Relativistic Quantum Mechanics

Programme course

6 credits

Relativistisk kvantmekanik

TFYA57

Valid from:

Determined by

Date determined

Replaced by
TFYT06

Main field of study
Applied Physics, Physics

Course level
Second cycle

Advancement level
A1X

Course offered for
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Physics and Nanoscience, Master's programme

Specific information
The course is given every second year. it will be offered during 2015

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Classical Electrodynamics, Analytical mechanics, Quantum mechanics.

Intended learning outcomes
The purpose of the course is to introduce students into relativistic quantum theory, emphasizing its important applications in condensed matter physics. After having passed the examination the students should have obtained such knowledge that the ability to understand research literature using relativistic quantum mechanical language is essentially increased. After finishing the course the students know:

- foundations of modern first-principles theories based on relativistic quantum mechanics
- foundations of scattering theory
- how to solve relativistic quantum mechanics problems that involve topics listed in the course content

Course content
Basic theory, including special relativity and angular momentum. Dirac equation, symmetries and operators, and free particles. Physical consequences of solutions, model problems. Important applications of quantum theory to condensed matter. Relevant theory for the one-electron atom. Development of the theory to describe the quantum mechanics of many electron systems, including Hartree-Fock and density functional methods. Scattering theory and band structures.

Teaching and working methods
The course is given as lectures.

Examination
UPG1	Homework problems and oral presentation	6 credits	U, 3, 4, 5

Grades
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Department
Institutionen för fysik, kemi och biologi

Director of Studies or equivalent
Magnus Johansson

Examiner
Sergei Simak

Course website and other links
http://www.ifm.liu.se/undergrad/fysikgtu/coursepage.html?selection=all&sort=kk

Education components
Preliminary scheduled hours: 48 h
Recommended self-study hours: 112 h

Course literature
"Relativistic Quantum Mechanics", Paul Strange