

Quantum circuit diagram showing two qubits. The first qubit has a Hadamard gate (H) and a phase gate ($e^{i\varphi_0}$). The second qubit has a Hadamard gate (H) and a phase gate ($e^{i\varphi_1}$). The circuit is enclosed in an orange dashed box, with a blue dashed box highlighting the phase gates. Below the circuit, the corresponding matrix representation is shown as a product of three 2×2 matrices:

$$\begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & \frac{-1}{\sqrt{2}} \end{bmatrix} \begin{bmatrix} e^{i\varphi_0} & 0 \\ 0 & e^{i\varphi_1} \end{bmatrix} \begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & \frac{-1}{\sqrt{2}} \end{bmatrix}$$

Quantum circuit diagram showing two qubits. The first qubit has a Hadamard gate (H) and a phase gate ($\cos \frac{\varphi}{2}$). The second qubit has a Hadamard gate (H) and a phase gate ($\cos \frac{\varphi}{2}$). The circuit is enclosed in an orange dashed box, with a blue dashed box highlighting the phase gates. Below the circuit, the corresponding matrix representation is shown as a product of two 2×2 matrices:

$$\begin{bmatrix} \cos \frac{\varphi}{2} & -i \sin \frac{\varphi}{2} \\ -i \sin \frac{\varphi}{2} & \cos \frac{\varphi}{2} \end{bmatrix}$$