$ax^2+bx+c = 0$, let us consider the Solution Matrix of x of this solution to be x = $\begin{bmatrix} \propto & \beta \\ -\beta & \alpha \end{bmatrix}$

- ⇨ x^2= x.x = $\begin{bmatrix} \propto & \beta \\ -\beta & \alpha \end{bmatrix} \cdot \begin{bmatrix} \propto & \beta \\ -\beta & \alpha \end{bmatrix} = \begin{bmatrix} \alpha^2 - \beta^2 & 2\alpha\beta \\ -2\alpha\beta & \alpha^2 - \beta^2 \end{bmatrix}$
- ⇨ $ax^2+bx+c = 0$
- ⇨ $a\begin{bmatrix} \alpha^2 - \beta^2 & 2\alpha\beta \\ -2\alpha\beta & \alpha^2 - \beta^2 \end{bmatrix} + b\begin{bmatrix} \propto & \beta \\ -\beta & \alpha \end{bmatrix} + \begin{bmatrix} c & 0 \\ 0 & c \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$
- ⇨ $\begin{bmatrix} a\alpha^2 - a\beta^2 + b\alpha + c & 2\alpha\beta + b\beta \\ -2(a)\alpha\beta - b\beta & a\alpha^2 - a\beta^2 + b\alpha + c \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$
- ⇨ $a(\alpha^2 - \beta^2) + b\alpha + c = 0$ &
- ⇨ $2\alpha\beta + b\beta = 0$
- ⇨ $2\beta(\alpha + b) = 0$
- ⇨ $\beta = 0$
- ⇨ $a\alpha^2 + b\alpha + c = 0$
- ⇨ $\alpha = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$

x = $\begin{bmatrix} \propto & \beta \\ -\beta & \alpha \end{bmatrix}$ Solution Matrix of x of this Equation $ax^2+bx+c = 0$

- ⇨ $\alpha = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$
- ⇨ $\beta = 0$
- ⇨ x = $\begin{bmatrix} \frac{-b\pm\sqrt{b^2-4ac}}{2a} & 0 \\ 0 & \frac{-b\pm\sqrt{b^2-4ac}}{2a} \end{bmatrix}$

Let's consider D= $b^2 - 4ac$

- ⇨ $\begin{bmatrix} \frac{-b\pm\sqrt{\mathrm{D}}}{2a} & 0 \\ 0 & \frac{-b\pm\sqrt{\mathrm{D}}}{2a} \end{bmatrix}$

for D < 0, $\sqrt{\mathrm{D}} = \mathrm{i}\sqrt{\mathrm{D}}$

So,

<u>Most important Findings/observation -#1</u>

it applies a phase of Π/2 from |+> state Along z axis & lands at |i+> state if D<0