

Elementary Particle Physics and Cosmology (in English)

National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)

Degree or qualification is awarded: **Master degree**

Language of study: **English**

Mode of study: **full-time**

Duration: **2 years**

Availability of free education: **yes**

Price: **207 610 rubles per semester**

Programme curator: **Mikhail D. Skorokhvatov**

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Field of study: "Nuclear Physics and Technologies".

Duration of training: 2 years, 120 credits.

Course delivery language: russian & english.

Basic department: Elementary Particle Physics (No. 40).

Program manager: M. D. Skorokhvatov, Professor, Doctor of Science (Phys.– Math.), Head of Department No. 40.

The purpose of the program is the training of masters possessing knowledge in nuclear physics, particle physics and cosmology, being able to carry out research work on (i) studying fundamental properties of matter, improvement of the experimental techniques in the field of nuclear and particle physics, preparation and carrying out of experiments in this field, analysis and interpretation of its results; and (ii) solution of fundamental problems of astrophysics, cosmology and particle physics, connected with description and evolution of the Universe, studying nature of dark matter, dark energy, etc.

Advantages of the program: There are several areas of training to choose from: with a focus on accelerator experiments in high-energy physics, with a focus on nuclear physics, on neutrino physics, on astrophysics and cosmology. Also, depending on the level and desire of a student, one can choose elective courses, fixing basic grounding in particle physics, information technologies, etc. (mainly, for those who studied earlier in other areas or came from other universities).

Characteristics of the field and objects of the professional activity of expected graduates: Training of masters is focused on their work in the field of basic and applied research in nuclear and particle physics, astrophysics and cosmology. Graduates may participate in preparation and carrying out of research, in particular, creation and use of particle and radiation detectors, as well as theoretical studies, analysis of results of experiments in high-energy physics, neutrino physics, astrophysics, and experiments at accelerators.

Objects of the professional activity: elementary particle physics and cosmology oriented mostly to particle accelerator experiments (Large Hadron Collider and etc.), neutrino physics, exotic nuclei, quark-gluon matter physics, physics of the early Universe, nature of dark matter and dark energy, theory of gravity with multidimensional generalizations, and also to the development of particle and radiation detectors.

Brief characteristics of the curriculum, features of the educational process, basic fundamental and special disciplines. The curriculum includes more than 30 courses, including elective ones, which provide all-round training in the field of modern nuclear physics, elementary particle physics, and cosmology. All students receive a basic theoretical and practical grounding in nuclear and particle physics. Entering graduates from other universities are provided in-depth training on specific subjects as an option. The training covers the foundations of nuclear physics, the theory of electroweak and strong interactions and its possible extensions, the foundations of the gravity theory and its multi-dimensional generalizations, also the fundamentals of physics of high-energy nuclear collisions and quark-gluon matter, cosmoparticle physics, etc. Much attention is paid to computer literacy of students.

List of enterprises for practical training: MEPhI, Research Center "Kurchatov Institute", Institute for High Energy Physics (Protvino), Alikhanov Institute for Theoretical and Experimental Physics, Petersburg Nuclear Physics Institute named after B. P. Konstantinov, Joint Institute for Nuclear Research (Dubna), Institute for Nuclear Research of the Russian Academy of Sciences, FI Academy of Sciences, the European Organization for Nuclear Research CERN (Switzerland), DESY (Germany), etc.

Specializations within this programme