

1. Limits of Classical Mechanics and the Emergence of Quantum Theory

- Blackbody radiation
- Photoelectric effect
- Compton effect
- Electron diffraction
- Bohr atom
- Wave-particle duality

2. Wave Mechanics

- Wave packets and the uncertainty relations
- The Schrödinger equation
- The probability interpretation

3. Time-Independent Schrödinger Equation

- Stationary states
- Eigenfunctions and eigenvalues

4. One-Dimensional Potentials

- The free particle
- The infinite square well
- potential barriers and scattering states
- The delta-function potential
- The finite square well
- α -decay

5. Operator Methods and Formalism in Quantum Mechanics

- Hilbert space and linear operators
- Eigenstates and eigenvalues
- Hermitian operators and observables
- Commuting operators
- Uncertainty relation
- Dirac notation
- Schrödinger and Heisenberg pictures

6. Three-Dimensional Potentials

- Schrödinger equation in spherical coordinates
- Separation into angular and radial components
- Angular momentum
- The hydrogen atom