

Kurchatov Institute: Current Life of the Institute Celebrating Jubilees.



2013 has become the year of three jubilees for the world famous Kurchatov Institute, that had played the key role in ensuring national security and development of important strategic branches of the Soviet and Russian science and industry. It was founded 70 years ago in 1943 in Moscow as the Laboratory # 2 under Academy of Sciences of USSR to solve the task for developing of nuclear weapons. By the edict of the Council of Ministers of the USSR Laboratory #2 was reorganized into the Institute for Atomic Energy in 1956.

January 14 2013 we celebrated 110th anniversary of the birth of academician Igor Kurchatov, who was the founder not only of the Institute, but also of the country's nuclear industry. The name of Igor Kurchatov is closely related with commissioning of P-1 - the

first nuclear reactor in Eurasia in 1946, development of the first native atomic and thermonuclear bombs. Development of commercial nuclear power engineering, nuclear Navy and civil fleet, space nuclear propulsion systems started under his auspices. After the death of academician Kurchatov in 1960 the Institute was called after him.

Finally, the third jubilee is 110th anniversary of the birth of academician Anatoly Alexandrov, who became the second after Kurchatov Institute director, and headed it for 25 years. The system of defensive mine countermeasures for the USSR Navy ships was developed under the auspices of Anatoly Alexandrov. He headed construction of nuclear production reactors generating weapons grade plutonium, power reactors for nuclear power plants, development of the first Soviet nuclear submarine, as well as establishment of the powerful submarine and surface fleets.



Still, nuclear power is not the only research area of the Institute. The Institute has launched quite a number of new areas of research: isotope separation, thermonuclear power, information technologies, use of synchrotron and neutron radiation, etc.

Kurchatov Institute's part in development of thermonuclear fusion research in our country is also hard to overestimate. March 12 2013 fusion community celebrated 100th anniversary of Igor Golovin, doctor of physics and mathematics, professor, the Lenin Prize (1958) and the Stalin Prize (1953) laureate, honoured worker of science of the Russian Federation (1996). Since 1950 Professor Golovin worked in the field of controlled thermonuclear fusion. Under his scientific guidance the first Tokamak (TMP) was assembled in 1955. It was Igor Golovin who invented the term "TOKAMAK", that was widely acknowledged by the world community.

In 1960-es the Institute was nominated the scientific advisor for superconductivity application in electric engineering and in atomic science and technology. At the beginning of 1970-es the Institute became a pioneer in developing new technologies for micro electronics; the first native Internet was developed owing to active development of information technologies in the Kurchatov Institute in 1980-es. The first specialized source of synchrotron radiation was commissioned on the post-Soviet territory in 1999.

The Institute is continuously developing and improving: in 1991 it got the status of the Russian Research Center, and since 2008 the pilot project for establishing the National Research

Center “Kurchatov Institute” has been executed. Three Russian research organizations joined this project in 2009. These are: Institute of Theoretical and Experimental Physics, Institute of High Energy Physics, and Institute of Nuclear Physics named after B. Konstantinov in St. Petersburg.

The First Russian National Research Centre is headed by the President, academician Yevgeny Velikhov, and the Director, Corresponding Member of RAS Michael Kovalchuk.

Active development of nanotechnologies started in the Kurchatov Institute in mid 2000-s. Unique Kurchatov NBICS-centre oriented for inter-discipline research and development in the area of nano-, bio-, info-, cognitive, socio-humanitarian sciences and technologies using X-ray,



synchrotron, and neutron radiation was established on the basis of Scientific and Technical area “Kurchatov Centre for synchrotron radiation”. Mega-installations are the basis of NBICS-centre: source of synchrotron radiation, neutron source based on IR-8 reactor, as well as modern research areas: laboratory of polymer materials, complex of high-resolution electron and probe microscopy, genomic and proteomic research, cognitive science department, “Protein plant”. The Centre possesses the set of molecular beam epitaxy facilities, multifunctional modular nanotechnological “NANOFAB” system, equipment for mapping of genome, etc. Nuclear medicine department is also a part of NBICS-Centre.

Three more centers were formed in 2012 in NRC “Kurchatov Institute”: Kurchatov Centre for Nuclear Technologies, Centre for Fundamental Research, and Center for Physical and Chemical Technologies in order to unite scientific departments, performing research in many areas.

Kurchatov Centre for Nuclear Technologies, which combines scientific research in the areas of “Fundamental and Applied Research in the area of plasma physics and tokamaks” and “Development of Nuclear Technologies for creating nuclear power of the next generation” was established on the basis of the Institute of Nuclear Reactors, Institute of Tokamak Physics, Institute of Reactor Materials and Technologies, and Scientific and Technical Complex “Remediation”. Main areas of research of the nuclear technology center are:

- Strategic systematic research to develop power energy and nuclear power cycle. Innovative research for development of nuclear power and closure of the nuclear fuel cycle.
- Development of generating capacities and modernization of the operating NPPs.
- Studies in the area of reactor material science.
- Studies in the area of thermonuclear fusion.
- Research and development in the interest of nuclear-weapons industry including nuclear Navy and civil fleet, and space nuclear-propulsion systems.
- Work in the area of eliminating radiation legacy.

Kurchatov Centre of Nuclear technologies possesses extensive experimental capabilities: 9 critical facilities, several thermophysical testing facilities, 5 research reactors, set of hot cells for material studies, set of high-resolution analytical equipment, which has no analogues in the organizations of nuclear industry, 2 tokamaks.

Center for Fundamental Research carries out research in the areas of general, nuclear and photon physics, as well as condensed state physics.

The tasks of the Centre for Physical and Chemical Technologies are to perform research in the areas of:

- isotope technologies and technologies for obtaining radiopharmaceuticals;
- plasma and chemical technologies;
- electro-chemical and hydrogen technologies;
- chemical physics.

Today NRC “Kurchatov Institute” possesses unique research and technological basis, performs research and developments in the wide range of the current science and technology areas: from power engineering, convergent technologies and elementary particle physics up to high technology medicine and information technologies.

Since the day of its foundation Kurchatov Institute uses the inter-discipline approach aimed at the whole cycle from fundamental research to development and adoption of ultimate technologies. Distinguished scientists of the Center transfer their knowledge and experience to young generation.

Up-to-date Kurchatov Institute actively participates in the international scientific mega-projects, it initiates some of them. This is the project for construction of the International Thermonuclear Experimental Reactor (ITER), one of the ideologist of which is the President of NRC “Kurchatov Institute” academician Velikhov. Russian participation in the European free-electron laser project (XFEL) was initiated by Kurchatov Institute. The government of Russia entrusted the Institute with the role of scientific coordinator and leader on the Russian side. Today upon the initiative of Michael Kovalchuk NRC “Kurchatov Institute” participates in the XFEL project within all the scientific and administrative levels. Large Hadron Collider in CERN is another mega-facility, where researchers and specialists from the Kurchatov Institute work. NRC leads experimental work at one of the four mega-detectors БАК – ALICE. Kurchatov scientists are also very active in the international experiment on the physics of neutrino, which is being carried out in the underground laboratory of the National Nuclear Physics Institute in Italy (BOREXINO), they participate in the international scientific mega-project for construction and operation of the European Centre to study ions and antiprotons (FAIR) in Germany. Russian-Italian project of experimental thermonuclear reactor of principally new type – IGNITOR has been started in recent years by the initiative of Yevgeny Velikhov. The installation will be operated on the unique modernized technological and infrastructural basis of the Kurchatov Institute and Troitsk Institute of innovative and thermonuclear research.

Russian component in these projects both financial and intellectual is quite high. All of the Institutes that are a part of the first National Research Centre participated in the development of all the above international mega-facilities, and are actively participating in operation of them.

Despite the complexity of “after-perestroika” period for the Russian science Kurchatov Institute continues working, evolving and delivering world level scientific results. The “renewed” Institute celebrating jubilees is ready for further progresses to strenghten Russian science.

Information provided by the NRC “Kurchatov Institute” Press-service