Course title: Rare Nuclear Events

Status: elective

ECTS: 15

Requirements: Fundamentals of Nuclear Physics, Nuclear Physics

Learning objectives

Introducing students to the theory of rare nuclear processes and the most interesting experiments in this area of research.

Learning outcomes

Acquiring knowledge about rare nuclear processes. Practical application of some specific parts of the course.

Syllabus:

Theoretical instruction

Rare radioactive decays (cluster emission, spontaneous fission, proton decay). Neutrino interactions and neutrino mass (the neutrinoless double beta decay, neutrino flavour oscillations, the problem of solar neutrinos, the H3 beta decay). Search for dark matter in the universe. Neutrino astronomy. Rare electromagnetic processes (accelerated decay of metastable states). Cosmic-ray physics (the interaction of cosmic muons with matter). Imaging by cosmic-ray muons.

Practical instruction

individual research work in the form of seminars – presentations.

Literature

1. H.V. Klapdor-Kleingrothaus and A. Staudt, Non-accelerator Particle Physics, IOP Publishing, London 1995
2. P. Povinec, Rare Nuclear Processes, World Scientific, Singapore 1992
3. J.N. Bahcall: Neutrino Astrophysics, Cambridge Univ. Press, Cambridge (1990)

Weekly teaching load	lectures: 4	Student research: 6