

Quantum Field Theory II

Topics for Final Project

1. Grand Unified Theories
Gauge Theories of Elementary Particle Physics, Cheng and Li, Ch. 14;
Unification and Supersymmetry, R. Mohapatra, Ch. 5, 6, 7.
2. Renormalization Group Equations and Critical Exponents
Introduction to Modern QFT, M. Peskin, Ch. 13;
Condensed Matter Field Theory, Altland and Simons, Ch. 8.
3. Quantum Field Theory of Superconductivity,
Condensed Matter Field Theory, Altland and Simons, Ch. 6;
The Quantum Theory of Fields II, S. Weinberg, Ch. 21.6.
4. Monopoles and Confinement
G. 't Hooft review;
Advanced Topics in QFT, M. Shifman, Ch. 4, 9.
5. Axions and the Strong CP Problem
The Quantum Theory of Fields II, S. Weinberg, Ch. 23.6;
Dynamics of the Standard Model, Donoghue, Golowich and Holstein, Ch. 3.
6. Topological Insulators
Field Theory of Condensed Matter Physics, E. Fradkin, Ch. 16;
plus several review articles.
7. The Quantum Hall Effect(s) and Topology
Condensed Matter Field Theory, Altland and Simons, Ch. 9;
Field Theory of Condensed Matter Physics, E. Fradkin, Ch. 12, 13, 14.
8. False Vacuum Decay
The Quantum Theory of Fields II, S. Weinberg, Ch. 23.8;
Advanced Topics in QFT, M. Shifman, Ch. 7.
9. Supersymmetric Field Theories
The Quantum Theory of Fields III, S. Weinberg, First few chapters;
Unification and Supersymmetry, R. Mohapatra, Ch. 9, 10;
Modern Supersymmetry J. Terning, First few chapters.