



SI2610 Many Particle Physics

7.5 credits

Mångpartikelfysik

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for SI2610 valid from Autumn 2007

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Physics

Specific prerequisites

Recommended prerequisites: Good knowledge about all compulsory physics courses and statistical mechanics.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The course gives the basis for modern condensed matter theory. Problems are studied that cannot be analyzed by starting from the properties of single atoms in a material, but from collective phenomena like superconductivity, which emerges when a large number of atoms are coupled together. In earlier courses in quantum mechanics, systems with a very small number of particles are treated. In statistical mechanics systems with many non-interacting bosons and fermions are studied. The aim in this course is to study a large number of interacting quantum mechanical particles. The goal is to give basic knowledge about a number of methods that have been developed to treat many particle systems. The most important applications are superconductivity and the electron gas.

Course contents

Second quantization, BCS theory and super conductivity, Greens functions and field theory, Feynman diagrams, Fermi systems, Linear response and collective modes, Bose systems and RKKY interaction.

Course literature

A. Fetter and J. Walecka, Quantum theory of many particle systems, McGraw-Hill 1971.

A. A. Abrikosov, L. P. Gorkov and I. Y. Dzyaloshinskii, Quantum field theoretical methods in statistical physics, Pergamon, 1965.

Examination

- INL1 - Assignment, 7.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Other requirements for final grade

Hand in problems (INL1, 7,5 university credits).

Ethical approach

- All members of a group are responsible for the group's work.

- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.