03.03.01 Applied Mathematics and Physics

Theoretical Physics and Mathematical Modeling

Program objective

training of highly qualified theoretical physicists who:

- are capable of conducting fundamental and applied research including the search for new laws of nature;
- modeling of complex physical, technical and engineering systems;
- suggesting and boosting new research directions in applied physics and technologies.

The graduates possess skills and research capabilities sufficient for productive and creative work in any area of modern physics. This includes physics of atoms, molecules and nanostructures, physics of classical and quantum fields, of atomic nuclei and elementary particles, astrophysics and cosmology, physics of plasmas and of condensed matter, laser physics, physics of extreme states of matter and high energy density physics. The key element of the program is intense training in fundamental physics and mathematics as well as in numerical simulations and computer sciences in general. The program relies on combination of general and specialized courses in theoretical physics and theoretical methods in physics and mathematical modeling.

The core part of the program includes the theory of elementary particles, methods of modern statistical physics, selected chapters of quantum field theory, general relativity as well as modern methods of mathematical modeling in theoretical physics.

The specialized part of the program contains courses on plasma theory, nuclear physics, astro- and cosmophysics, physics of condensed matter, that are developed by leading researchers in the respective fields.

Career opportunities

National and international leading research centers and companies specializing in research software:

- Physics of ultrahigh laser fields
- Particle physics
- Astrophysics and cosmology
- Nuclear physics
- Quantum informatics and quantum computers
- Physics of nanosystems