$$t \cdot \sqrt{\Delta^2 + \Omega^2}$$

$$= t\Delta\sqrt{1+\frac{\Omega^2}{\Delta^2}} \qquad = t\Omega\sqrt{1+\frac{\Delta^2}{\Omega^2}}$$

$$\approx t\Delta\left(1+\frac{\Omega^2}{2\Delta^2}\right) \qquad = t\Omega\left(1+\frac{\Delta^2}{2\Omega^2}\right)$$

$$\varepsilon(a+a^\dagger) \quad \text{or} \quad \frac{\varepsilon}{2}(a+a^\dagger)$$

$$H = \varepsilon(t)\cdot(a+a^\dagger) \qquad \varepsilon(\tau) = \bar{\varepsilon}\, e^{-\frac{t^2}{2\sigma^2}}$$

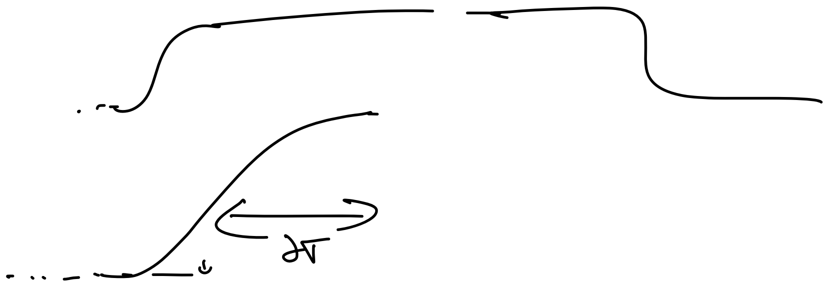
$$U = e^{-i\int_0^{\tau} d\varepsilon\, \varepsilon(\varepsilon)\,(a+a^\dagger)} = D(f(\varepsilon))$$

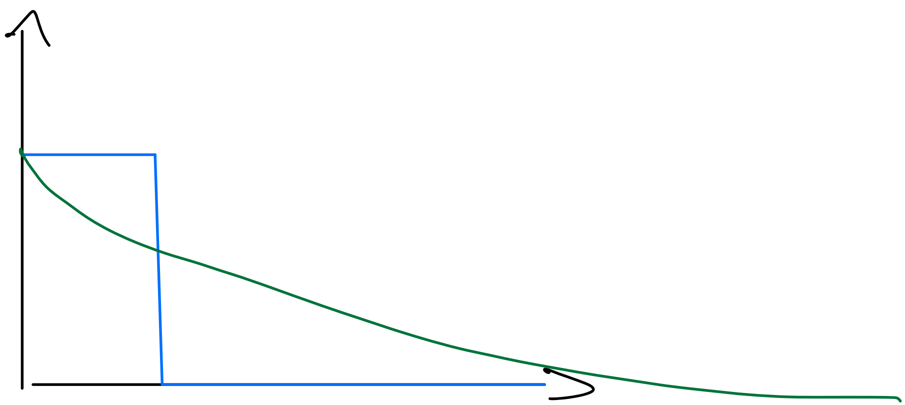
$$D(f(\varepsilon))|0\rangle = |f(\varepsilon)\rangle$$

What coherent state has $P(|1\rangle)$ maximal?

$$|\alpha\rangle = e^{-\frac{|\alpha|^2}{2}} \sum_n \frac{\alpha^n}{\sqrt{n!}} |n\rangle$$

for what α is $\alpha\, e^{-|\alpha|^2}$ maximal





$|\psi\rangle \to K_{gg}|\psi\rangle$

$|\psi\rangle : N$

$K_{gg} : N^2$

$$\rho = K_{gg}\rho K_{gg}^\dagger + K_{ge}\rho K_{ge}^\dagger + \dots$$

$$= \sum_j K_j \rho K_j^\dagger$$

$\rho = N^2$

$$\mathcal{F} = |\langle \varphi | \phi \rangle| = \sqrt{\langle \phi | \rho | \phi \rangle}$$

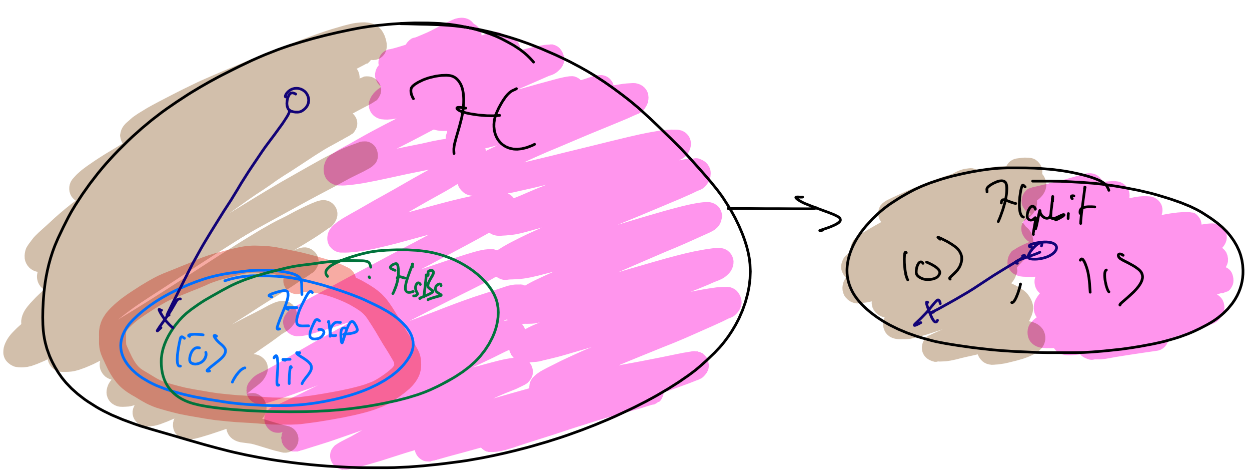
$$\mathcal{F} = |\langle \varphi | \phi \rangle|^2$$

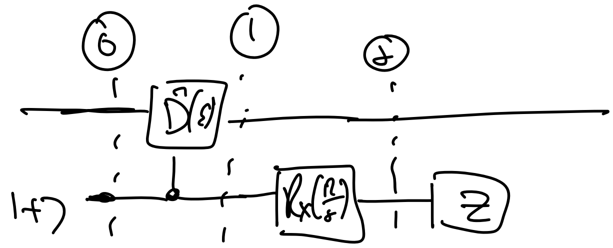
$$\mathcal{F}_{\phi,\rho} = \langle \phi | \rho | \phi \rangle$$

$$\rho = |\psi\rangle\langle\psi|$$

$$\rho = p_1 |\psi_1\rangle\langle\psi_1| + p_2 |\psi_2\rangle\langle\psi_2|$$

$$\mathcal{F}_{\phi,\rho} = p_1 |\langle \phi | \psi_1 \rangle|^2 + p_2 |\langle \phi | \psi_2 \rangle|^2$$





$$C\hat D(\varepsilon) = |g\rangle\langle g| \otimes D\left(\tfrac{\varepsilon}{2}\right) + |e\rangle\langle e| \otimes D\left(-\tfrac{\varepsilon}{2}\right)$$

$$R_x(\pi/2) = \frac{1 - iX}{\sqrt{2}}$$

$$e^{-i\frac{\theta}{2}X} = \cos\tfrac{\theta}{2}\,\mathbb{1} - i\sin\tfrac{\theta}{2}\,X$$

0 $$|\psi\rangle \otimes |+\rangle = |\psi\rangle \otimes \left(\frac{|g\rangle + |e\rangle}{\sqrt{2}}\right)$$

1 $$= C\hat D(\varepsilon)\left[|\psi\rangle \otimes \left(\frac{|g\rangle + |e\rangle}{\sqrt{2}}\right)\right]$$

$$= \frac{\hat D\left(\frac{\varepsilon}{2}\right)}{\sqrt{2}}|\psi, g\rangle + \frac{\hat D\left(-\frac{\varepsilon}{2}\right)}{\sqrt{2}}|\psi, e\rangle$$

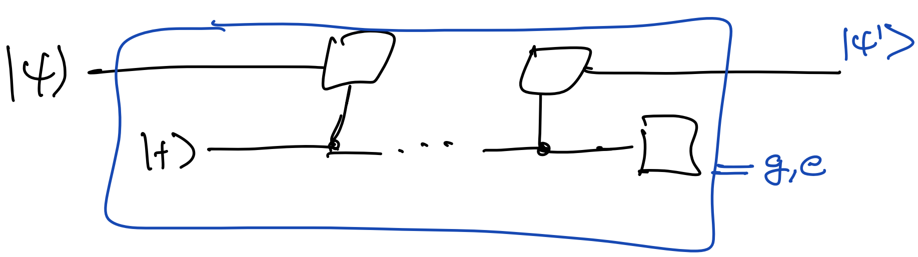
2 $$= \frac{\hat D\left(\frac{\varepsilon}{2}\right)}{2}|\psi\rangle \otimes (|g\rangle - i|e\rangle) + \frac{\hat D\left(-\frac{\varepsilon}{2}\right)}{2}|\psi\rangle \otimes (|e\rangle - i|g\rangle)$$

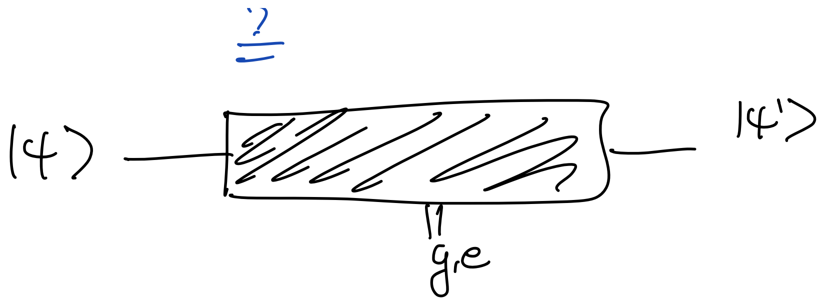
$$= \frac{1}{2}\left\{\left[\hat D\left(\tfrac{\varepsilon}{2}\right) - i\hat D\left(-\tfrac{\varepsilon}{2}\right)\right]|\psi, g\rangle + \left[-i\hat D\left(\tfrac{\varepsilon}{2}\right) + \hat D\left(-\tfrac{\varepsilon}{2}\right)\right]|\psi, e\rangle\right\}$$

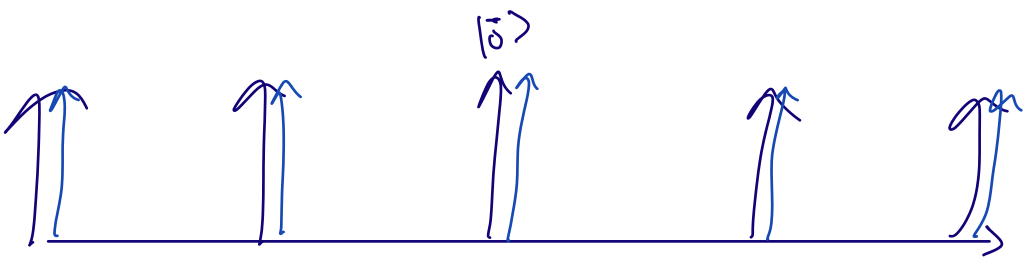
mesure bleu : $$|\psi'\rangle = \overbrace{\frac{1}{2}\left[\hat D\left(\tfrac{\varepsilon}{2}\right) - i\hat D\left(-\tfrac{\varepsilon}{2}\right)\right]}^{=\hat K_g}|\psi\rangle$$

avec prob. $|\langle\psi'|\psi'\rangle|^2 =$

mesure rouge : $$|\psi'\rangle = \underbrace{\frac{-i}{2}\left[\hat D\left(\tfrac{\varepsilon}{2}\right) + i\hat D\left(-\tfrac{\varepsilon}{2}\right)\right]}_{=\hat K_e}|\psi\rangle$$





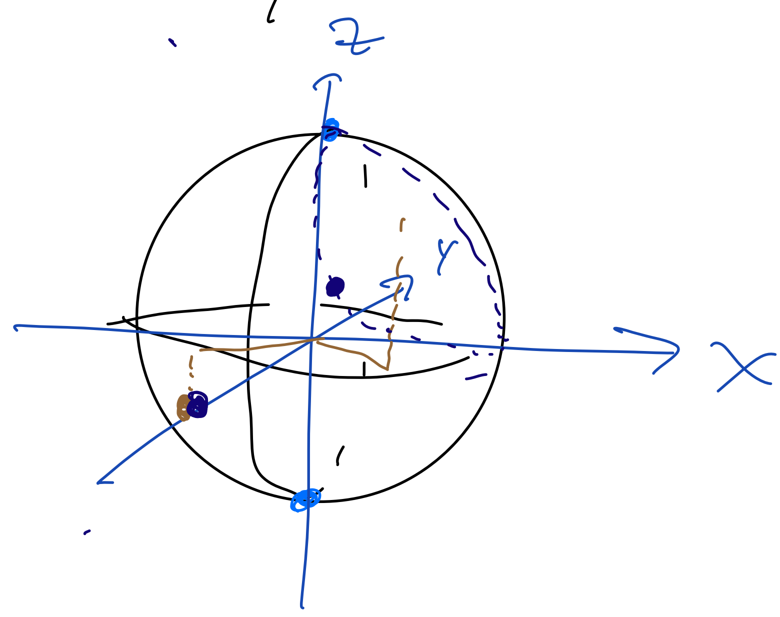


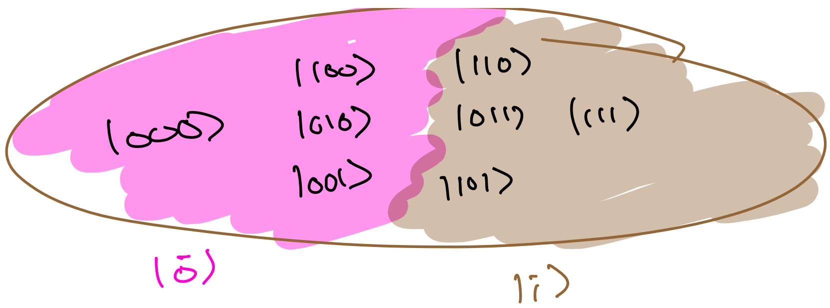
Prepare $|\bar{0}_{GKP}\rangle$

apply SBs

compute $\langle\bar{0}|\rho|\bar{0}\rangle$

$$\rho = \frac{|0\rangle\langle 0| + |1\rangle\langle 1|}{2}$$





$$\alpha|000\rangle + \beta|111\rangle \rightarrow \alpha|\bar{0}\rangle + \beta|\bar{1}\rangle$$

$$\alpha|100\rangle + \beta|011\rangle \rightarrow \alpha|\bar{0}\rangle + \beta|\bar{1}\rangle$$

$$\alpha|000\rangle + \beta|011\rangle \longrightarrow \rho = |\alpha|^2 |\bar{0}\rangle\langle\bar{0}| + |\beta|^2 |\bar{1}\rangle\langle\bar{1}|$$

mesurer $Z_1 Z_2$ $+1$ avec prob $|\alpha|$

$Z_2 Z_3$ $+1$

$$|\psi\rangle \longrightarrow \rho_{qubit} = \frac{1 + \vec{r}\cdot\vec{\sigma}}{2}$$

$$\vec{\sigma} = (\sigma_x, \sigma_y, \sigma_z)$$

$$\langle\sigma_z\rangle = Tr(\sigma_z \rho_{qubit}) = r_z$$

$$\langle\bar{Z}\rangle_\psi = r_z$$

$$\langle\bar{X}\rangle_\psi = r_x$$

$$\langle\bar{Y}\rangle_\psi = r_y$$

$$\bar{Z} = \mathrm{Re}\left[\hat{T}(i\sqrt{\pi})\right]$$

$$|\phi_{\sqrt{H}}\rangle = \sqrt{H}\cdot|0\rangle$$

$$F = \langle\phi_{\sqrt{H}}|\rho|\phi_{\sqrt{H}}\rangle$$

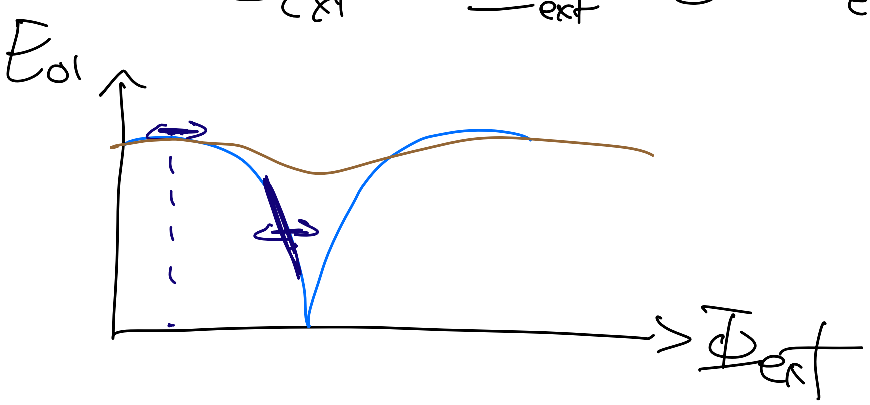
$$\rho = p_1 \psi_1 + p_2 \psi_2$$

$$= p_1 \left(\frac{1 + \vec{r}_1 \cdot \vec{\sigma}}{2} \right) + p_2 \left(\frac{1 + \vec{r}_2 \cdot \vec{\sigma}}{2} \right)$$

$$= \frac{1 + (p_1 \vec{r}_1 + p_2 \vec{r}_2) \cdot \vec{\sigma}}{2}$$

$$\frac{\partial E_{01}}{\partial \Phi}$$

$$\Phi_{ext} = \bar{\Phi}_{ext} + \delta \Phi(t)_{env}$$



$$T_2 \sim \underbrace{\frac{\partial E_{01}}{\partial \Phi}} \cdot S(0)$$