

# Photonics of nanostructures

National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)

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

Language of study: **Russian, English**

Mode of study:

Duration: **4 years**

Availability of free education: **yes**

Price: **129 000 rubles per semester**

Programme webpage at the university website:

[http://eis.mephi.ru/AccGateway/index.aspx?report\\_url=/Accreditation/program\\_annotation\\_eng&report\\_param\\_pid=350&report\\_param\\_year=2019](http://eis.mephi.ru/AccGateway/index.aspx?report_url=/Accreditation/program_annotation_eng&report_param_pid=350&report_param_year=2019)

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**Department** of Condensed matter physics

**The objectives of the program:** to obtain by a bachelor the higher education, which allows him /her to successfully work in the field of activities related to fundamental and applied research, development and technology in the field of photonics and optical informatics, have general cultural and professional competences that promote his/her social mobility and stability in the labor market, or further study in the Master program.

**The area of professional activity of the graduates:** Research, development and technology, including photonics, which is a field of science and technology related to the use of light (or photon flux) in elements, devices and systems, in particular those based on nanostructures, in which optical signals are generated, amplified, modulated, propagated and detected, and optical informatics, which is the photonics area in which optical devices and technologies for the transmission, reception, processing, storage and display of information are created. The field of activity is also the development of the elemental base for optical and photonic instrumentation, optical inorganic and organic materials, including nanomaterials, metamaterials, hybrids and composites, and nanostructures based on these materials.

**Objects of professional activity:**

- fundamental and applied research and development in the field of photonics and optoinformatics;
- elemental base, systems and technologies of integral, fiber and gradient optics, as well as micro-optics;
- elemental base, systems, materials, methods and technologies providing optical transmission, reception, processing, recording and storage of information;
- elemental base and systems of information transformation and display;
- elemental base and systems based on nanoscale structures;
- systems of optical and quantum computing, optical and quantum computers;
- optical systems of artificial intelligence;
- devices and computer photonics systems.

**The academic plan** includes two main stages:

- 1) Basic training in humanitarian, natural sciences and general professional disciplines. The general courses: General Physics, Mathematical analysis, Linear Algebra, Theoretical Mechanics, The Classical Theory of Fields, Quantum Mechanics, Statistical Physics, Mathematical Physics, Life safety, Sociology, Law, Information Security.
- 2) Professional training. The general courses: Optics and Photonics of nanostructures, Technological foundations of photonics, Physics of semiconductors for photonics, Introduction to modern nanotechnologies, Materials for photonics, «Introduction to modern nanotechnologies, Physical Optics and Foundations of Photonics, Optical electronics of heterostructures.

**Institutions for the practice and employment of graduates:** The Institution of Functional Nuclear Electronics NRNU MEPhI, The “Crystallography and Photonics” and other scientific centers, “Roselectronica JSC” and other industrial companies, the Institute of Microwave Semiconductor Electronics and other institutions of the Academy of Sciences.

## **Specializations within this programme**