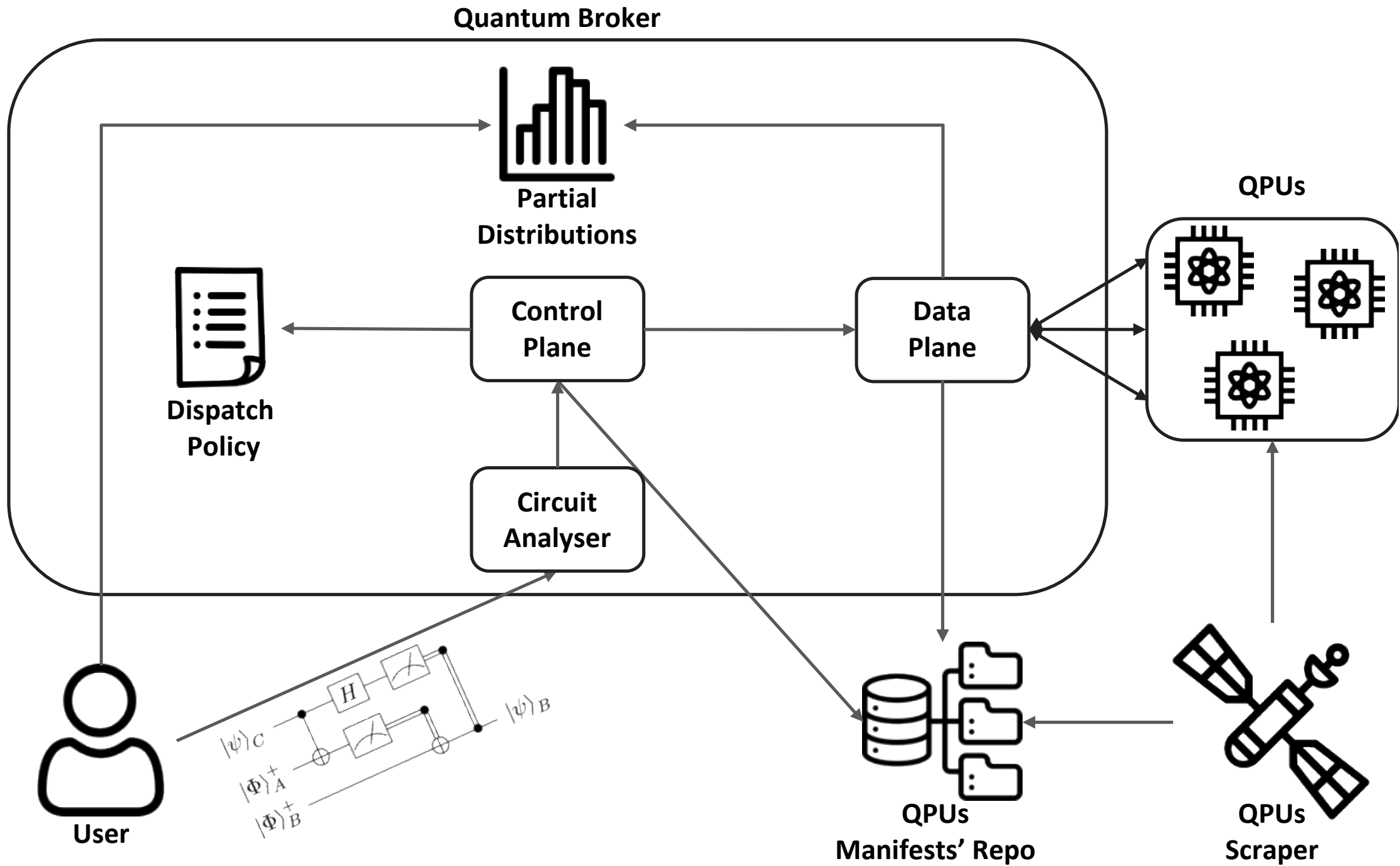
Circuit Cutting











THANK Q!

