

Innovation Activities

The strategic goal of the innovative development of JINR for the period up to 2030 is to make the Institute the leading center for the transfer of knowledge of the JINR member countries in the field of nuclear physics and accelerators. Implementation of innovation plans for the period 2021–2023 assumes concentration of efforts in the following main directions. Technology transfer and commercialization.

I. Establishment of an international innovation center for nuclear physics research

The main goals of organizing the JINR Interlaboratory Innovation Center (hereinafter referred to as the Innovation Center) are to conduct innovative research in the most demanded areas of radiation, biomedical technologies, in particular, the development of technologies and methods in the field of nuclear and radiation medicine, radiation materials science, as well as ecology and information systems, personnel training and advanced training of specialists from the JINR member states in radiation biology and medical physics.

The main stages of the implementation of the project for the creation of the Innovation Center are:

- applied innovative research within the framework of the project of a complex of superconducting rings on colliding beams of heavy ions NICA, including the creation of three specialized research channels: (1) heavy charged high-energy particles (150–350 MeV/nucleon for research on the radiation resistance of semiconductor micro- and nano electronics and also 400–800 MeV/nucleon for radiobiological research and modeling the effects of heavy charged particles of Galactic cosmic radiation on biological objects, including the cognitive functions of the brain of small laboratory animals and primates); (2) low-energy heavy charged particles with an energy of 3.2 MeV/nucleon for testing the radiation resistance of micro- and nano-electronics; (3) beams of protons, deuterons and light ions with energies of 1.0–4.5 GeV/nucleon for obtaining new nuclear data for nuclear power technologies, transmutation of spent nuclear fuel, creation of new neutron sources; (implementation period: 2021–2024);

- development in the Veksler and Baldin Laboratory of High Energy Physics of high-temperature superconductivity technologies, first of all, for the creation of electromagnets of accelerators and inductive energy storage;

- establishment in the Flerov Laboratory of Nuclear Reactions of the DC-140 accelerator complex for research in the field of radiation materials science, tests for radiation resistance of electronic components, improvement of the technology for the production of track membranes, etc. (implementation period: 2021–2023);

- establishment in the Flerov Laboratory of Nuclear Reactions of a modern radiochemical complex, including a class I radiochemical laboratory, with the aim of developing new radioisotopes for nuclear medicine in photonuclear reactions at an industrial electron accelerator (implementation period: 2022–2026);

- radiation biology: expansion of the research infrastructure of the Laboratory of Radiation Biology, development of OMICS technologies, neuroradiobiological research, development of approaches to improve the effectiveness of radiation therapy based on radiomodifiers (pharmaceuticals, transgenic systems), search for new methods of targeted delivery (molecular vectors) of radiomodifiers and radionuclides to tumor cells;

- establishment of a center for research and development in the field of radiation therapy: research on proton flash therapy, development of new approaches to treatment planning; pencil beam technologies, creation of a superconducting proton cyclotron (230 MeV) as a pilot facility for a future medical center (implementation period: 2021–2024).

The Innovation Center program will also include medium-term interlaboratory projects that imply the expansion of the experimental research program, as a place for the development of new technologies and a testing ground for advanced scientific research (Open Research Space @ DUBNA) in the following areas: life sciences, technologies of environmentally friendly carbon-free energy, big data and quantum computing. In addition to these new directions, the development of the directions already implemented at JINR in the field of artificial intelligence and quantum computing technologies will be carried out on the basis of the Meshcheryakov Laboratory of Information Technologies and the Veksler and Baldin Laboratory of High Energy Physics, R&D on linear superconducting continuous accelerators; micropixel detectors of the Medipix family, new avalanche photodetectors, laser metrology, laser inclinometers, etc.

For the implementation of the main stages of the project to create the Innovation Center a roadmap should be developed.

The implementation of innovative projects based on the research infrastructure of the Innovation Center should become a significant additional incentive to expand the interest and involvement of the participating countries and associate members in the JINR research program. The priority area for the development of the Innovation Center should be to provide opportunities for young professionals and students from the participating countries to carry out cutting-edge innovative research.

II. Effective integration into the global innovation system

One of the important tasks of the current seven-year period is the effective integration of JINR into the global innovation system and into the global scientific information system. In this direction, the Institute plans to carry out activities on the following main tasks.

1. Development of partnerships in the field of innovation with organizations of the European Union, including the European association "Knowledge4Innovation", the European Institute of Innovation and Technology (EIT).

2. Formation of the leading positions of JINR in expert scientific and innovation communities and committees of interstate integration associations, including the JINR member countries, CIS member states, EAEU, BRICS, etc.

3. Conducting field events in the JINR Member States in order to promote the innovative capabilities of the Institute and form communication channels in the field of innovation.

4. Organization of internships at JINR and innovation centers on the territory of the Russian Federation for students and young employees of research, educational and innovative organizations from the JINR member countries.

5. Participation in international exhibitions, conferences, forums of an innovative nature.

Specific activities and deadlines for completing the tasks of this section of the program for 2017–2023 depends on various factors, so they will be updated annually in the plans of JINR innovation activities.

III. Information support and PR for innovation activities at JINR

Noting the importance of broad coverage of JINR's innovative activities, one of the priority tasks should be:

- development, professional content and promotion of the site for innovative research at JINR;
- implementation of the best practices for promoting innovations, cooperation and use of the experience of the CERN technology transfer group;
- preparation and placement of popular scientific articles, digests about the innovative potential of JINR;
- participation in international exhibitions, conferences, innovation forums;

– participation in JINR offsite events in the participating countries in order to present the innovative potential of the Institute.

The innovative activities of JINR should also stimulate the participating countries to expand the experimental research agenda at all basic JINR facilities, serve as a testing ground for the development and mastering of new technologies, and contribute to the creation of research infrastructure in the JINR Member States and other interested countries.

Particular attention should be paid to improving the activities of existing and creating new subjects of management and coordination of innovation activities, including expanding the functionality of the JINR Expert Council on Innovations by including in it representatives of the state structures of the JINR Member States responsible for innovative development.

With the aim of additional support for the development of the most promising innovative directions, the issue of establishing a grant from the Directorate, a competition for innovative projects, and the JINR Innovation Development Fund is being considered.

Particular attention should be paid to the issues of registration and commercialization of the institute's rights to the results of intellectual activity, the development of new approaches to organizing work with intellectual property at the institute.

In order to create a system for processing business requests for custom R&D, it is planned to expand interaction with companies-residents of the special economic zone of the technology-innovative type “Dubna”.