

# Experimental Research and Simulation of Fundamental Interactions

National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)

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

Language of study: **Russian**

Mode of study: **full-time**

Duration: **4 years**

Availability of free education: **yes**

Price: **316 290 rubles per semester**

Programme curator: **Petr Y. Naumov**

Tel.: **Contact name: Olga N. Petukhova, Phone number. +74957885699, ext. 8045**

E-mail: [ONPetukhova@mephi.ru](mailto:ONPetukhova@mephi.ru)

**Field of study:** "Nuclear Physics and Technologies".

**Duration of training:** 4 years, 240 credits.

**Course delivery language:** russian.

**Basic department:** Instrumentation in Nuclear Physics (No. 11).

The educational program of training of highly qualified bachelors (4 years) with the possibility of prolonging the training within MA course (2 years) and further on as a post-graduate student (4 years) is aimed at issuing specialists for the participation in current research and experiments according to international and Russian programs of studies in particle physics and physics of atomic nuclei, neutrino physics, astrophysics, cosmic ray physics, nuclear matter of extremely high densities, and spin physics, as well as in adjacent branches of femto-, nano-, and microstructures and applied technologies.

The leaders of the program are academicians of the Russian Academy of Sciences V. A. Matveev and Yu. Tz. Oganessian, professors V. A. Grigoryev and Yu. V. Piatkov.

The curriculum of the Department of Instrumentation in Nuclear Physics (No. 11) includes more than 60 courses (some to be chosen by a student). The main courses provide for the knowledge of basic physics and mathematics, some technical knowledge, and humanitarian education. Also they provide for special theoretical and practical studies of physics of fundamental interactions of elementary particles and nuclei, as well as mathematical, computer, and electronic technologies for these experiments.

The three and four year students study physics of elementary particles and nuclear physics, nuclear experimental techniques, nuclear particle detectors and associated electronics, and data processing methods, as well as computer technologies of the experimental data analysis.

Much attention is drawn to theoretical description and mathematical simulations, particularly of experiments at accelerators and colliders, and also to space research. The methods for optimization of an experiment are given using computer languages and programs, such as C++, LINUX, MathCAD, and others.

In the process of individual student research work, practice, and diploma work, students master these means in practice.

For deeper studies, students can choose one of the following orientations:

- experimental data analysis, acquisition of physical results and their interpretation;
- design of new experiments at accelerators or colliders and on board satellites;
- mathematical and computer simulations of nuclear physics processes;
- execution of experiments, acquisition and processing of experimental data (with the use of microcontrollers,

- microprocessor systems, and computer networks);
- formulation of physical hypotheses and their comparison with experimental results.

Graduates of Department No. 11 work at the best Russian and international research centers, such as National Research Centre "Kurchatov institute", Joint Institute for Nuclear Research (Dubna, Moscow region), Institute for Nuclear Research of the Russian Academy of Sciences, Institute for Theoretical and Experimental Physics, Institute for High Energy Physics (Protvino, Moscow region), Lebedev Physical Institute, and Space Research Institute of the Russian Academy of Sciences, Institute of Medical and Biological Problems of Russian Academy of Medical Sciences, MEPhI, at leading institutes of the Rosatom State Corporation (Sarov, Moscow, Snezhinsk), at enterprises of the Russian Federal Space Agency (Moscow; Korolev, Moscow region) and also in foreign countries, such as in the United States (BNL), Germany (DESY), Great Britain, Switzerland (CERN), and France.

### **Specializations within this programme**