0100001011100110101001111011011011101001101111110000101010001001101010011011101011011000101001111000001111110100101000011010001010111111110001010110011111110000010101

One Qubit

The standard basis for $\mathbb{C}^2$ *is denoted by* $|0\rangle_1 = \begin{pmatrix}1\\0\end{pmatrix}, |1\rangle_1 = \begin{pmatrix}0\\1\end{pmatrix}$. *The standard basis for* $(\mathbb{C}^2)^{\otimes q}$, *which has* 2^q *elements, is denoted by* $|0\rangle_q, |1\rangle_q, \ldots, |2^q - 1\rangle_q$.

If we pick the standard basis for $\mathbb{C}^2$, *then a single qubit* $(q = 1)$ *can be represented as* $\alpha|0\rangle + \beta|1\rangle = \alpha\begin{pmatrix}1\\0\end{pmatrix} + \beta\begin{pmatrix}0\\1\end{pmatrix}$ *where* $\alpha, \beta \in \mathbb{C}$ *and* $|\alpha|^2 + |\beta|^2 = 1$.

Superposition: $\alpha\ |0\rangle + \beta\ |1\rangle$

Complex Amplitudes: $\alpha,\ \beta$

Probabilities: $|\alpha|^2,\ |\beta|^2$

An Introduction to Quantum Computing, Without the Physics, Giacomo Nannicini, 2017 (2020).