



SK2700 Mesoscopic Physics 8.0 credits

Mesoskopisk fysik

Course syllabus for SK2700 valid from Autumn 08

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

Grading scale: A, B, C, D, E, FX, F

Education cycle: Second cycle

Main field of study: Engineering Physics, Physics

Intended learning outcomes

The goal of this course is to communicate a basic understanding of electron transport in system that are “coherent” in the quantum mechanical sense. With this understanding you should be able to:

- Compare new the new concepts of nano-electronics with the present-day technique, and understand their fundamental limits.
- Use simple models to calculate the basic energy and length scales for mesoscopic phenomena which are physically relevant.
- Identify various basic device concepts in a variety of physics systems.

Course main content

Classical transport and diffusion, ballistic transport and conductance quantization, Landauer formalism and coherent transport, gauge invariant phase and Aharonov-Bhom effect, weak and strong localization, Coulomb blockade, Mesoscopic superconductors, decoherence of a quantum system in its environment. Nano-electronics, Nano-mechanics, experimental methods and demonstrations..

Language of instruction

Language of instruction is specified in the course offering information in the course and programme directory.

Eligibility

Recommended prerequisites: Basic courses in electro-magnetism and quantum mechanics are required. Basic course in solid state physics (kittel level) is recommended.

Literature

Supriyo Datta, Electron Transport in Mesoscopic Systems, Cambridge University Press.

Diverse articles

Examination

- INL1 - Assignments, 6.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 2.0 credits, grading scale: P, F

Requirements for final grade

The examination will be through home project assignments (INL1; 6 credits, grading scale A-F) and lab exercises (LAB1; 2 credits, grading scale P/F).