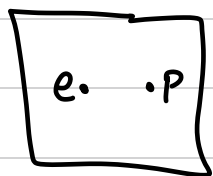
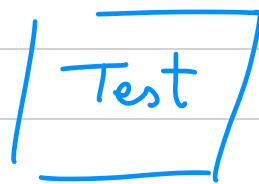


Decorrelation :



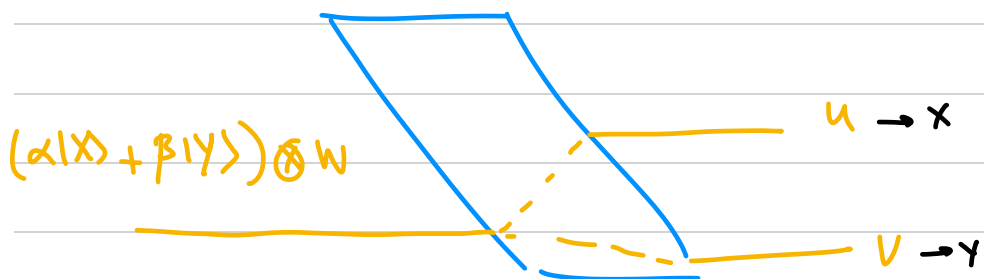
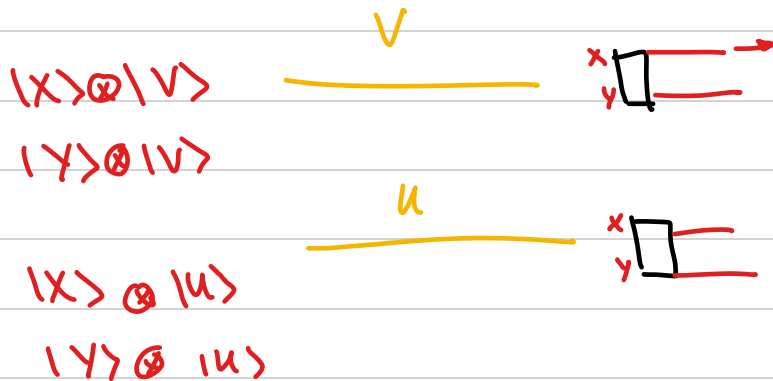
$|\uparrow\rangle \otimes |\downarrow\rangle$
 $|\uparrow\rangle \quad |\uparrow\rangle$
 $|\downarrow\rangle \quad |\downarrow\rangle$
 $|\downarrow\rangle \quad |\uparrow\rangle$



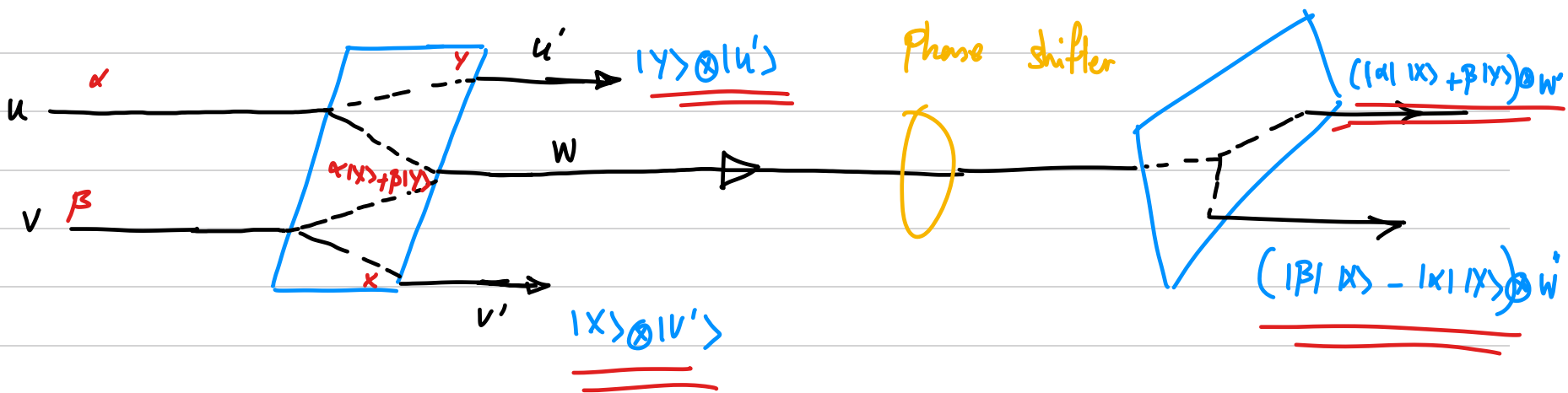
$|a\rangle \otimes |b\rangle$

...

...



$$\alpha |X\rangle \otimes |u\rangle + \beta |Y\rangle \otimes |v\rangle$$



$$\alpha |X\rangle \otimes |u\rangle + \beta |Y\rangle \otimes |v\rangle \longrightarrow \left(\alpha e^{i\phi} |X\rangle + \beta e^{i\eta} |Y\rangle \right) \otimes |w\rangle$$

$$|X\rangle \otimes |u\rangle \longrightarrow e^{i\phi} |X\rangle \otimes |w\rangle$$

$$|Y\rangle \otimes |v\rangle \longrightarrow e^{i\eta} |Y\rangle \otimes |w\rangle$$

$$\beta^* |X\rangle \otimes |u\rangle - \alpha^* |Y\rangle \otimes |v\rangle$$

$$\longrightarrow (\beta^* e^{i\phi} |X\rangle - \alpha^* e^{i\eta} |Y\rangle) \otimes |w\rangle$$

$$|X\rangle \rightarrow e^{i(\theta-\xi)} \sqrt{\frac{\alpha^*}{\alpha}} |X\rangle$$

$$|Y\rangle \rightarrow e^{i(\theta-\eta)} \sqrt{\frac{\beta^*}{\beta}} |Y\rangle$$

$$\alpha e^{i\xi} |X\rangle + \beta e^{i\eta} |Y\rangle \rightarrow e^{i\theta} (|\alpha| |X\rangle + |\beta| |Y\rangle)$$

$$\beta^* e^{i\xi} |X\rangle - \alpha^* e^{i\eta} |Y\rangle \rightarrow e^{i\theta} \sqrt{\frac{\alpha^*}{\alpha} \frac{\beta^*}{\beta}} (|\beta| |X\rangle - |\alpha| |Y\rangle)$$

$$N \text{ dim} : N^2 - 1$$

$$n \text{ dim} + m \text{ dim} \rightarrow nm \text{ dim} . \quad \underbrace{n^2}_{100 \times 100} \underbrace{m^2}_{-1} - 1 \neq \underbrace{(n^2-1)}_{99} + \underbrace{(m^2-1)}_{99}$$

$$\text{cls.} : P_1 + P_2$$

$$a : \left(\hat{A} \otimes \hat{1} + \hat{1} \otimes \hat{B} \right)_{m\mu, n\nu} = A_{mn} \delta_{\mu\nu} + \delta_{mn} B_{\mu\nu}$$

$$A_{ij} = \langle i | A | j \rangle$$

$$\hat{C}_{m\mu, n\nu} = \langle m | \otimes \langle \mu | \hat{C} | n \rangle \otimes | \nu \rangle$$

$$\left(\hat{A} \otimes \hat{1} + \hat{1} \otimes \hat{B} \right) (|u\rangle \otimes |v\rangle)_{m\mu} = \sum_{n\nu} (A_{mn} \delta_{\mu\nu} + \delta_{mn} B_{\mu\nu}) u_n v_\nu$$

$$= \left(\sum_n A_{mn} u_n \right) v_\mu + u_m \left(\sum_\nu B_{\mu\nu} v_\nu \right)$$

$$= (A u \otimes v) + (u \otimes B v)$$

