Academy of Sciences of the USSR

Victor Borovsky

The Academy of Sciences of the USSR is one of the oldest institutions in the country. It was established by Peter the Great in St. Petersburg almost 250 years ago and became the centre of scientific thought in Russia. As far back as the 18th Century the Academy had prominent scientists such as Mikhail Lomonosov and Stepan Krasheninnikov. In subsequent years, M. Ostrogradsky, P. Lebedev, I. Sechenov, I. Mechnikov, P. Chebyshev, A. Kovalevsky, A. Butlerov and many others worked there.

After the Revolution, the Academy became the centre of scientific training for the Soviet Union. In his article "Draft Plan of Scientific and Technical Work" V. I. Lenin substantiated a large-scale programme of activities for the Academy of Sciences and all research institutions of Soviet Russia for many years to come. The gradual reorganization of the Academy and its strengthening as the highest scientific centre of the country took place during the period from 1917 to 1936. In 1925 it was given the status of the Highest Scientific Institution of the country and the name "The Academy of Sciences of the Union of Soviet Socialist Republics". The most significant changes in the organization of the Academy were carried out in the 1930s when it transferred from Leningrad to Moscow and new scientific branches and bases were set up in the provinces.

During the war (1941-1945) the Academy and its research institutions played a tremendous role in the reconstruction of the country's economy along war lines. Despite the difficulties of those years the number of institutions attached to the Academy increased and its structure was improved. A number of independent academies was set up on the basis of its previously existing branches and bases: the Academies of Georgia and Lithuania in 1941; the Academies of Armenia and Uzbekistan in 1943; the Academy of Estonia in 1946.

In 1957 a new scientific centre was founded in Novosibirsk — the Siberian Branch of the Academy of Sciences of the USSR. It has several new institutions affiliated to it which are engaged in the problems of automation, electrometry, geology and geophysics, hydrodynamics, organic chemistry, theoretical and applied mechanics, solid-state physics and semi-conductor electronics, nuclear physics and others.

At present the Academy constitutes a system of scientific institutions which are subdivided into three groups. The first one comprises the Academies with a network of Institutions. They tackle basic theoretical problems and work out long-term trends for the development of science. The second group comprises branch research Institutions engaged in the problems of technology, searching for applications of scientific discoveries. The third group comprises research laboratories of industrial and other enterprises where the practical application of the new achievements are organized.

The supreme organ of the Academy is its General Meeting incorporating full and corresponding members of the Academy. The Presidium of the Academy of Sciences implements the decisions of the General Meeting and, between sessions, administers the entire activities of the Academy. It is elected for a term of four years by the General Meeting. The scientific work carried out by the Academy is concentrated at its institutions, laboratories, observatories, botanical gardens, museums, in scientific councils on different problems, and in committees and commissions. The Academy controls the activities of over 100 scientific establishments.

The establishments are grouped into four sections:

Physico-Technical and Mathematical Sciences;

Chemical-Engineering and Biological Sciences;

Terrestrial Sciences;

Social Sciences.

Each section incorporates a number of specialized departments which are each directed by a bureau composed of full and corresponding members of the given speciality. The bureau is responsible for the scientific and scientific-methodological direction of the institutions attached to the Academy and its branches, and to the Academies of the Republics in their respective fields of science.

The activities of the Academy of Sciences and its scientific institutions were described as follows by Academician Lev Artsimovich (Head of the Department of General Physics and Astronomy, Chairman of the National Committee of Soviet Physics of the Academy, and Member of the Executive Committee of the European Physical Society) with emphasis on the work in his Department:

"At the turn of the century the Russian Academy of Sciences had one institute, several laboratories, museums and experimental stations affiliated to it and only 45 full and 50 corresponding members. The number of full and corresponding members of the Academy has by now increased more than six-fold and the number of scientific publications almost a hundred-fold.

It is impossible even to mention all the major achievements of Soviet scientists from the Academy in one article. I shall briefly cite a few of them: I. Kurchatov, A. Alexandrov and others made a tremendous contribution to the development of atomic power engineering in the USSR. V. Veksler developed the scientific principle on which modern accelerator technology is based. Soviet scientists helped lay down the foundations of quantum electronics. P. Kapitsa achieved notable results in the field of low temperature physics.

The ideas and methods of modern mathematics are applied on an ever wider scale in different fields and branches of science and technology. High-speed electronic computers and special cybernetic devices are now

The building of the USSR Academy of Sciences Presidium in Moscow.

(Photo N. Granovsky)

Academician Lev Artsimovich, Chairman of the National Committee of Soviet Physics of the Academy and Member of the Executive Committee of the European Physical Society.

(Photo M. Ozersky APN)

widely used in production, accounting, planning and management.

Soviet astronautics and rocket engineering have come a long way from the fundamental work in the field of jet propulsion and astronautics by K. Tsiolkovsky to the development of complex space rocket systems. The results of space research have more than a purely academic significance. The practical utilisation of artificial earth satellites found its expression in the development of the system of satellites used for radio communication. Television programmes have been regularly transmitted in this way from Moscow to Vladivostok for over two years and "Orbita" stations for the reception of television programmes through communication satellites have been installed in many cities of the Soviet Union. "Meteor" sputniks are also giving vital information for meteorologists.

Turning to the present work of the Department of General Physics and Astronomy, the Department incorporates several Institutes, and astronomical Observatories. Several scientific councils for different physical problems, such as solid-state physics, plasma physics, radioastronomy; the Astronomical Council and other associations are attached to the Department.

Important results have been achieved in low temperature physics, the physics of durability, the physics of magnetic phenomena, the physics of high temperature plasma, superconductivity, thermoelectricity and dielectrics. The achievements in the development of quantum electronics are applied in different fields of science and technology. Also widely known are the achievements in space research, in space radio-communication, in the radio-location of the planets Mercury, Venus, Jupiter and Mars.

The Institute of Physics, named after Lebedev, which developed semiconductor optical generators, transforming electrical energy into luminous energy, is at present engaged in interesting research. Together with the Institutes of Terrestrial Magnetism, Ionosphere and the Propagation of Radiowaves, this Institute does research into the properties of the ionosphere, and is developing a theory of the interaction of the ionosphere with artificial satellites.

The Institute of Physical Engineering named after A. Ioffe has achieved successes in the field of semiconductors. It has developed, in particular, controllable silicon valves on the basis of laminated semiconductor structures. The scientists of the Institute of the Physics of Metals have successfully completed research in the field of solid-state physics. They have discovered a new effect of the heavy-current pulsed magnetic field on the durability and structure of steel in the course of its thermo-mechanical processing at low temperatures. This Institute and the Institute of the Physics of High Pressure have developed a method of processing metals, which are fragile and difficult to form, by liquid extrusion at high pressure.

The research carried out by the Institute of Radio and Electronic Engineering allowed the distance to Venus to be determined with greater precision.

Astronomers of the Department have deciphered the data of geomagnetic observations on the plasma flux emitted by the sun. The Crimea Astrophysical Observatory has assembled data to improve methods of forecasting sun bursts. Interesting results from observations of the nuclei of galaxies have been received at the Byurakan Astrophysical Observatory.

In 1969, there was the discovery in astrophysics by S. Polosnov and A. Mikirov, from analysis of experiments carried out by means of rockets during the total eclipse of the sun in February 1961. Completing the work of many years they came to the conclusion that the interplanetary dust is distributed quite irregularly in the solar system and is concentrated mainly in certain aggregations (heterogeneities). This discovery is an important contribution to modern theory concerning the origin of the solar system. It is also of great significance for practical purposes, in particular for the solution of some problems of interplanetary travel.

The existence of a field of increased ionization at altitudes of from 10 to 40 kilometres and of a field of low ion concentration at altitudes of from 50 to 70 kilometres has been experimentally discovered. E. Shverkovsky and his colleagues, Y. Brain and O. Kostko, succeeded in establishing that the existence of ionosphere at low altitudes is accounted for not by solar radiation but by the effect of cosmic-ray particles.

A third discovery was due to M. Markov and V. Khohlova. They found an increased reflecting power of the moon's surface in the infrared spectrum. They used a 50 inch reflection telescope for their research, developed special apparatus and worked out original methods of measurement in the infrared range of the spectrum. Analysis of the data revealed that the

reflecting capacity of the spectrum in the area of 3.5 microns is three to five times higher than in the range of the visible field of longer waves (8 to 13 microns). The results of an experiment by American scientists, using a high altitude aerostat, were in close agreement with these data. Data transmitted by the space station Zond-3 again confirmed the observation. This property of the moon's surface is of great significance for determining its mineralogical composition and the development of navigation systems in lunar space.

A State Prize of the USSR for 1969 in the field of physics went to a group of scientists headed by B. Samoilov for their discovery of and research into the effect of the formation of strong magnetic fields on the nuclei of non-magnetic atoms ingrained in the crystal lattice of iron. This research is of great significance not only for nuclear physics but for solid-state physics also.

A State Prize was conferred on L. Groshev and other authors for their work on gamma spectra arising when nuclei capture thermal neutrons. This work has expanded the knowledge of the properties of nuclei and received wide international recognition."

Society News

Symposium on Physics and Society

The following points are taken from information provided by M. Kersten (ad interim Chairman of the Physics and Society Advisory Committee) concerning a symposium on "Physics and Society" organized by E. Ascher on his own initiative following an extensive exchange of views with physicists of many countries. The symposium was held at the Institut Battelle, Geneva, on 18, 19 November 1969. The President of the EPS decided that this informal meeting "could be considered as a symposium to put forward proposals to the Advisory Committee on Physics and Society".

The symposium was attended by G. Alaga, E. Ascher, G. Diemer, L. Etienne-Amberg, M. Kersten, C.P. O'Toole, L. Pekarek, D. Schumacher, A. Speiser, H. Thiemann, I.P. Valko and J. Vlachy. The afternoon and evening of the first day were devoted to an inventory of problems. Major items were:

History and reasons for the meeting: E. Ascher

General survey of the problems relating to physics and society: H. Thiemann

On the second day particular problems were discussed:

Quantitative data on physics in small countries: J. Vlachy

The future of the physicist: M. Kersten

The public image of physics: G. Diemer

A great deal of time was given to stimulating and constructive discussion of the many proposals which emerged in the course of the symposium. It was decided that working groups should be set up to examine particular questions and to provide all participants in the symposium with the resulting information as a basis for further discussions. The tasks selected for the first working groups are

(1) Acquisition of quantitative data (Coordinator - J. Vlachy)

(2) Public image of physics (Coordinator - G. Diemer with G. Alaga and I.P. Valko)

(3) Social interaction (no Coordinator has yet been assigned: this subject is seen as a long-term assignment involving literature studies).

It was agreed that the participants at the symposium, in consultation with other interested people, should prepare a programme, listing the proposed aims of the Advisory Committee, to be presented to the Executive Committee. This will follow a second meeting.

An article on Physics and Society, which it was intended to include in this issue of Europhysics News, will appear after the discussions in the second meeting.

Associate Member

Laboratories RCA Ltd. (Zurich) has decided to join the European Physical Society as an Associate Member.

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A gift of £ 250 has been received from International Nickel Limited (London).

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