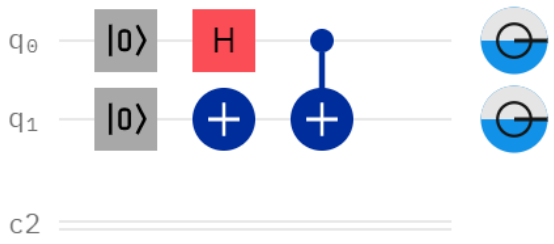
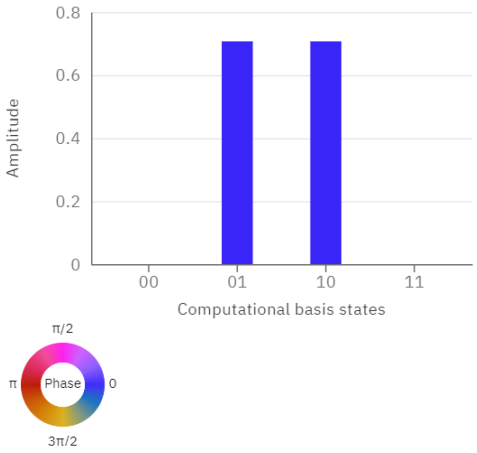
1. Use a quantum circuit to prepare $\Psi^+$

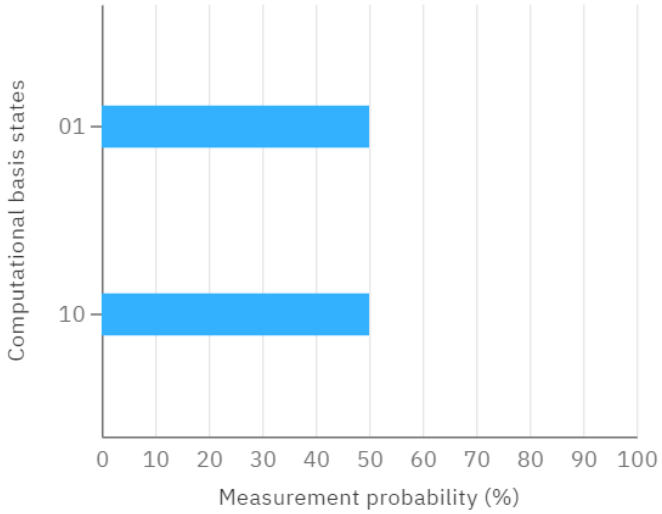
   Circuit:




   Statevector:

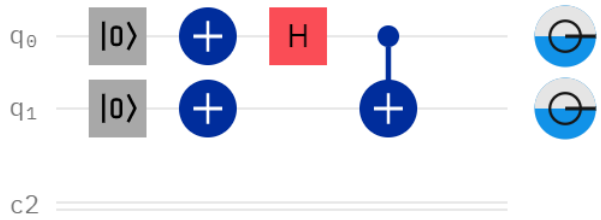



   Measurement Probabilities:

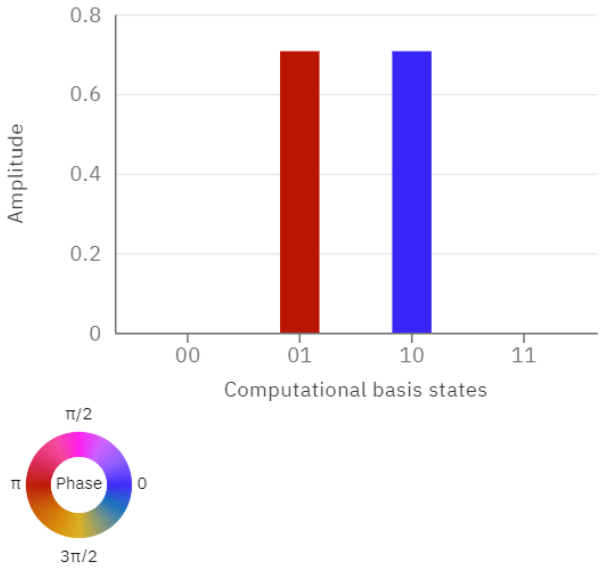


2. Use a quantum circuit to prepare $\Psi^-$

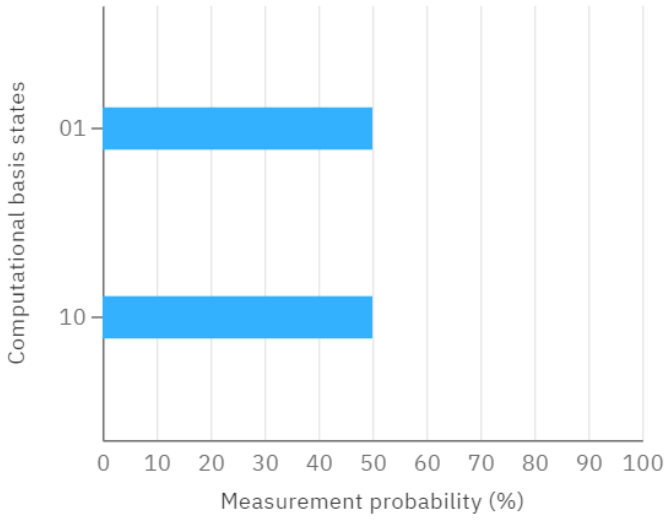
Circuit:




Statevector:



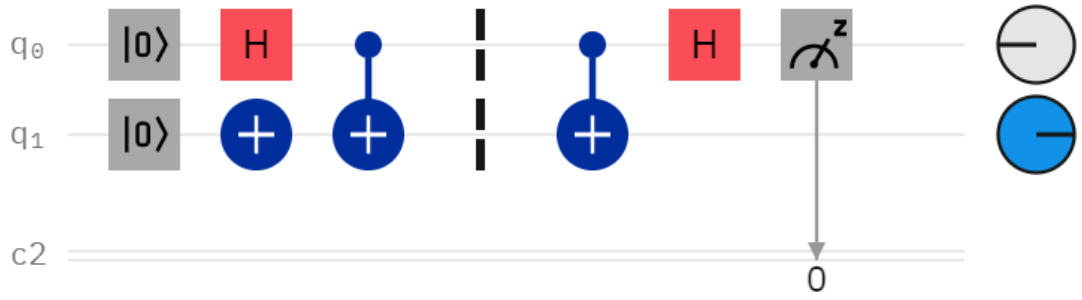

Measurement Probabilities:



3. Use a quantum circuit to distinguish $\Psi^+$ and $\Psi^-$

   $\Psi^+$ and $\Psi^-$ could be distinguished by making a measurement on $q_0$ after applying a CNOT gate and an H gate at $q_0$. For $\Psi^+$, the outcome would be 0. For $\Psi^-$, the outcome would be 1.

   Circuit for $\Psi^+$:




   Circuit for $\Psi^-$: