Sergei Éduardovich Frish (Obituary)

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Usp. Fiz. Nauk 125, 733–734 (August 1978)

PACS numbers: 01.60. + q

Soviet physics has suffered a heavy loss. On November 19, 1977, the outstanding spectroscopist Sergei Éduardovich Frish died in his seventy-ninth year. Frish was chairman of the Joint Scientific Council on Optics (Academy of Sciences of the USSR), the editor-in-chief of the journal Optika i Spektroskopiya, an honored scientific figure in the Russian Soviet Federal Socialist Republic, a professor at Leningrad University, and a corresponding member of the Academy of Sciences of the USSR. We have thus lost another leader of the Leningrad optics group which was founded in the early years of the Soviet state and which went on to gain worldwide fame.

SERGEI ÉDUARDOVICH FRISH (1899–1977).

Frish began his scholarly work in the State Optics Institute under the guidance of D. S. Roshdestvenkiĭ, while still a student in the physics and mathematics department at Petrograd University. After completing work at the University in 1921, he stayed on at the State Optics Institute and became one of Roshdestvenskiĭ's closest colleagues. At the same time, Frish was teaching and carrying out research at Leningrad University, where, in 1934, he organized a department of optics, which he was to head for nearly forty years.

His scientific work began at a time when atomic spectroscopy was the primary source of the information required for the development of atomic theory. In his first papers, Frish studied the Zeeman effect in the spectra of alkali metals and discovered a new type of spectral-line splitting in a magnetic field. He then carried out a series of studied on the systematic classification of atomic spectra and studied the spectra of ionized sodium and neon and the more complicated spectra of cesium and uranium. Developments in nuclear physics stimulated his pioneering work in the 1930s on the interaction of the nucleus with the atomic electrons, which leads to the appearance of the hyperfine structure in spectra. In this famous work, he studied the hyperfine structure of the sodium lines, established the rule relating the spin of a nucleus to its parity, and studied the hyperfine structure and isotopic shift in the lines of potassium, silver, copper, barium, calcium, thallium, samarium, and other elements.

In the mid-1930s Frish became one of the first to take up the spectroscopy of gas-discharge plasmas. He is universally credited with the widespread adoption of atomic spectroscopy in the physics of gas discharges, which has made possible a comprehensive study of plasma properties. This field became the focus of research in the department which he headed at Leningrad State University; Frish always felt that the development of these new fields was one of his primary responsibilities. Several of his papers dealt with an interferometric study of the line shapes of the ions in the positive column of a discharge and the nature of the ion motion. In order to determine the densities of atoms in various states, he made widespread use of reabsorption, inversion, and dispersion methods. He carried out a thorough systematic study of the rf discharge. One result of this work was the development of a method for spectral analysis of gases which is widely used in industrial applications. Several of his papers dealt with the mechanism for the excitation of high-lying atomic levels, with the role played by collisions of the second kind, and with the corresponding cross sections. In extensive work on optical excitation functions he established the existence of a fine structure in these functions, identified the role of cascade transitions, and found the level-excitation cross sections. All these directions are being pursued successfully by his students.

Frish devoted much attention to the development of spectral apparatus and to the improvement of light

 0038-5670/78/080721-02$01.10

sources. He proposed an interesting interferometric method for studying anomalous dispersion. He carefully followed the developments in spectroscopic techniques and was always ready to support new and progressive initiatives.

Frish was one of the most prestigious and honored professors at Leningrad State University. For ten years (1937–1947) he served as dean of the Faculty of Physics-a difficult position—and for the next ten years he was director of the physics institute at the University.

His excellent lectures on optics and atomic spectroscopy, which were informative and polished, are remembered by all his many students. For many years he lectured on general physics in the physics department at Leningrad University. In collaboration with his lifelong companion A. V. Timoreva, he wrote a three-volume course in general physics, completing an effort begun by Professor O. D. Khvol'son. This course was revised several times, translated into several other languages, and used widely at all Soviet universities and engineering colleges.

After being elected a corresponding member of the Academy of Sciences of the USSR in 1946, Frish carried out important work as a scientific administrator in the Academy. As a member of the Bureau of the Branch of General Physics and Astronomy and chairman of the Scientific Council on Optics, Frish devoted much effort to organizing research in optics and spectroscopy and to the development of optical and spectral instrumentation. He was one of the organizers of the Commission on Spectroscopy (of the Scientific Council), and for several years he supervised the work of this Commission. Upon the founding of the journal *Optika i Spektroskopiya* in 1956, Frish was appointed its editor-in-chief, and he actively supervised the work of the editorial board to his very last days.

Frish has left us a large and valuable scientific heritage. All Soviet spectroscopists have learned and continue to learn from the fundamental monographs which he wrote: *Atomic Spectra, Spectroscopic Techniques, Optical Spectra of Atoms, Spectroscopic Determination of Nuclear Moments, Optical Measurements,* etc. His scientific publications and reports were distinguished by impeccable scientific logic, clarity, and definite judgments. Frish was widely known for his erudition and his unfailing good will. He was very active in various scientific conferences and was generous in sharing his own experience. He was a worthy representative of the Soviet Union at international conferences and symposia.

Sergei Éduardovich Frish will always be remembered warmly by all who knew him.

Translated by Dave Parsons