

Quantum Field Theory

Lecturers: Felix v. Oppen

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Time	Lecture	
& Place:	Th 10-12 & Fr 8-10	HS A

Problem session

Mo 8-10 HS B

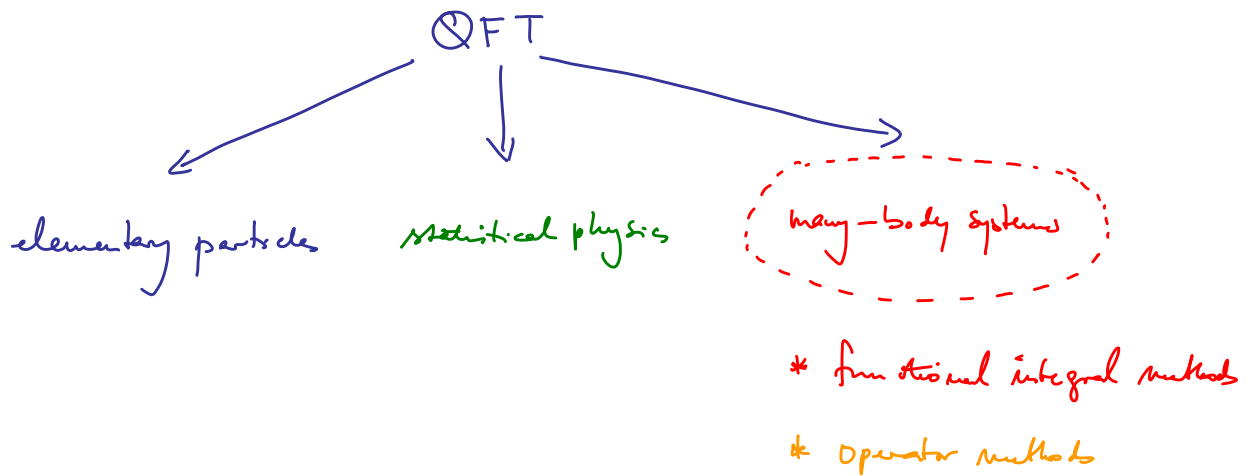
Lectures & problem sessions will be freely interchanged, typically with advance notice.

Exam: Fr 22.7.2016 8-10 HS A

Make-up exam: last week of summer break
OR first week of winter term 2016/17

Homework problems:

- * made available on website on Thursday
- * solutions should be turned in on the following Thursday
at the beginning of class
- * must have 50% of points



Literature

- 1) A. Altland, B. Simons, Condensed Matter Field Theory (Cambridge)
- 2) P. Chaikin, T. Lubensky, Principles of Condensed Matter Physics (Cambridge)
- 3) L.S. Brown, Quantum Field Theory (Cambridge)
- 4) A. Zee, Quantum Field Theory in a Nutshell (Princeton)
- 5) N. Nagaosa, Quantum Field Theory in Condensed Matter Physics (Springer)
- 6) H. Bruus, K. Flensberg, Many-Body Quantum Theory in Condensed Matter Physics (Oxford)
- 7) J. Negele, H. Orland, Quantum Many Particle Systems (Addison-Wesley)
- 8) A. Fetter, D. Walecka, Quantum Theory of Many-Particle Systems (Mc Graw-Hill)

9) A. Abrikosov, L. Gorkov, L. Dzyaloshinski, Methods of Quantum Field Theory in Statistical Physics (Dover)

10) X.-G. Wen, Quantum Field Theory of Many-Body Systems

11) E. Fredkin, Field Theories of Condensed Matter Systems

... and many more

You may also find it useful to consult books for some of the math that is used throughout these lectures. Good references are

* M. Stone & P. Goldbart, Mathematics for Physics, Cambridge Univ Press (2009)

* G.B. Arfken, Mathematical Methods for Physicists

* F. Smithies, Integral equations

Quantum field theory

Chapter 0: Phases of matter and phase transitions

Chapter 1: Free bosonic fields: harmonic chain

Chapter 2: Path integrals

Chapter 3: Linear response and correlation functions

Chapter 4: Second quantization

Chapter 5: Boson functional integrals

Chapter 6: Interacting Bose systems

Chapter 7: Bose superfluidity

Chapter 8: Bosons at finite temperature and vortex excitations

Chapter 9: Fermion functional integral

Chapter 10: Hubbard-Stratonovich transformation and RPA

Chapter 11: Superconductivity

Chapter 12: Topological terms

Chapter 13: Perturbation theory and Feynman diagrams

Chapter 14: Feynman diagrams for Green's functions