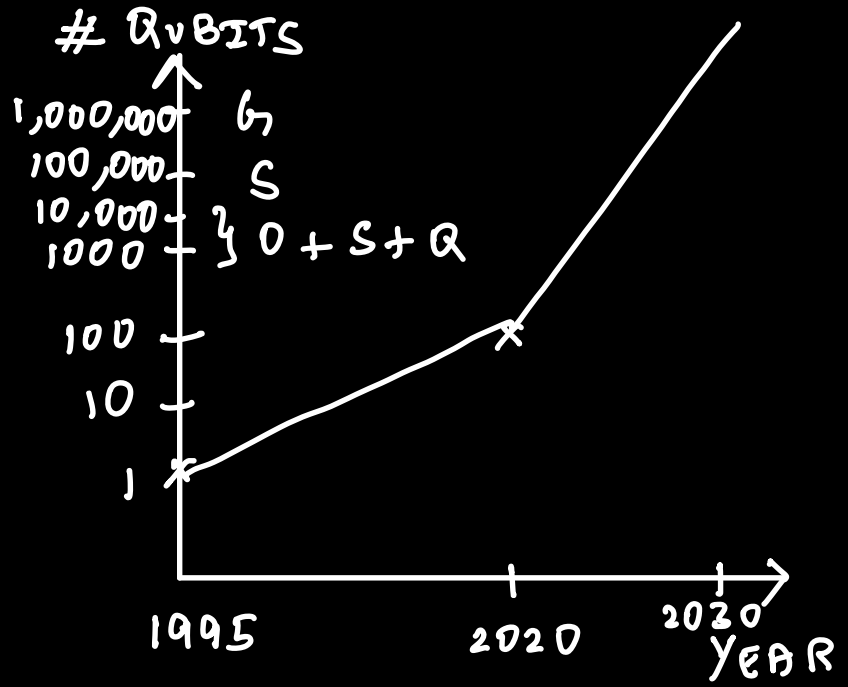
LECTURE - 1



G → GROVER ALGORITHM - 1,000,000

S → SHOR'S ALGORITHM - 100,000

O+S+Q: OPTIMIZATION + SIMULATION + QML

↳ 1000

QUANTUM VOLUME = # QUBITS

X

OPERATIONS

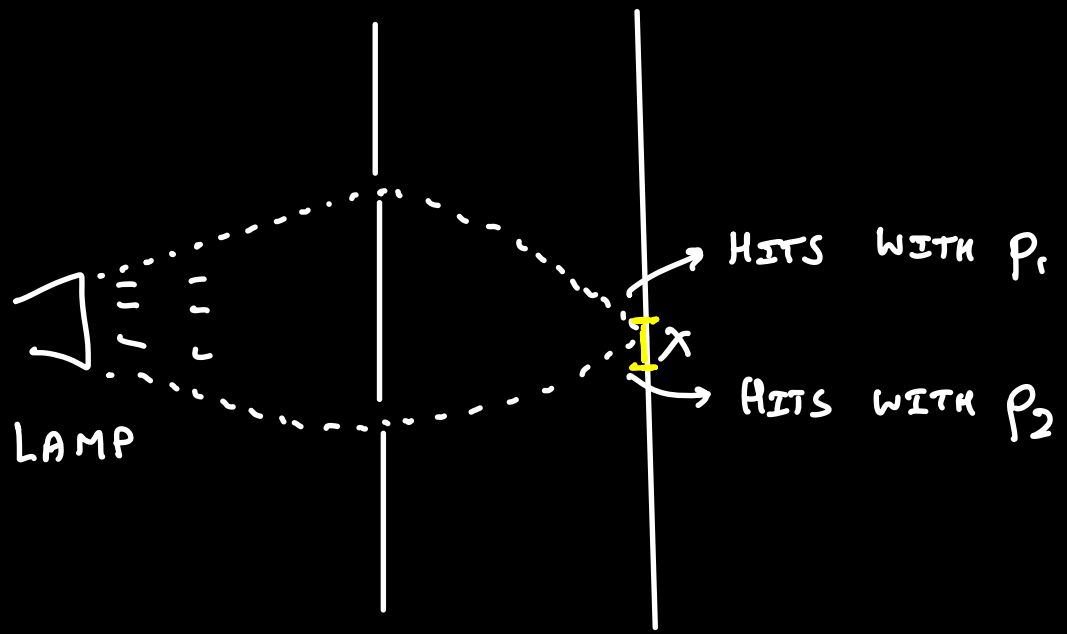
NOW, $QV = 100 \times 100 = 10{,}000$ //

QUBIT:

$$\begin{pmatrix} \alpha \\ \beta \end{pmatrix} \quad \alpha, \beta \in \text{COMPLEX}$$

300 QUBITS: VECTOR OF 2^{300} COMPLEX NUMBERS.

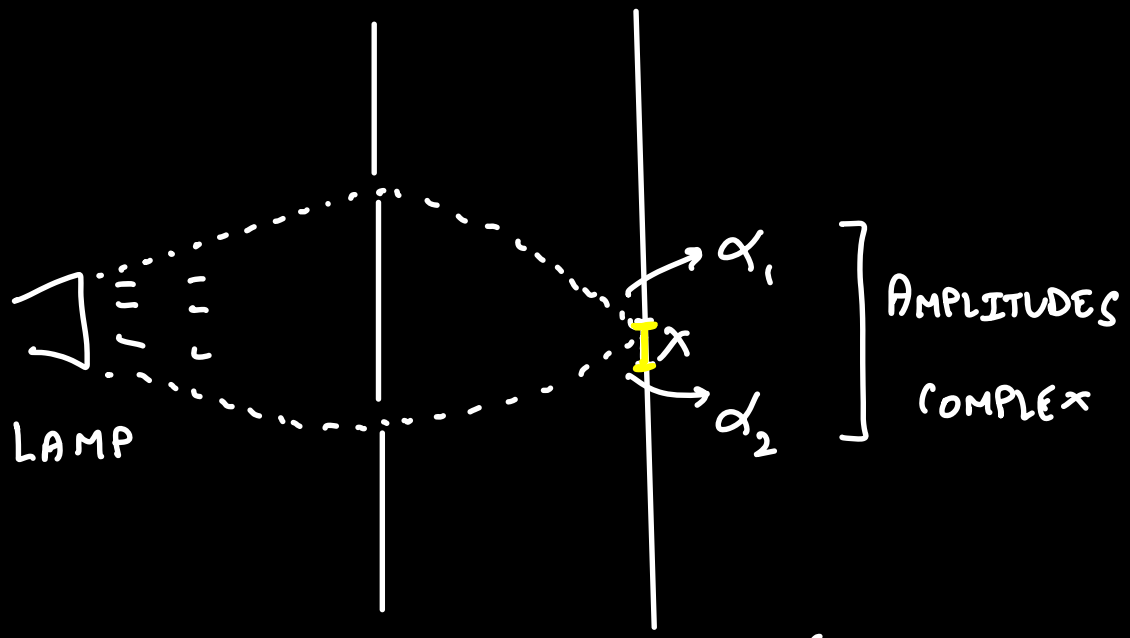
DOUBLE SLIT EXPERIMENTS:



ONLY SLIT 1, HITS X WITH $P = P_1$

ONLY 2 $\rightarrow P_2$

BOTH OPEN, $P \neq P_1 + P_2$.



$\alpha = \alpha_1 + \alpha_2$.

Say $\alpha_1 = 1/\sqrt{2}$, $\alpha_2 = -1/\sqrt{2}$

PROBABILITY $= |\alpha|^2$.

$$P = |\alpha_1 + \alpha_2|^2 = \left| \frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}} \right|^2 = 0 \;//$$

So, particles do not have one trajectory, but it takes all the possible trajectories.

PROBABILITIES

 QUANTUM COMPUTING

AMPLITUDES

LANGUAGES:

CLASSICAL → QUANTUM

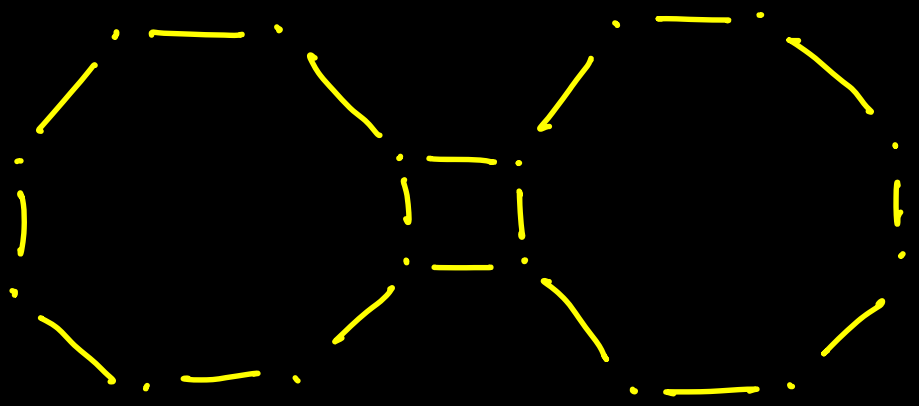
CIRQ: PYTHON LIBRARY

QISKIT: PYTHON

PYQUIL: PYTHON

Q# : NEW

RIGETTI: (STARTUP IN CALIFORNIA)



16 QUBITS

→ NOT ALL CONNECTED

→ COMPILERS HELP OVERCOME THIS AND HELP PERFORM ANY 2 QUBIT OPERATIONS AS IF THEY ARE CONNECTED.

FAMOUS QUOTES:

EINSTEIN: God does not play dice (1926)

FEYNMAN: Nature isn't classical, damnit (1981).

EVERYBODY: $1/\sqrt{2}$.