Level: bachelor

Course title: Quantum mechanics

Status: obligatory

ECTS: 5

Requirements: Introduction to theoretical physics

Learning objectives

Study of Quantum Mechanics using more abstract mathematical formalism introducing the basic quantum field theory and systems of identical particles.

Learning outcomes

After taking the course, the students should have developed:

General abilities: basic knowledge of this field, following the literature, analysis of various solutions and the choice of the most adequate solution, application in practice and other subjects.

Subject-specific abilities: knowledge of abstract mathematical formalism of Quantum Mechanics; knowledge of the basic quantum Field Theory (second quantization).

Syllabus

Theoretical instruction

Schrödinger, Heisenberg and interaction picture. Heisenberg's motion equations and quantisation of classical systems. Theory of measurement (in quantum mechanics). Representation theory. Kinetic momentum and momentum addition. Variation principle. Nonstationary perturbations. S-matrix and transition probability. Systems of identical particles. Hartree–Fock approximation. Scattering theory. Elastic and inelastic scattering. Scattering of identical particles. The elements of relativistic quantum mechanics. Dirac electron theory and Pauli equation. Introduction to quantum field theory. Second quantisation of electromagnetic field. Interaction of radiation with matter.

Practical instruction

Problem solving. Homework.

Weekly teaching load				Other:
Lectures: 3	Exercises: 2	Other forms of teaching:	Student research:	