Level : bachelor

Course title: Particle physics

Status: obligatory

ECTS: 5

Requirements: Electrodynamics, Introductory Nuclear Physics

Learning objectives

To teach students about the main aspects of experimental and theoretical particle physics

Learning outcomes

Understanding the principles of Standard Model and Beyond Standard Model and Particle Physics. Ability to follow the latest results in this research field.

Syllabus

Development of understanding of the structure of matter and concept of elementary particle. Standard model. General properties of elementary particles, fundamental interactions and interaction carriers. Virtual particles. Relationship between range of interaction and mass of interaction carrier. Antiparticles. The asymmetry of matter and antimatter in the cosmos. Units in particle physics; natural units. Feynman diagrams. Vertices. Leptons and quarks. Electromagnetic interaction. Gravitational interaction. The strong interactions and QCD as a theoretical model of strong interaction. Weak interaction. Coupling constants and the strengths of fundamental interactions. The polarization of vacuum. Conservation laws and symmetries. Conservation of lepton and baryon number. Parity. Parity violation. Running constants and grand unification of fundamental interactions. The experiments and detection techniques in high-energy physics. Review of current possibilities and perspectives of development of instrumentation in particle physics. Dark matter in cosmos and weakly-interacting massive particles - WIMP's.

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