

MIPT-Astroalliance

The program of continuous astrophysical education of the Research and Education Center "Fundamental particles and Astrophysics" (MIPT-Astroalliance) focuses on the most effective use of Russian astrophysical institutes, observatories, and base MIPT departments in the preparation of highly qualified personnel and, ultimately, to support national astrophysical projects. Astrophysical Department of Moscow Institute of Physics and Technology (problems in physics and astrophysics, quantum electronics, astrophysics and theoretical nuclear physics problems of the Department of Pure and Applied Physics, space physics, nonlinear and dynamic processes in astrophysics and geophysics and fundamental interactions and cosmology of the Department of Problems of Physics and Power Engineering) based in the leading scientific centers of Russia (Lebedev Physical Institute, Space Research Institute, Institute for Nuclear Research, Institute of Astronomy of the Russian Academy of Sciences, 'Kurchatov Institute'), which in varying degrees, develop and maintain by the majority of terrestrial and space astrophysical projects in Russia. They are Pushchino Radio Astronomy Observatory, Astro Space Center, and Tien Shan and Pamir observatory department of nuclear physics and astrophysics (LPI), as well as space projects Spektr-R (RadioAstron) and Millimetron (ASC LPI), a solar space telescope "ARKA", the complex solar telescopes in the federal program "Geophysics" and a set of solar telescopes for space missions "Intergeliozond" (Department of Optics LPI), Spektr-RG, INTEGRAL, and "CHIBIS-M" (SRI), Spectrum-UV (Ultraviolet) and OSIRIS (INASAN), Baksan and Baikal Neutrino Observatories (INR). MIPT is in long and fruitful collaboration with the largest Russian Special Astrophysical Observatory.

Thus, MIPT through its basic departments directly relates to the majority of national astrophysical projects. On the other hand, existing educational and material resources are still used inefficiently. The program MIPT-Astroalliance of the additional astrophysical education, developed on the basis of the Research and Education Center "Fundamental particles and astrophysics", would essentially bring the educational process to real astrophysical research.

The main principles of the program MIPT-Astroalliance should be

1. Continuity of education. Between the entry in MIPT and the beginning of real scientific work on the basic departments is sometimes two or even three years. A cycle of additional disciplines for the lower classes covering the basic ground of the cosmic physics (e.g., plasma physics and General Relativity) will be developed.
2. Proximity to national projects. Beginning with the first year, students must be familiar with the main objectives of ground and space astrophysical projects. The educational process should be more close to the scientific research carried out in Russia. In particular, we are going to develop a series of laboratory works connecting with the real observational data.
3. Extensive interaction with regional and international research centers. MIPT through additional education and training courses can become the center of target preparation for further collaboration. There should also be made for a fruitful interaction between students and academic staff of the MIPT with foreign researchers.

The main tasks that must be engaged in Research and Education Center, will be

1. Computational Physics. We are going to develop the educational programs to learn the modern methods of the computer modeling of processes taking place in space.
2. Computer processing of observations. Will be developed educational programs in the processing of observations, in particular - in real time.
3. Information systems for future observatories. Here we can mention the development of computer-information technology for the processing and analysis of multibeam receiving and transmitting antenna systems in real time.
4. Access to new technology. This may be the development of highly sensitive detectors of sub-millimeter and infrared ranges with innovative technology, high-precision system of adaptive mirrors for observation and communication.