

Quantum Bits

Basis Set with $\{0, 1\}$

1 qubit

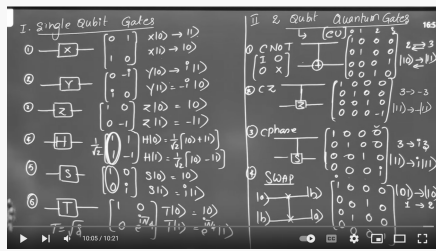
Basis Set with $\{00,01,10,11\}$

2 Qubits

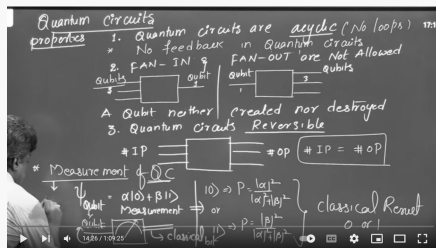
Basis Set with $\{000,001,010,011,100,-$

3 Qubits $101,110,111\}$

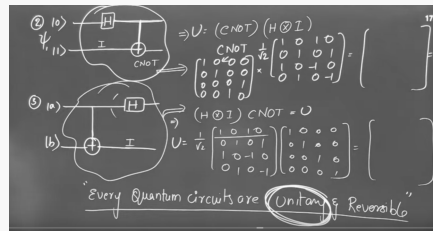
Quantum Gates



Quantum Circuits



Quantum Circuits (copy)



Quantum Algorithms

Deutsch-Jozsa Algorithm

Bernstein-Vazirani determine a secret number stored inside a box

Algorithm

Simon's Algorithm

Quantum Fourier Transform transforms computational basis to the Fourier basis

Quantum Phase Estimation uses phase kickback to write the phase

Estimation

Shor's Algorithm famous for factoring integers in polynomial time

Grover's Algorithm Unstructured Search

Teleportation

Pauli Gates

$X 0\rangle = 1\rangle$	$Y 0\rangle = i 1\rangle$	$Z 0\rangle = 0\rangle$
$X 1\rangle = 0\rangle$	$Y 1\rangle = -i 0\rangle$	$Z 1\rangle = - 1\rangle$
$X +\rangle = -\rangle$	$Y +\rangle = -i -\rangle$	$Z +\rangle = +\rangle$
$X -\rangle = +\rangle$	$Y -\rangle = i +\rangle$	$Z -\rangle = - -\rangle$
$X i\rangle = -i j\rangle$	$Y i\rangle = j\rangle$	$Z i\rangle = i j\rangle$
$X j\rangle = i i\rangle$	$Y j\rangle = -i i\rangle$	$Z j\rangle = i\rangle$

Quantum Machine Learning

SVM

Clustering

Classification

QNN

Linear Models