When things are small, very light, or both, then the classical perspective or paradigm we know and love breaks down and funky unexpected results occur. This is the quantum world where the rules of the universe are significantly different from conventional rules we use in everyday life. For example, in this world nothing ever stops moving, people can exist at two spots simultaneously (just as long as you don’t look too closely) and everyone has a specific wavelength.

• 1: Waves and Particles

• 2: Fundamentals of Quantum Mechanics

\[ \langle \Phi | \Psi \rangle \]

• 3: The Tools of Quantum Mechanics

• 4: The 7 Postulates of Quantum Mechanics
5: Particle in Boxes

6: One Dimensional Harmonic Oscillator

7: Angular Momentum

9: The Hydrogen Atom
10: Multi-electron Atoms

11: Angular Momenta Coupling

11: Molecules

12: Electron Scattering
\[ E_n^{(1)} = \langle \phi_n | H_1 | \phi_n \rangle \]
\[ c_{nk}^{(1)} = \frac{\langle \phi_k | H_1 | \phi_n \rangle}{E_n^{(0)} - E_k^{(0)}} \]
\[ E_n^{(2)} = \sum_{k \neq n} \frac{|\langle \phi_k | H_1 | \phi_n \rangle|^2}{E_n^{(0)} - E_k^{(0)}} \]

12: Stationary Perturbation Theory

\[ n = 2, \ell^2 \quad J = 3/2 \quad \begin{array}{c} F = 2 \\ F = 1 \end{array} \]
\[ J = 1/2 \quad \begin{array}{c} F = 1 \\ F = 0 \end{array} \]

13: Fine and Hyperfine Structure

\[ n = 1, S^i \quad J = 1/2 \quad \begin{array}{c} F = 1 \\ F = 0 \end{array} \]

14: Systems of Identical Particles

15: Time-dependent Quantum Dynamics
16: Molecular Spectroscopy

• 17: Quantum Calculations

• Chapter 14. Nuclear Magnetic Resonance

• Zeeman Effect

• Gen Chem Quantum Theory