

Physics 402: Applications of Quantum Mechanics

2017 Syllabus

- 1) Fundamentals of quantum mechanics:** Hilbert space description of states, operators for observables and physical transformations, symmetries and conservation laws.
- 2) Essential quantum systems:** operator formalism for the harmonic oscillator. Spin and angular momentum. Review of the hydrogen atom.
- 3) Time independent perturbation theory:** non-degenerate and degenerate perturbation theory. Applications to atomic physics.
- 4) The variational method,** with applications to atomic and molecular physics, and condensed matter.
- 5) Time-dependent perturbation theory,** with applications to atomic transitions.
- 6) The adiabatic approximation**
- 7) Special topics:** may include scattering theory, basics of quantum information theory, or an introduction to quantum field theory