

# Experimental Nuclear Physics, Cosmic Physics and Physics of Fundamental Interactions

National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)

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

Language of study: **Russian, English**

Mode of study: **full-time**

Duration: **2 years**

Availability of free education: **yes**

Price: **207 610 rubles per semester**

Programme curator: **Petr Y. Naumov**

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**Graduation department:** Department of Experimental Nuclear Physics and Cosmophysics (#7)

The purpose of the program is the staffing, scientific and innovative provision of academic institutes and leading scientific centers, that specialize in nuclear and particle physics, and cosmophysics research, as well as organizations and enterprises of the nuclear industry and other high-tech industries

**Area of professional activity:** The training of master students is focused on research work in the field of elementary particle physics, cosmophysics and experimental nuclear physics. The main research areas are:

- Tests of the Standard Model predictions with respect to the values of its parameters and properties of elementary particles, search for new physics beyond the Standard Model;
- Investigation of the properties of quark-gluon matter, necessary for understanding of the Universe evolution;
- Cosmic ray studies, which are of interest from the point of view of the fundamental problems of cosmology and astrophysics; • Investigation of high-energy processes in solar bursts, their influence on near-Earth space and upper layers of the Earth's atmosphere.

**Alumni of the department** participate in the preparation, simulation and carrying out of experiments (including the development and construction of new types of detectors for elementary particles and radiations), as well as in the processing and analysis of experimental data, the formulation of new hypotheses and models based on the obtained results.

**Features of the syllabus:** Education process provides a close connection between educational and research activities, which ensures a high level of knowledge and skills. Syllabus consists of basic and special courses in the field of nuclear and particle physics, and cosmophysics. Along with lectures, seminars and laboratory works, students take part in scientific research in the laboratories of the department, Research Institutes of the Russian Academy of Sciences and world-leading research centers. During the educational period, the graduate students perform research under the guidance of leading scientists, participants of the largest international experiments. Within the framework of the syllabus, students can choose one of the two specialization areas: «nuclear physics and cosmophysics» or «physics of fundamental interactions». Both of these areas contain same basic courses, but different disciplines of specialization. The "nuclear physics and cosmophysics" area is focused on courses that are necessary for the development and construction of experimental facilities and radiation detectors. Students extensively study modern programming languages, and packages for modeling, processing and analyzing data in particle and nuclear physics. The program "physics of fundamental interactions" is carried out at LPI RAS by leading scientists (both experimenters and theoreticians) from LPI RAS, ITEP, INR RAS and is focused on training specialists in particle physics. The education process is conducted jointly with the students from MIPT. The emphasis is on studying theoretical courses such as Quantum Field Theory, Standard Model Extensions, Cosmology, etc. The training of specialists, who oriented towards participation in international projects, requires a good knowledge of English.

Job opportunities in scientific centers and institutions:

- Scientific Research Institutes of the Russian Academy of Sciences (LPI RAS, INR, SRI),

NRC "Kurchatov Institute" (ITEP, IHEP);

- ROSATOM and ROSCOSMOS;

- Ministry of Defense and Ministry of Education and Science;

- International scientific research organizations JINR (Dubna, Russia), CERN

(Switzerland), BNL (USA), Desi (Germany), etc.

There is a PhD program in the specializations 01.04.01 "Devices and methods of experimental physics" and 01.04.16 "Physics of the atomic nucleus and elementary particles"

**The program page on the MEPhI website:**

[http://eis.mephi.ru/AccGateway/index.aspx?report\\_url=/Accreditation/program\\_annotation\\_eng&report\\_param\\_pid=82&report\\_param\\_year=2016](http://eis.mephi.ru/AccGateway/index.aspx?report_url=/Accreditation/program_annotation_eng&report_param_pid=82&report_param_year=2016)

**Specializations within this programme**