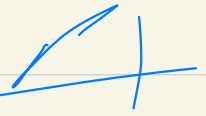
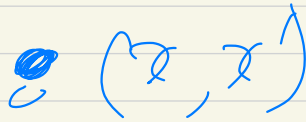


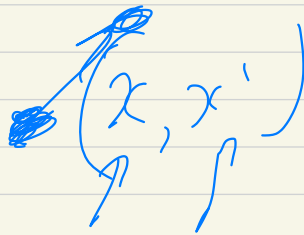
C3 T2022-9-4



$$\vec{q}_3 = \alpha \vec{q}_1 + \beta \vec{q}_2$$

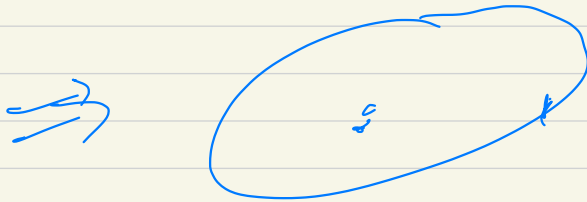


$$\vec{F} = m\vec{a}$$



$$f = \frac{1}{r^2} \text{ GRAVITY}$$

ELLIPSES





1 QBIT

2 STATES 0, 1

USE VECTOR $0 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$

$1 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$

$|0\rangle = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$

BRACKET

$|1\rangle = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$

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

$$\alpha^* \alpha + \beta^* \beta = 1$$

$$\text{IF } \alpha = 1 + 2i$$

$$\alpha^* = 1 - 2i$$

$$\alpha \alpha^* = .05$$

$$\text{FORCE} \beta \beta^* = .95$$

IF MEASURE ρ

$$\rho(10) = .05$$

BELL'S THEOREM.

MQ

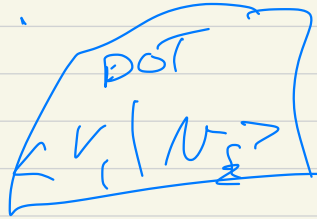
MP

ALL OPERATORS
CHANGE QBIT.

APPLY M TO Q .

CHANGES Q .

$$Q' = M Q.$$



QUANTUM COMPUTING

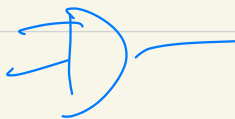
OPERATORS.

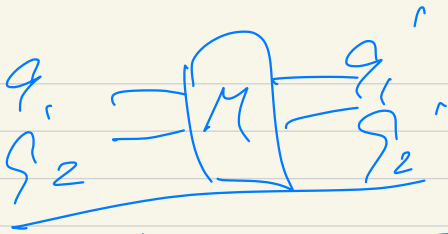
(NOT MEASUREMENT)

INVERTIBLE.

$$Q_2 = M Q_1$$

$$Q_1 = M^{-1} Q_2$$





1 QBIT

$$\begin{pmatrix} a \\ b \end{pmatrix}$$

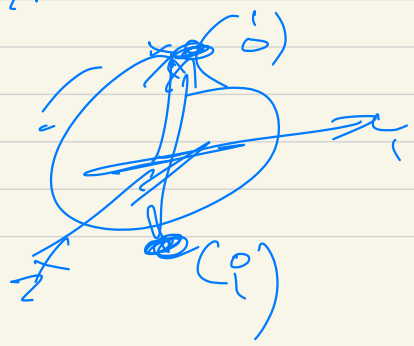
$$\begin{pmatrix} 1 \\ 0 \end{pmatrix} \quad \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

NOT

$$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} b \\ a \end{pmatrix}$$

$$\begin{pmatrix} 1 \\ 0 \end{pmatrix} \leftrightarrow \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

BLock SPHERE = V(SU(2) MATR)



$$U = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$$

$$U \begin{pmatrix} \varphi \\ a \end{pmatrix} = \begin{pmatrix} -b \\ a \end{pmatrix}$$

ROTATION

$$R_{\theta} = \begin{pmatrix} 1 & 0 \\ 0 & e^{i\theta} \end{pmatrix}$$

$$S = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$

$$Sg \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} \varphi \\ a \end{pmatrix} = \begin{pmatrix} b \\ a \end{pmatrix}$$

IMPORTANT: HADAMARD

$$H = \frac{1}{\sqrt{2}} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$$

$$H \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \frac{1}{\sqrt{2}} \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$H \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \frac{1}{\sqrt{2}} \begin{pmatrix} 1 \\ -1 \end{pmatrix}$$

1 QBIT

$|0\rangle, |1\rangle$

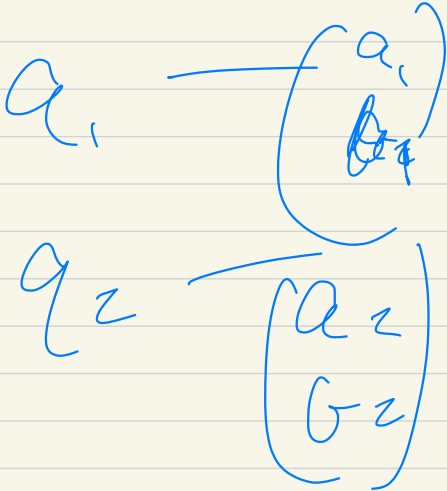
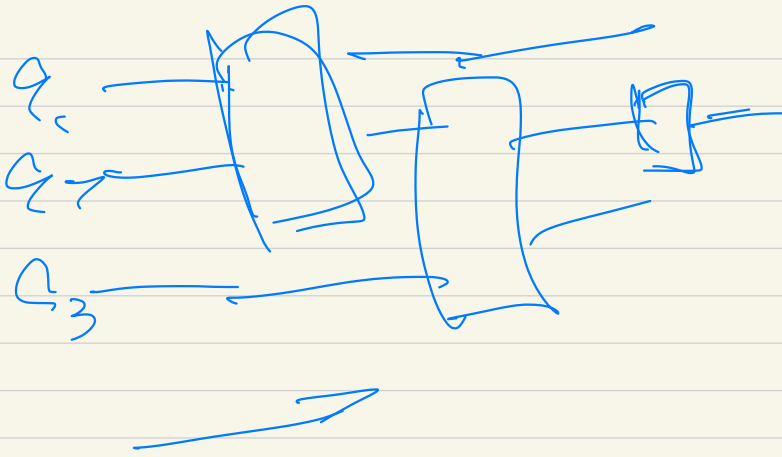
$$H \begin{pmatrix} 1 \\ 0 \end{pmatrix} \Rightarrow \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

2 QBIT

STATE VECTOR FOR

Q

$$\begin{pmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \end{pmatrix}$$



NO CLONING

WHAT IS CLONE?

CLASSICAL

$$x' = x$$

$$y' = x$$
