Feliks Romanovich Ulinich (Obituary)

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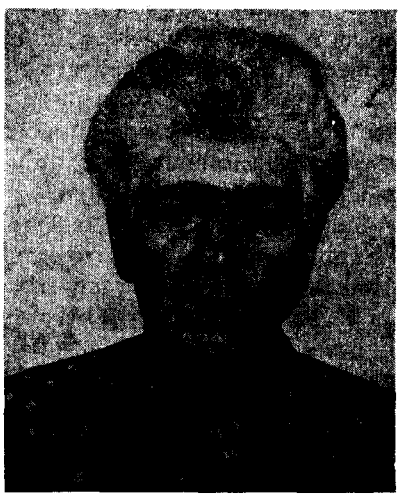
Professor and Doctor of Physical and Mathematical Sciences Feliks Romanovich Ulinich, a prominent theoretical physicist with whose name are associated many remarkable results in the fields of plasma and solid state physics, died on August 13, 1990.

F. R. Ulinich was born in Moscow on May 2, 1929 into a family with many generations of intellectuals. He graduated from the Physics Department of Khar'kov State University in 1953. From 1953 to 1956 he worked at the All-Union Scientific-Research Institute for Coal, from 1956 to 1959 at the Scientific-Research Institute of Radiophysics and Electronics, Siberian Branch of the Academy of Sciences of the USSR, from 1959 to 1964 at the Institute of Terrestrial Physics, and since 1964 at the I. V. Kurchatov Institute of Atomic Energy (at the Magnetic Laboratory of the Branch of the Institute of Atomic Energy in Troitsk). He defended his candidate's dissertation in 1958 and his doctorate dissertation in 1972.

A broad universalism is the most strongly expressed feature of F. R. Ulinich's creative activity. To a significant degree this is connected with the influence of L. D. Landau's theoretical physics course, which was taught him by Landau's closest students E. F. Lifshitz and A. I. Akhiezer. In the initial period of F. R. Ulinich's scientific life, he had to work in very diverse fields: the theory of brittle fracture and the theory of elasticity (at the All-Union Scientific-Research Institute for Coal), the propagation of radio waves (at the Scientific Research Institute of Radiophysics and Electronics, Siberian Branch of the Academy of Sciences of the USSR), and metallization at high pressures (at the Institute of Terrestrial Phyics). He could see the fundamental problems and solve the problems with a method adequate for their complexity without sacrificing precision to any degree, which enabled him to obtain in any field results possessing great generality and which found wide recognition. For example, in the well-known "Course on Theoretical Physics" by L. D. Landau and E. M. Lifshitz (the "Quantum Mechanics" volume), the solution of the problem of the value of the above-the-barrier reflection coefficient of a quantum mechanical particle found by F. R. Ulinich *et al.* is included.

He instilled this universalism along with mathematical precision in all his students, in particular, in his colleagues at the theoretical laboratory. He wanted to create a small laboratory staffed by colleagues with a well-rounded education capable of flexibly and capably turning to timely themes, and he succeeded to a significant degree in attaining this goal.

F. R. Ulinich aided the development of the main scientific fields (magnetohydrodynamics, gas lasers, and thermonuclear fusion) of the Branch of the Institute of Atomic Energy in Troitsk, which was directed by E. P. Velikhov in those years. F. R. Ulinich's characteristic interest in the fundamentals of physics always stimulated a search for the fundamental questions in those practical fields where he had to work.



FELIKS ROMANOVICH ULINICH
(1929–1990)

Thus, work in the field of magnetohydrodynamics evoked his interest in the problems of turbulence in general, and he wrote a number of papers on the statistical theory of turbulence from 1965 to 1971. The transport of small-scale vortices by large-scale vortices is allowed for in his theory, which enabled him to find a spectrum for turbulent flow. It was shown in F. R. Ulinich's papers that the main parameter in terms of which one might be able to expand solutions is essentially of the order of unity. This conclusion becomes more understandable now in connection with the appearance of new ideas in the theory of strong turbulence.

In thermonuclear research, the main problem for open traps—the confinement of electrons, whose flux may be by a factor of 60 greater than the ion flux—was solved by him. The solution of this problem, which existed from the 1950s, allows one to consider again open traps as promising thermonuclear systems.

In this same period, F. R. Ulinich made a number of investigations on the thermodynamics of a nonideal plasma after formulating a hypothesis of the nature of ionization equilibrium in which the interaction parameter can reach unity. He also constructed a theory of the thermal contraction of gas discharges in cylindrical tubes, and first indicated the profound analogy of this phenomenon with a thermal explosion, the theory for which was created by D. A. Frank-Kamenetskiĭ.

The scientific interests of F. R. Ulinich in the field of solid state physics were concentrated in two fields: the be-

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havior of electrons in a quantizing magnetic field, and Bose condensation. F. R. Ulinich was developing the basic idea of the quantum Hall effect, the nondissipative drift of quasi-two-dimensional electrons in crossed electric and magnetic fields, long before the experimental discovery of this phenomenon (since 1968). Feliks Romanovich's interest in this system arose during searches for physical models containing a gap in the density of states at the Fermi level. The idea of using binary Bose operators for a mathematically precise description of the condensate in the classical problem of a slightly nonideal Bose gas is due to F. R. Ulinich.

F. R. Ulinich's scope of scientific interests by no means is exhausted by what has been said above, and his students continue to investigate a number of his interesting ideas.

F. R. Ulinich devoted much effort to teaching; being a professor at Moscow Physicotechnical Institute, he conducted the "Scientific Seminars" course, where he discussed fundamental problems of physics picturesquely and understandably.

A rare efficiency with invariable thoroughness and profound responsibility for any task always characterized him. A sense of civil responsibility and principle not only in science but also in public life were always characteristic of F. R. Ulinich. In 1990, he was elected a deputy of the Troitsk City Council, and he was full of creative plans for improving the conditions of life for his fellow citizens. Being a member of the Scientific Council of the Branch of the I. V. Kurchatov Institute of Atomic Energy, Feliks Romanovich recently actively discussed one of the most vexing problems of perestroika—the fate of fundamental science in industrial departments under conditions of conversion and economic budgeting.

The bright memory of an outstanding scientist and a wholehearted benevolent person, Feliks Romanovich Ulinich, will be preserved both in science and in the hearts of his friends, colleagues, and students.

Translated by Frederick R. West