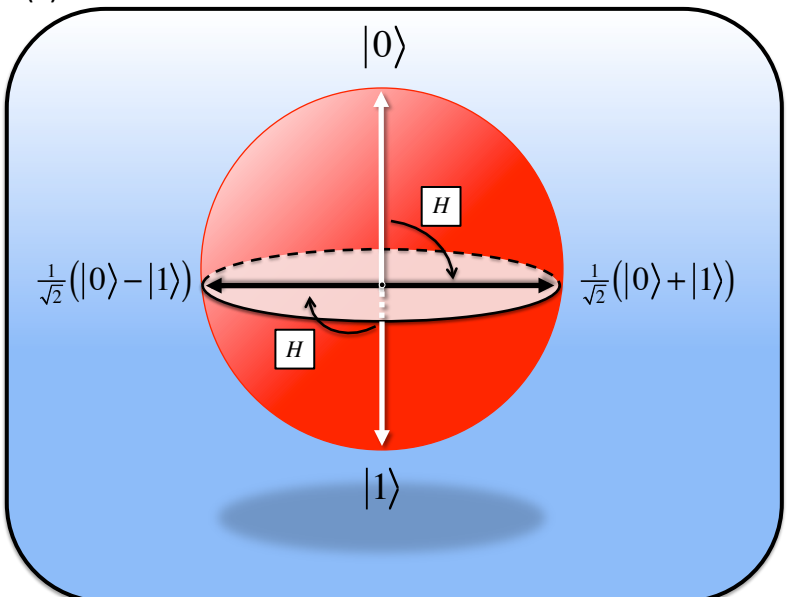
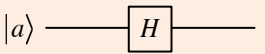
(a)



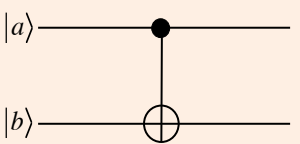
(b)

Hadamard



$$|0\rangle \rightarrow (|0\rangle + |1\rangle)/\sqrt{2}$$
$$|1\rangle \rightarrow (|0\rangle - |1\rangle)/\sqrt{2}$$

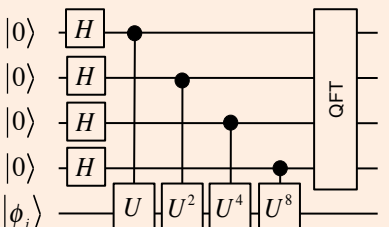
Controlled-NOT (CNOT)



$$|0\rangle|0\rangle \rightarrow |0\rangle|0\rangle$$
$$|0\rangle|1\rangle \rightarrow |0\rangle|1\rangle$$
$$|1\rangle|0\rangle \rightarrow |1\rangle|1\rangle$$
$$|1\rangle|1\rangle \rightarrow |1\rangle|0\rangle$$

Phase Estimation Algorithm (PEA)

$$H|\phi_j\rangle = E_j|\phi_j\rangle$$



$$|0000\rangle|\phi_0\rangle \rightarrow |E_0\rangle|\phi_0\rangle$$
$$|0000\rangle|\phi_1\rangle \rightarrow |E_1\rangle|\phi_1\rangle$$
$$|0000\rangle|\phi_2\rangle \rightarrow |E_2\rangle|\phi_2\rangle$$
$$\vdots$$