

(2)

* Measurement of a single qubit in an entangled state:

$$|\psi\rangle = \frac{1}{\sqrt{2}} (|00\rangle + |11\rangle)$$

measurement of the first qubit:

~~Pr(0)~~ $P_1|0\rangle = \langle\psi|(M_0 \otimes I)^\dagger (M_0 \otimes I)|\psi\rangle$
 $= \frac{1}{\sqrt{2}} \langle 00 | \frac{1}{\sqrt{2}} | 00 \rangle = \frac{1}{2}$

Post measurement state:

$$|\psi'\rangle = \frac{(M_0 \otimes I)|\psi\rangle}{\sqrt{P_1(0)}} = \frac{\frac{1}{\sqrt{2}}|00\rangle}{\frac{1}{\sqrt{2}}} = |00\rangle$$
