... origin of the Heisenberg uncertainty principle ...

Example

$$\underset{\sim}{\Omega} \doteq \begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix} \qquad \underset{\sim}{\Lambda} = \begin{pmatrix} a & b & d \\ b^* & c & b^* \\ d & b & a \end{pmatrix}$$

(unitary...)
aka, "symmetry operator"

$$\underset{\sim}{\Omega}\underset{\sim}{\Lambda} - \underset{\sim}{\Lambda}\underset{\sim}{\Omega} \overset{?}{=} 0$$

$$\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}\begin{pmatrix} a & b & d \\ b^* & c & b^* \\ d & b & a \end{pmatrix} = \begin{pmatrix} d & b & a \\ b^* & c & b^* \\ a & b & d \end{pmatrix}$$

$$\begin{pmatrix} a & b & d \\ b^* & c & b^* \\ d & b & a \end{pmatrix}\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix} = \begin{pmatrix} d & b & a \\ b^* & c & b^* \\ a & b & d \end{pmatrix}$$

but note: $\underset{\sim}{\Omega}\underset{\sim}{\Lambda} - \underset{\sim}{\Lambda}\underset{\sim}{\Omega} = 0$

$\underset{\sim}{\Lambda} - \underset{\sim}{\Omega}^{-1}\underset{\sim}{\Lambda}\underset{\sim}{\Omega} = 0$ $\qquad \Omega^{-1} = \Omega^{\dagger}$ (unitary)

or $\underset{\sim}{\Omega}^{\dagger}\underset{\sim}{\Lambda}\underset{\sim}{\Omega} = \underset{\sim}{\Lambda}$ $\longleftarrow$ $\underset{\sim}{\Lambda}$ is "invariant" under $\underset{\sim}{\Omega}$.

$\underset{\sim}{\Omega}$ is a "symmetry operator"

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

obvious eigenvector.