Quantum Mechanics

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Quantum Mechanics I

- 1. Chapter 1 Introduction
- 2. Chapter 2 U(1) representations
- 3. Chapter 3 Two-state systems and SU(2)
- 4. Chapter 4 Linear algebra
- 5. Chapter 5 Lie Algebras and Lie Algebra Representations
- 6. Chapter 6 Rotations and Spin in 3 dimensions
- 7. Chapter 7 Rotations and Spin 1/2 in a Magnetic Field
- 8. Chapter 8 Representations of SU(2) and SO(3)
- 9. More Chapter 8
- 10. Chapter 9 Tensor Products
- 11. Chapter 10 Momentum and the Free Particle
- 12. Chapter 11 Fourier Analysis and the Free Particle
- 13. Chapter 12 Position and the Free Particle
- 14. Chapter 13 The Heisenberg group and the Schrodinger representation
- 15. Chapters 14 and 16 Poisson brackets and the symplectic group
- 16. Chapter 16 Quadratic polynomials and the symplectic sroup
- 17. Chapter 15 Hamiltonian vector fields and the moment map
- 18. Chapter 17 Quantization
- 19. Chapter 18 Semi-direct products
- 20. Chapter 19 Representations of the Euclidean group and the free particle
- 21. Chapter 20 Representations of semi-direct products

- 22. Chapter 21 Central potentials and the Hydrogen atom
- 23. Chapter 22 The Harmonic Oscillator
- 24. Chapter 23 Coherent states
- 25. Review

Quantum Mechanics II

- 1. Chapters 24-26 Canonical quantization, second semester overview
- 2. Chapters 27 and 28 Fermionic oscillators, Weyl and Clifford algebras
- 3. Chapter 29 Clifford algebras and geometry
- 4. Chapter 30 Anticommuting variables and pseudo-classical mechanics
- 5. Chapter 31 Fermionic quantization and spinors
- 6. Chapters 32 and 33 Complex structures and supersymmetry
- 7. Chapter 33 Supersymmetric quantum mechanics
- 8. Chapter 34 The Pauli equation and the Dirac operator
- 9. Chapter 35 Lagrangian methods and the path integral
- 10. Chapter 36 Multi-particle systems: momentum space
- 11. Chapter 37 Multi-particle systems and field quantization
- 12. Chapters 25-26 Review of symmetries and quadratic operators
- 13. Chapter 38 Symmetries and non-relativistic QFT
- 14. Chapter 40 Minkowski space and the Lorentz group
- 15. Chapter 41 Representations of the Lorentz Group
- 16. Chapter 42 The Poincare group and its representations
- 17. Chapter 43 The Klein-Gordon equation and scalar quantum fields
- 18. Chapters 43 and 44 Symmetries and propagator for scalar fields

- 19. Chapters 43 and 44 More symmetries and propagators for the scalar field
- 20. Chapter 45 $\mathrm{U}(1)$ gauge symmetry and electromagnetic fields
- 21. Chapter 46 Quantization of the electromagnetic field
- 22. Chapter 46 More on quantization of the electromagnetic field
- 23. Chapter 47 The Dirac equation and spin 1/2 fields
- 24. Chapter 47 More on the Dirac equation and spin 1/2 fields
- 25. Chapter 48 The Standard Model

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