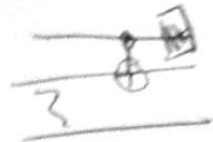


$$|\psi\rangle = \alpha|0\rangle + \beta|1\rangle$$

$$\frac{\text{Tr}(\rho)}{\alpha^2 + \beta^2}$$



$$|e\rangle = \frac{1}{\sqrt{2}} \overset{T_2}{(|00\rangle + |11\rangle)}$$

alternate quantum teleportation

$$|\psi\rangle \otimes |e\rangle = \frac{1}{\sqrt{2}} [\alpha|0\rangle(|00\rangle + |11\rangle) + \beta|1\rangle(|00\rangle + |11\rangle)]$$

$$= \frac{1}{\sqrt{2}} (\alpha|000\rangle + \alpha|011\rangle + \beta|100\rangle + \beta|111\rangle)$$

$$(H \otimes I \otimes I) (CNOT \otimes I) (|\psi\rangle \otimes |e\rangle)$$

$$\frac{1}{\sqrt{2}} (\alpha|000\rangle + \alpha|011\rangle + \beta|110\rangle + \beta|101\rangle)$$

$$\frac{1}{\sqrt{2}} \frac{1}{\sqrt{2}} (\alpha|000\rangle + \alpha|011\rangle + \alpha|111\rangle + \beta|101\rangle - \beta|110\rangle + \beta|100\rangle + \beta|111\rangle)$$

$$\frac{1}{2} [\alpha(|000\rangle + |100\rangle + |011\rangle + |111\rangle) + \beta(|010\rangle + |100\rangle - |110\rangle - |111\rangle)]$$

$$\frac{1}{2} [|00\rangle (\alpha|0\rangle + \beta|1\rangle) + |01\rangle (\alpha|1\rangle + \beta|0\rangle) + |10\rangle (\alpha|0\rangle - \beta|1\rangle) + |11\rangle (\alpha|1\rangle - \beta|0\rangle)]$$

$$|\psi\rangle = \alpha|0\rangle + \beta|1\rangle$$

$$|e\rangle = \frac{1}{\sqrt{2}}(|10\rangle + |01\rangle)$$

$$|\psi\rangle \otimes |e\rangle = \frac{1}{\sqrt{2}}(\alpha|1010\rangle + \alpha|1001\rangle + \beta|1110\rangle + \beta|1101\rangle)$$

$$(H \otimes I \otimes T) (\frac{1}{\sqrt{2}}(\sigma_x + \sigma_z) \otimes I) (|\psi\rangle \otimes |e\rangle)$$

$$\frac{1}{\sqrt{2}}(\alpha|010\rangle + \alpha|100\rangle + \beta|100\rangle + \beta|111\rangle)$$

$$\frac{1}{2} [\alpha(|010\rangle + |110\rangle + |100\rangle + |101\rangle) + \beta(|100\rangle - |110\rangle + |101\rangle - |111\rangle)]$$

$$\frac{1}{2} [|00\rangle (\alpha|1\rangle + \beta|0\rangle) + |01\rangle (\alpha|0\rangle + \beta|1\rangle) + |10\rangle (\alpha|1\rangle - \beta|0\rangle) + |11\rangle (\alpha|0\rangle - \beta|1\rangle)]$$

□-□

□

$$|\varphi\rangle = \alpha|0\rangle + \beta|1\rangle$$

$$|e\rangle = \frac{1}{\sqrt{2}}(|00\rangle - |11\rangle)$$

$$|\varphi\rangle \otimes |e\rangle = \frac{1}{\sqrt{2}}(\alpha|1000\rangle - \alpha|1011\rangle + \beta|1100\rangle - \beta|1111\rangle)$$

$$(H \otimes I \otimes I) (\text{CNOT} \otimes I) (|\varphi\rangle \otimes |e\rangle)$$

$$\frac{1}{\sqrt{2}}(\alpha|1000\rangle - \alpha|1011\rangle + \beta|1110\rangle - \beta|1101\rangle)$$

$$\frac{1}{2} [\alpha(|0000\rangle + |1100\rangle - |1011\rangle - |1111\rangle)$$

$$+ \beta(|0110\rangle - |1110\rangle - |1001\rangle + |1101\rangle)]$$

$$\frac{1}{2} [|000\rangle (\alpha|0\rangle - \beta|1\rangle) + |011\rangle (-\alpha|1\rangle + \beta|0\rangle)$$

$$+ |110\rangle (\alpha|0\rangle + \beta|1\rangle) + |111\rangle (-\alpha|1\rangle - \beta|0\rangle)]$$

⊗

$$|\psi\rangle = \alpha|0\rangle + \beta|1\rangle$$

$$|e\rangle = \frac{1}{\sqrt{2}}(|10\rangle - |01\rangle)$$

$$|\psi\rangle \otimes |e\rangle = \frac{1}{\sqrt{2}}(\alpha|010\rangle - \alpha|001\rangle + \beta|110\rangle - \beta|101\rangle)$$

$$(H \otimes I \otimes I)(CNOT \otimes I)(|\psi\rangle \otimes |e\rangle)$$

$$\frac{1}{\sqrt{2}}(\alpha|010\rangle - \alpha|100\rangle + \beta|100\rangle - \beta|111\rangle)$$

$$\frac{1}{2}[\alpha(|010\rangle + |110\rangle - |100\rangle - |110\rangle)$$

$$+ \beta(|100\rangle - |110\rangle - |101\rangle + |111\rangle)]$$

$$\frac{1}{2}[|00\rangle(\alpha|1\rangle + \beta|0\rangle) + |01\rangle(\alpha|0\rangle - \beta|1\rangle)$$

$$+ |10\rangle(-\alpha|1\rangle - \beta|0\rangle) + |11\rangle(\alpha|0\rangle + \beta|1\rangle)]$$

$$\square - \square - \square$$

$$\square$$