CHM 305 The Quantum World
Lecture 6: The Rules of Quantum Mechanics (pt. 2)

September 21, 2021
Reading: McQuarrie Ch. 4
Quantum operators:
- are linear
- may not commute

\[ \hat{A} \sum_{i=1}^{\infty} c_i \psi_i = \sum_{i=1}^{\infty} c_i a_i \psi_i \]

Eigenfunctions of an operator:
- are normalized
  \[ \int_{-\infty}^{\infty} |\psi_n(x)|^2 dx = 1 \]
- are mutually orthogonal
  \[ \int_{-\infty}^{\infty} \psi_n^*(x) \psi_m(x) dx = 0 \]
- form a complete set

\[ \Phi(x) = \sum_{n=1}^{\infty} b_n \psi_n(x) \]
Discuss in detail the five Postulates of Quantum Mechanics

1. Wave functions represent probability distributions
2. Operators represent physical quantities, or observables
3. Measurements with operators read out eigenvalues
4. How to calculate expectation values of measurements
5. The time-dependent Schrödinger equation
Time-dependence of superposition states

https://www.youtube.com/watch?v=imdFhDbWDyM
• **Next time:** quantum tunneling!

• **Today’s reading:** McQuarrie Ch. 4

• **Problem sets:** PS2 due today, PS3 posted soon

• **In the last minute or two:** Your muddiest point from today’s lecture?