Opti 570 Recap 1 Tu Aug 26th

$\Psi(x)$ - wavefunction

$\int_a^b |\Psi(x)|^2 dx$ - probability of finding object b/w point a and b

$|\Psi\rangle$ - "ket" - Dirac notation

$\Psi(x) = \langle x | \Psi \rangle$

$|\Psi\rangle$ - can include "spin"

$H|\Psi\rangle = E|\Psi\rangle$ (E: energy)

$H|\Psi\rangle = E|\Psi\rangle$ (E: measurement) $\quad |\Psi\rangle = \frac{1}{\sqrt{2}}(|0\rangle + |1\rangle$

E_0 w/ $|0\rangle$

- afterwards? - system has energy E and is in state $|\Psi\rangle$

$|0\rangle \xrightarrow{\text{possible?}} \frac{1}{\sqrt{2}}(|0\rangle + |1\rangle)$

Postulates of QM

1. State of system - wavefunction Ψ
2. Every measurable quantity has an associated operator.
3. The outcomes of measurements are eigenvalues of the associated operator.

4. The outcome of a measurement is a probabilistic property of the associated operator.

5. After performing a measurement, the system is left in the eigenstate associated with the measured eigenvalue. Collapse postulate

6. State evolves in time according to the Schrodinger equation.

Uncertainty principle

x, p - non-commuting operators

$$\underbrace{\Delta x}_{0} \cdot \Delta p \geq \frac{\hbar}{2}$$

$\Delta x = \delta(x - x_0)$

p - momentum. Fourier transform of position.

$\Delta p \to \infty$