Spartak Timofeevich Belyaev (on his sixtieth birthday)

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October 27, 1983 was the sixtieth birthday of Academician S. T. Belyaev, a gifted Soviet theoretical physicist, an innovative scientist, a major organizer of science and an eminent teacher.

Belyaev belongs to that pre-war generation which went through their first universities on the fronts of World War II. In 1941, immediately after finishing school, Belyaev started work as a lathe operator in a factory, and in August 1941 he went into the field with the army as a volunteer. In 1946 after demobilization he began studies at the Physico-technical faculty of Moscow State University and was graduated with distinction in 1952. In 1947 he began his creative activities at the Institute of Atomic Energy under the guidance of G. I. Budker.

His first work, part of which was carried out together with Budker, was devoted to the kinetics of a rarified ionized gas in strong external fields. In that work, in connection with the problems being worked on at that time in the physics of electron accelerators of new types, a relativistic kinetic equation was consistently obtained for the first time and effective methods for its solution were proposed, in particular for the practically important case of strong fields. In the same group of studies he solved the completely new and important problem of multiquantum recombination of an ionized gas, using the elegant idea of describing the process in terms of diffusion in energy space. The methods developed in these studies were used and developed later in a large number of investigations on the physics of electron beams and plasma.

In 1955 Belyaev first turned to questions of nuclear physics. His first work in this field was devoted to experimental problems involving both atomic and nuclear physics—the creation of sources of polarized nuclei. This problem was at that time very urgent, since the lack of information as to how nuclear interactions depended on the polarization was greatly retarding the development of ideas regarding nucleon-nucleon forces, many nuclear reactions, and nuclear models. Belyaev in 1955 first proposed the idea of using for solution of this problem strong inhomogeneous magnetic fields in which the atoms of the source are separated in accordance with the components of the ion of this idea and its subsequent development made possible, first at the Institute of Atomic Energy and later in other institutes of the Soviet Union, the production of intense beams of polarized nuclei which are extensively used in nuclear research.

At the end of the 1950s, Belyaev (in a productive collaboration with A. B. Migdal and V. M. Galitskiĭ) became one of the pioneers in the development of a new area of theoretical physics—the application of the methods of quantum field theory to many-body problems. In 1958 he published his classic work on the theory of a nonideal Bose gas, which made his name well known. In these studies he proposed new and original methods of describing interactions of particles in the presence of a Bose condensate (which have subsequently used, in particular, also for development of the theory of superconductivity), and his calculations of the energy spectrum of a nonideal Bose gas in the gas approximation (which generalized the results of the perturbation theory of N. N. Bogolyubov) demonstrated the possibilities and productivity of the methods developed.

Belyaev obtained his most important results in work on the theory of the structure and properties of nuclei which he began in 1959. In his work on "Effects of the Pairing Correlation on Nuclear Properties" carried out during his stay at the Niels Bohr Institute at Copenhagen in 1959, he put into practice the qualitative reasoning of Aage Bohr, Ben Mottelson, and David Pines on the application to the nucleus of the methods of the theory of superconductivity.

This work came to be routinely utilized and led to the understanding of a large group of nuclear phenomena and to the manifestation of nucleon pairing effects.

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In this way it was possible to explain the existence of a gap in the spectra of single-particle excitations of nonmagic nuclei and the significant departure of the moments of inertia of deformed nuclei from the rigid-body values. For the first time it became possible to understand the fundamental role of quadrupole vibrations in the structure of nonmagic nuclei and in the nature of the phase transition from spherical nuclei to deformed nuclei. An explanation was obtained for the systematic variation of the location of the first 2 levels and the $E2$ transition probabilities with filling of a shell. This work brought worldwide fame to Belyaev and initiated the intensive development of microscopic models of collective excitations, a development which has continued to the present time.

In 1962 Belyaev, together with V. M. Galitskiĭ and several young physicists, moved to the Scientific Town at Novosibirsk and became a leading member and then the director of the theoretical division of the Nuclear Physics Institute of the Siberian Division USSR Academy of Sciences.

In 1964 Belyaev was elected a corresponding member of the USSR Academy of Sciences, and in 1968 an Academician. Since 1965 he is the rector and occupies the chair of theoretical physics at Novosibirsk State University.

Beyond these formal activities is the intensive work of a physicist, organizer of science, and educator of youth.

First of all his own work on study of the fundamental problems of nuclear structure was being actively developed. It is sufficient to mention briefly the principal results obtained during these years by Belyaev and his colleagues: the theory of nonlinear (anharmonic) effects in nuclei, which produced great interest on the part of theoreticians in various countries and is at the center of attention up to the present time; the theory of interaction of nucleons in a nucleus with collective excitations—nuclear phonons; the systematic analysis of the consequences following from the properties of gauge invariance of nucleon interactions and the prediction of new types of nuclear collective excitations; the theory of nuclear rotation, based on a microscopic consideration of rotation as an equally probable collective excitation; the development of general methods of obtaining nuclear Hamiltonians for collective motions; study of nonstatistical mechanisms of nuclear reactions.

Being in turn of mind a typical theoretician, one of the brilliant members of the school of theoretical physics associated with the name of L. D. Landau, Belyaev was well acquainted with the design of experiments in various fields of physics. He took a very active part in discussions of the general program of development at the Nuclear Physics Institute and in the design of specific experiments. His deep knowledge, broad point of view, and realistic understanding of the conditions of a physics experiment played here an invaluable role.

At the same time Belyaev carried on the major work of being rector of Novosibirsk State University. Going into all details of the process of instruction of students, he attempted to maintain constant contacts of the university with leading scientific establishments and to involve students in direct participation in the development of contemporary science. He devoted much effort and time to the Physics-Mathematics School for Young Scientists at Novosibirsk State University, attentively studying the general problems of educating young scientists and the organization of higher education, and often wrote on these problems in the general press. His own lectures, thoughtfully arranged, concise, and physically transparent, always attracted the attention of any lecture hall—from students or school children to the participants of international conferences. Belyaev combined this time-consuming work with a large amount of scientific organization activity at the presidium of the Siberian Division, USSR Academy of Sciences, in the executive office of the Division of Nuclear Physics, USSR Academy of Sciences, in the editorial office of the journal Yadernaya Fizika [Soviet Journal of Nuclear Physics], and other activities.

In 1978 Belyaev returned to Moscow to the Kurchatov Institute of Atomic Energy and in 1981 he became director of the Division of General and Nuclear Physics at that Institute. At the same time he occupied the chair of theoretical physics at the Moscow Physico-technical Institute. In the responsible post of division director, Belyaev has shown himself to be a broadly thinking physicist and a talented organizer. In addition to the support and development of work in nuclear physics, in particular on the study of anomalous states of nuclear matter, he is actively involved in work on the physics of condensed matter and on applied physics carried out in the division. The new ideas and initiatives developed by him, his thoughtful attention to each problem and to each colleague, together with his calm and helpful style of communication, have a major and beneficial influence on the work of the division and strengthen the creative atmosphere.

Belyaev's military and public service have been the occasion of many government awards: the Order of Lenin, the Order of the October Revolution, the Order of the Red Banner of Labor, the Order of the Red Star, and many medals.

Spartak Timofeevich is at the flowering of his creative strength, and it is a pleasure, on the occasion of his sixtieth birthday, to wish him good health and new creative accomplishments for the benefit of Soviet science.

Translated by Clark S. Robinson