

Applied Quantum Mechanics (I)

- Fundamental Ideas of Quantum Mechanics (Origins of quantum mechanics, Black-body radiation, Photoelectric effect, Compton effect, Double-slit experiment, Wave-particle duality, Wavefunctions, Time independent Schrödinger equation (TISE), Exact solutions of the TISE for simple problems such as free particle, potential step, potential barrier, potential well and etc., Time dependent Schrödinger equation (TDSE), Probability current, Wavepackets, Heisenberg uncertainty principle, ...)
 - Mathematical Tools (Wavefunction (state) space, Linear operators, Examples of linear operators in quantum mechanics such as Hamiltonian, momentum and position operators, Dirac notation, ...)
 - The Postulates of Quantum Mechanics and Applications (quantum state, observable, measurement, and the evolution of a quantum state, Commuting observables, Density operator and density matrix, Evolution operator, ...)
 - Harmonic oscillator (Review of the classical harmonic oscillator, Quantum harmonic oscillator: one dimensional case, Coherent states, Annihilation and creation operators, ...)
 - Perturbation Theory and Applications
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