

Syllabus

In a departure from accepted practice, the lecture material will be organized around particular phenomena, while mathematical formalism will be developed only as necessary. The list of topics below is subject to change.

Phenomena

- volume exclusion and degeneracy pressure
- chemical bonds
- quantum liquids
- van der Waals force (entanglement)
- electron bubbles
- physical qbits
- motion in magnetic fields
- C₆₀ nanotransistor
- quantized light in cavities
- photoelectric cross section
- quantum spin systems
- squeezed states

Mathematical Formalism

- time evolution (Fermi golden rule, Landau-Zener, sudden approximation)
- density matrix
- perturbation theory
- group representations (angular momentum)
- coherent states
- path integrals

- Berry phase
- No hidden variables theorems
- Born-Oppenheimer approximation