

$$\text{In}[\bullet] := \psi_0 = \frac{1}{\sqrt{2}} \{0, 1, 1, 0\};$$

$$\psi_t = U_t . \psi_0$$

$$\text{Out}[\bullet] = \left\{ 0, \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0 \right\}$$