

Georgii Nikolaevich Flerov (on his 60th birthday)

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Usp. Fiz. Nauk 109, 617-619 (March (1973).

On March 2, 1973, the well-known Soviet physicist, Georgi Nikolayevich Flerov, will be 60 years old.

Flerov was born in 1913 in Rostov-on-Don. After finishing school in 1929, he worked as a laborer, as an oiler in a railroad terminal, and as an electrician. In 1931 he moved to Leningrad where he began working in a factory. In 1933, he was directed to begin studies at the Engineering-Physics Department of the Leningrad Polytechnic Institute.

In 1937, while still a student, Flerov began working in I. V. Kurchatov's laboratory at the Leningrad Physico-technical Institute. His talent as an experimental physicist and his exceptional persistence and clearness of purpose in the course of solving the most difficult problems in nuclear physics manifested themselves even in the initial years of his scientific activity.

Even his first work, devoted to the study of the interaction of slow neutrons with nuclei, produced interesting results. At that time, when the feasibility in principle of a nuclear chain reaction became clearer, Flerov performed together with L. I. Rusinov one of the first studies on the determination of a key parameter for the realization of the chain reaction, namely, the number of secondary neutrons produced in fission.

In 1940, Flerov together with K. A. Petrzhak, made a fundamental discovery which was afterwards included in textbooks and monographs. By developing a method of unprecedented sensitivity they succeeded for the first time in observing spontaneous nuclear fission. This discovery served as the start of the development of a whole new branch of nuclear physics.

In the first years of the war, G. N. Flerov joined the Leningrad militia and later he was directed to the Air Force Academy in Yoshkar-Ola. However, he continued to work on problems connected with nuclear fission with the hope of creating new powerful weapons during the grim war years. At the end of December of 1941, he went to Kazan' where he delivered a paper before A. F. Ioffe and P. L. Kapitza and other physicists on the necessity of investigating nuclear chain reactions induced by fast neutrons. The paper indicated possible ways of solving a number of basic problems.

At the end of 1942, papers on the development of atomic science and technology began to appear in the Soviet Union and Flerov was among the first few physicists with whom I. V. Kurchatov began to analyze and solve a whole set of problems. Flerov participated very actively in this work and he can be credited with considerable contributions to research directly connected with strengthening the country's defenses and building a foundation for nuclear energy in the Soviet Union.

In the postwar years, G. N. Flerov continued his work on the physics of nuclear fission and conducted a cycle of experiments on the fissioning component of cosmic rays. Flerov was one of the first in the USSR to use nuclear-physics methods to solve problems in



prospecting for oil and in most efficient exploitation of petroleum deposits.

Beginning with 1951, he has directed for a number of years research at the Moscow Petroleum Institute, which resulted in development of perfected apparatus for neutron and gamma logging of petroleum layers.

Since 1953, Flerov's scientific interests have been connected with the development of a new trend in nuclear physics—the investigation of processes that occur during the collision of complex nuclei, and the fundamental problem of the synthesis of new elements. The basis of this research was the development of methods of producing and accelerating multiply charged ions of heavy atoms. Within a short time, intense beams of heavy ions were produced at the Institute of Atomic Energy and the first experiments aimed at the synthesis of the 102nd element were conducted.

Subsequently, under the direction of G. N. Flerov, a Laboratory of Nuclear Reactions was organized at the Joint Institute for Nuclear Research. The main acceler-

ator of the Laboratory—a 310 cm cyclotron—is the best heavy-ion accelerator in the world.

Of all the diverse trends of possible research on beams of heavy ions, Flerov chose the most fundamental and the most difficult, the synthesis of transfermium elements, which are at the limit of nuclear stability.

Since the cross sections for the production of the new elements turned out to be unusually small and only few atoms were synthesized in experiments lasting many days, a great many difficulties were encountered on the path toward the synthesis. It was necessary, on the one hand, to increase appreciably the beam intensity and to widen the assortment of the accelerating ions, and on the other hand, to learn how to separate atoms of transfermium elements from background products whose yield in the reaction turned out to be hundreds of millions times larger than the yield of the investigated nuclei.

From the first days of the Laboratory's operation to the present time, Flerov devoted much effort and energy to the continued perfection of the Laboratory's accelerator, to the discovery of better sources of multiply-charged ions, to the development of physical and chemical Laboratory methods of rapidly isolating the unknown products of a reaction and identifying them, especially by means of spontaneous fission. The experiments on the synthesis of transfermium elements demanded maximum mobilization of the efforts of the whole staff of the Laboratory.

Flerov's acutely critical approach, his ability to clearly analyze an aggregate of complex experimental facts, his profound understanding of the essence of physical phenomena, his unusual energy and ability to lead his plans to completion—these are the qualities that determined the brilliant scientific achievements of G. N. Flerov and the staff he headed.

In 1964–1970, a whole series of new isotopes of transfermium elements with the atomic numbers, 102, 103, 104, and 105, were synthesized in Flerov's laboratory, and their physical and chemical properties were studied. The name Kurchatovium was given to the 104th element at the suggestion of Flerov and his co-workers in honor of Academician I. V. Kurchatov, who devoted much attention and gave considerable help to the development of research on the synthesis of new elements.

Other discoveries made at the laboratory under Flerov's direction are widely known: spontaneously fissioning isomers and the emission of delayed protons.

In all of his research, Flerov as a scientist is characterized by a combination of experimental skill and an exceptional flair for new discovery.

In recent years he devoted much attention to an interesting new problem connected with the possible existence of superheavy elements. Flerov conducted this research from two directions: on the one hand, extensive search was undertaken for superheavy elements in nature; on the other hand, experiments were begun on the synthesis of superheavy elements in reactions with heavy ions. For this purpose, Xenon ions were accelerated on a system of two cyclotrons at Flerov's laboratory for the first time in the world. The experiments have only been begun and have merely an exploratory character, but we can expect that he will shed light on this problem, too, in the near future.

Flerov's prestige is very high in our country, as well as outside it; his lectures at the most important international conferences meet unflinching attention.

Flerov educated a whole generation of young students. He devoted much attention to the organization of scientific research and the practical utilization of the achievements of nuclear physics. He is the chairman of the Scientific Council of the USSR Academy of Sciences on the application of nuclear physics methods in related areas, and a member of the editorial boards of the journals *Yadernaya Fizika* (Nuclear Physics) and *Problemy Fiziki Elementarnykh chastits i atomnogo yadra* (Problems of the Physics of Elementary Particles and of the Atomic Nucleus). Together with his scientific and pedagogical activity and great organizational work, Flerov also takes a most active part in the political life of the nation; he was elected as a delegate to the 24th Congress of the Communist Party of the Soviet Union.

Flerov received many state awards for his outstanding research in the area of nuclear physics which had great scientific and practical significance. The title "Hero of Socialist Labor" was conferred upon him; he was awarded the Lenin and State Prizes, as well as orders and medals in the Soviet Union and other countries.

In 1953, Flerov was elected corresponding member of the USSR Academy of Sciences, and became a full member in 1968. In 1969, he was elected foreign member of the Royal Academy of Sciences in Denmark.

Flerov celebrates his 60th birthday in the full bloom of his creative forces, full of energy and wide-ranging scientific projects. His working day begins early in the morning and ends late at night; he takes part as usual, in the research that is conducted at his laboratory.

From the bottom of our hearts we wish G. N. Flerov health, inexhaustible energy, and new creative successes.

Translated by J. G. Adashko