

Viktor Mikhaĭlovich Galitskiĭ (Obituary)

A. P. Aleksandrov, N. G. Basov, S. T. Belyaev, I. I. Gurevich, Yu. M. Kagan, B. B. Kadomtsev, V. G. Kirillov-Ugryumov, V. I. Kogan, A. B. Migdal, and N. A. Chernoplekov

Usp. Fiz. Nauk **134**, 173-174 (May 1981)

PACS numbers: 01.60.+q

Soviet physics has suffered a bitter and irredeemable loss. Viktor Mikhaĭlovich Galitskiĭ died on January 7 this year at the age of 56 after a severe illness. He was a Corresponding Member of the USSR Academy of Sciences, the Director of the Division of General and Nuclear Physics of the I. V. Kurchatov Institute of Atomic Energy, and an outstanding theoretical physicist.

His untimely death has robbed us of a scientist of rare versatility and breadth of vision in theoretical physics, the author of fundamental papers covering a great range of topics in physics, and outstanding teacher and administrator, and one of our brightest and most authoritative physicists.

V. M. Galitskiĭ was born on September 8, 1924 in Moscow into the family of an academic geographer. In 1942, soon after graduating from high school, he joined the armed forces and fought in World War II as a lieutenant, commanding an artillery platoon. He was badly wounded during the fighting in the Kursk arc and had to be discharged from the army. He subsequently joined the Moscow Aviation Institute and, at the beginning of 1946, the reopened Engineering Physics Department of the Moscow Mechanical Engineering Institute (now MIFI). He completed his studies at the Institute in 1949 but, even before that, in 1948, he was already working at the Institute of Atomic Energy in the laboratory of A. B. Migdal.

V. M. Galitskiĭ's early work was devoted to nuclear physics and in part to accelerator physics. It covered the theory of scattering of gamma-rays by nuclei, the theory of the disintegration of the deuteron in the Coulomb field of the nucleus (jointly with L. D. Landau and A. B. Migdal, unpublished), the theory of the "cyclotron" (jointly with G. I. Budker), and so on. It is interesting to note that the scientific career of V. M. Galitskiĭ did not go through an "incubation period": he was a mature scientist right from the outset.

During the period 1951 - 1953, V. M. Galitskiĭ took an active part in research into controlled thermonuclear fusion that began at the Institute of Atomic Energy at that time. He was responsible for pioneering work on the very important problem of the propagation of cyclotron radiation in magnetized thermonuclear plasmas (jointly with A. B. Migdal). Again jointly with A. B. Migdal, he developed during this period (and independently of Bohm and Pines) the method of collective variables for the description of plasmas. His subsequent research into the hydrodynamic theory of collective



VIKTOR MIKHAĬLOVICH
GALITSKIĬ
(1924-1981)

phenomena in plasmas (growth of waves, Cherenkov emission and absorption, and so on) was the basis for his Candidate Thesis (1954) and acted as a major stimulus to Soviet work on the quasilinear approximation in the theory of collective phenomena.

In later years, V. M. Galitskiĭ transferred his main interests to problems in the theory of condensed media. His work on the application of the methods of quantum field theory to the many-body problem brought him world-wide recognition. We note particularly the development (jointly with A. B. Migdal) of the method of Green's functions in the many-body problem, and of the theory of the nonideal Fermi gas. In contrast to previous work in this field, which was based on perturbation theory, V. M. Galitskiĭ developed the gas approximation in which the interaction between the particles was taken into account exactly and only multiple collisions were neglected. By investigating the properties of Fermi systems, V. M. Galitskiĭ was able to introduce a number of generalizations such as the spectrum of the nonideal Fermi gas, acoustic excitations in Fermi systems, and collective excitations in such systems. His ideas are widely used in the modern theory of the Fermi liquid.

In 1960, V. M. Galitskiĭ was appointed head of the Department of Theoretical Nuclear Physics at MIFI (with which he had been actively collaborating for 12 years) but retained close scientific links with IAE. From this point on, his contributions to the education of physicists in the Soviet Union were extended still further. After defending his Doctoral Thesis (on the application of the methods of quantum field theory to the many-body problem), V. M. Galitskiĭ moved to the Institute of Nuclear Physics of the Siberian Division of the USSR Academy of Sciences. He remained there for three years but his influence on the research activities of this new institute and on the creation of the Novosibirsk physics school generally was commonly acknowledged as profound and fruitful.

During this period, V. M. Galitskiĭ completed a series of researches in the theory of electromagnetic interaction between high-energy particles. In collaboration with V. N. Baĭer, he studied multiphoton processes occurring in colliding-beam experiments. In collaboration with I. I. Gurevich, he developed during this period the theory of the energy loss by ultrarelativistic electrons.

Between 1965 and 1971, V. M. Galitskiĭ resumed his headship of the Department of Theoretical Nuclear Physics at MIFI.

A major series of researches carried out during this period was concerned with the interaction of resonance radiation with matter. In collaboration with I. I. Alekseev and Yu. A. Vdovin, V. M. Galitskiĭ investigated the radiation emitted by a macroscopic system of two-level molecules and its propagation through a resonance medium. The methods used in these researches were subsequently employed in the theory of quantum mechanical generators. V. M. Galitskiĭ and his students succeeded in solving many important problems in the theory of gas lasers and the behavior of semiconductor generators in strong fields. They showed that the field will produce a gap in the energy spectrum of electrons in the semiconductor, and that under certain definite conditions, a nonequilibrium superconducting state may appear.

V. M. Galitskiĭ directed and participated in a series of researches into the properties of resonance or near-resonance collisions between atoms and the effect of such collisions on the interaction between atoms and resonance radiation. This work resulted in the prediction of the shape and halfwidth of spectral lines with rigorous allowance for the degeneracy of the atomic states, the loss of coherence, and the transfer of excitation by collision.

In 1971, V. M. Galitskiĭ returned to his main work at the Kurchatov Institute of Atomic Energy and, in 1974, was appointed director of the Division of General and Nuclear Physics at the Institute. In this responsible

post, Viktor Mikhaĭlovich demonstrated his talents as an administrator and initiator of new and promising lines of research. He was responsible for starting the major program of experimental and theoretical work on unusual states of nuclear matter that can appear during the interaction between fast heavy ions. He played a leading role in establishing the Moscow center for the investigation and application of synchrotron radiation. His extensive erudition and great competence in all details of theory and experiment, his great energy, and his selfless devotion to his work made an enormous contribution to the establishment of the new Division and the successful implementation of its scientific program. Viktor Mikhaĭlovich was elected Corresponding Member of the USSR Academy of Sciences in 1976.

Viktor Mikhaĭlovich devoted much effort to the popularization of science as deputy editor-in-chief of the periodical *Priroda*; the present high scientific standard and extensive coverage provided by this journal was in great measure due to Viktor Mikhaĭlovich's efforts. His activities on the VAK Council of Experts were both responsible and important. Galitskiĭ was distinguished by the exceptional depth and clarity of his thinking on physical topics and his unusual ability to share the interests of physicists working with him. Discussions with him were exceedingly useful. He was an outstanding teacher. Many of his students became outstanding scientists. The collection of problems in quantum mechanics that he published with V. I. Kogan has become very popular and has been translated into other languages.

Sadly, it was only after his death that his two most recent books were published: *Theory of Collisions between Atomic Particles* (in collaboration with E. E. Nikitin and B. M. Smirnov) and *Problems in Quantum Mechanics* (with B. M. Karnakov and V. I. Kogan).

For his war service and for his subsequent work, V. M. Galitskiĭ was awarded the *Otechestvennaya Voĭna* Class 2 and *Znak Pocheta* orders and many medals.

V. M. Galitskiĭ was an unusually sensitive and responsive man. His friends and collaborators were always aware that he was interested in them and that he cared.

The realization of the untimely departure of Viktor Mikhaĭlovich will take time to sink in. But the life of men of his scale cannot be measured in temporal terms alone. His ideas, his methods, and his scientific research will live and will continue to be developed by his many students and friends.

The shining memory of this remarkable man and scientist will always remain with us.

Translated by S. Chomet