

1.3.19 Laser physics (in the research area of the Department of Micro- and Nanosystems Physics)

Department of Physics of Micro- and Nanosystems (No.81)

Terms of study at the full-time department: 4 years

Purpose of the program: to prepare a dissertation for the degree of Candidate of physical and mathematical sciences in the field of laser physics and development in the field of interaction of electromagnetic radiation with micro- and nanostructures. Depending on the chosen topic, PhD students are invited to participate in R&D implemented in the interests of various organizations and departments. Research and development projects carried out at the department have a practical orientation and are related to the development of new devices.

The direction of scientific research:

1. *General directions according to the specialty passport:* interaction of laser radiation with substance; laser plasma; laser installations, including installations with super-strong light fields; generation and acceleration of charged particles; generation of nanoparticles and surface modification, creation of sensors and devices on this basis.

The focus of research area of the Department: modern analytical techniques based on laser technology and optical technologies for integrated security; generation and interaction of terahertz radiation with substance, terahertz radio vision systems.

2. *General directions according to the specialty passport:* medical optics and biotechnology.

The focus of research area of the Department: modern analytical techniques based on laser technology and optical technologies for comprehensive security.

3. *General directions according to the specialty passport:* optical materials and devices; holography; integrated optics; microscopy; optical sensors, measurements and metrology; plasmonics and surface optics; physical optics.

The focus of research area of the Department: nano-hybrid systems based on organic semiconductors and semiconductor nanoparticles for new generation solar cells and LEDs.

4. *General directions according to the specialty passport:* nonlinear optics; harmonic and supercontinuum generation; forced scattering; nonlinear optical materials; photonic crystals and devices.

The focus of research area of the Department: 1D and 2D photon crystals of optical and terahertz range, sensors based on them.

5. *General directions according to the specialty passport:* ultrafast process optics.

The focus of research area of the Department: laser photophysics of excited states in condensed phase, micro- and nanostructures.

Partner organizations for joint research:

- JSC Federal Center of Science and High Technologies "SNPO Eleron" of Rosatom State Corporation;
- Research Institutes of RAS;
- Gamaleya Research Institute of Epidemiology and Microbiology;
- Rosnano group of companies;
- POLYUS Research Institute of M.F. Stelmakh Joint Stock Company;
- various commercial manufacturers of analytical equipment.