Contemporary Physics (PHY3653) – Course Objectives

Created by Dr. Scott Schneider - Revised 01/24/05

- Study the origins of Einstein's Special theory of Relativity
- Calculate changes in observed length and time for moving objects
- Investigate the "Twin Paradox" and make calculations to resolve the paradox
- Investigate the photoelectric effect and calculate cutoff wavelengths for different materials
- Study the basic ideas of blackbody radiation
- Investigate the "Compton effect" and calculate outgoing wavelengths and energies from a collision
- Study the concepts of pair production, in preparation for later General Relativity thought models
- Calculate wavelengths/momenta/uncertainties of waves and particles based on the ideas of deBroglie and Heisenberg
- Apply Schroedinger's equation to particles in finite and infinite square well potentials, barriers, quantum oscillators, and the Hydrogen atom
- Calculate probabilities and energy levels for particles in infinite square well potentials
- Investigate the historical progression of atomic theories (Thompson, Rutherford, Bohr, QM)
- Using radial solutions to SE, calculate probabilities of finding an electron at different distances from the nucleus of the Hydrogen atom
- Investigate the effect that these basic wavefunction solutions have on the organization of the Periodic Table of Elements
- Apply energy level concepts to the study of the simple LASER models
- Calculate binding energies for nuclei and reaction energies for different nuclear decay processes
- Investigate nuclear reactions and reactor design
- Investigate the "Standard Model" of elementary particles
- Investigate the basic concepts of General Relativity
- Calculate the Schwartzchild radius for the event horizon of a blackhole
- Investigate proofs of GR (and SR) involving Mercury's precession, radar signals from Venus, binary pulsar systems
- Categorize the end result of stars based on original mass (white dwarfs, neutron stars, blackholes)
- Investigate evidence for the "Big Bang" theory of Cosmology