

# Fundamental Research in Particle Physics (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**

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**The educational program** of training of highly qualified masters (MD, 2 years) with the possibility of prolonging the training 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.

**Characteristics of the scope and objects of professional activity of future graduates:** modern physics experiment, modern electronic systems for data collection and processing, mathematical models for theoretical and experimental studies in the field of elementary particle physics and nuclear physics.

**Objects of the professional activity:** Master degree program is aimed mostly at training specialists capable of working in the field of experimental physics. Graduates are able to take part in different nuclear-physics experiments, in data collection and processing, in the analysis of theoretical hypothesis and in interpretation of the results of experiments in high energy physics (including collider experiments).

**The curriculum** of Department No. 11 includes more than 30 courses (including individual topics of scientific research works). Some courses are to be chosen by a student. The main courses provide for the comprehensive training in elementary particle physics, neutrino physics, atomic and nuclear physics, and modern methods for planning and conduction of experiments. They include all aspects of the experiment beginning with the formulation of its goal, mathematical simulations of the physical processes in experimental installations, and finishing with the development of the hardware and software for these experiments, including means for data processing and analysis using computer technologies. Also students get basic theoretical and practical training in physics of fundamental interactions of elementary particles, nuclei, and heavy ions, as well as mathematical, computer and electronic technologies for these experiments, including practical training in computer simulation of experimental devices using different computer languages.

The students study modern microprocessor technologies of data acquisition and on-line pre-processing. Deep studies are devoted to methods of theoretical description and computer simulations of physical processes at accelerators, colliders, and in space research.

Much attention is paid to particle detectors and associated electronics, computer data processing and analysis. Much attention is also paid to practical programming and data processing using C++, LINUX, MathCAD, Root and program packages for data simulation (GEANT and others) during two years of studies in the process of research work, practice, and preparation of the magister theses at leading research institutes.

The main orientation of the MD scientific research is preparation and conduction of different experiments in nuclear and particle physics (including development of new detectors and installations) in the best scientific domestic and foreign laboratories, analysis of the experimental data, acquisition of physical results, and their interpretation. The MD students can also be specialized in adjusting scientific and applied areas. The students participate in different conferences and seminars, international schools, and in scientific publications.

**The base of industrial and/or scientific practice and employment:** the MD graduates can prolong their studies as post-graduate students at MEPhI and other laboratories, participate in research at CERN (Switzerland), in the United States (BNL, FNAL, SLAC), France, Germany (DESY), and Japan (KEK, JPARC, ICRR).

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), and at enterprises of the Russian Federal Space Agency (Moscow; Korolev, Moscow region). 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.

## **Specializations within this programme**