Estado cuántico 1-cubit

Estado cuántico $|\psi\rangle = \begin{pmatrix} \alpha \\ \beta \end{pmatrix}$ $\alpha \in \mathbb{C}$ $\beta \in \mathbb{C}$

Notación de Dirac: $|\psi\rangle = \alpha\,|0\rangle + \beta\,|1\rangle$ "a la vez cero y uno"

Los números complejos α, β se llaman *amplitudes de probabilidad*

Medir un cubit: $P(0) = |\alpha|^2$ $P(1) = |\beta|^2$ $\mathcal{M}(|\psi\rangle) = \begin{pmatrix} |\alpha|^2 \\ |\beta|^2 \end{pmatrix}$

$$\boxed{|\alpha|^2 + |\beta|^2 = 1}$$

Estado cuántico 2-cubit

$$|\psi\rangle = \begin{pmatrix} \alpha_{00} \\ \alpha_{01} \\ \alpha_{10} \\ \alpha_{11} \end{pmatrix} \qquad \mathcal{M}(|\psi\rangle) = \begin{pmatrix} |\alpha_{00}|^2 \\ |\alpha_{01}|^2 \\ |\alpha_{10}|^2 \\ |\alpha_{11}|^2 \end{pmatrix} \qquad \boxed{\|\psi\| = 1}$$

$$\|\psi\| = \sqrt{|\alpha_{00}|^2 + |\alpha_{01}|^2 + |\alpha_{10}|^2 + |\alpha_{11}|^2} = 1$$

$$P(00) = |\alpha_{00}|^2 \quad P(01) = |\alpha_{01}|^2 \quad P(10) = |\alpha_{10}|^2 \quad P(11) = |\alpha_{11}|^2$$

Estado cuántico 3-cubit, etc...

$$|\psi\rangle = \begin{pmatrix} \alpha_{000} \\ \alpha_{001} \\ \alpha_{010} \\ \alpha_{011} \\ \alpha_{100} \\ \alpha_{101} \\ \alpha_{110} \\ \alpha_{111} \end{pmatrix} \qquad \mathcal{M}(|\psi\rangle) = \begin{pmatrix} |\alpha_{000}|^2 \\ |\alpha_{001}|^2 \\ |\alpha_{010}|^2 \\ |\alpha_{011}|^2 \\ |\alpha_{100}|^2 \\ |\alpha_{101}|^2 \\ |\alpha_{110}|^2 \\ |\alpha_{111}|^2 \end{pmatrix}$$

algebra lineal

$$\begin{pmatrix} \alpha \\ \beta \end{pmatrix} = \alpha \begin{pmatrix} 1 \\ 0 \end{pmatrix} + \beta \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \alpha \left|0\right\rangle + \beta \left|1\right\rangle$$