SERGEĬ ÉDUARDOVICH FRISH

(on his 60th birthday)

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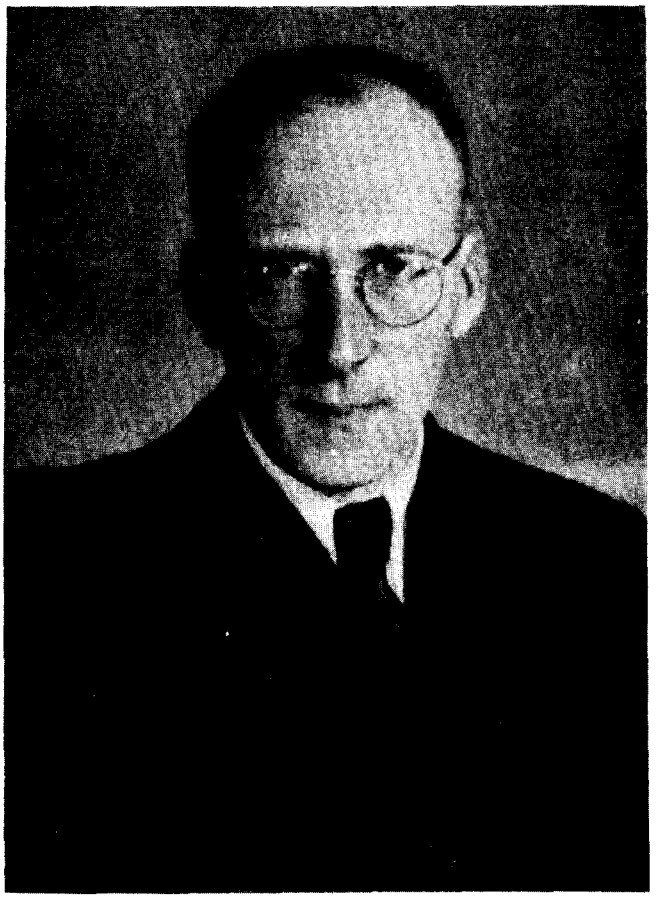
JUNE 19 marked the 60th birthday of one of the greatest Soviet spectroscopists and opticists, corresponding member of the USSR Academy of Sciences, Sergeĭ Éduardovich Frish.



While still a student of the Physico-mathematical Department of the Leningrad University, Frish started his scientific work under the leadership of D. S. Rozhdestvenskiĭ. After graduation in 1921, he continued his scientific work at the State Optical Institute and became one of Rozhdestvenskiĭ's closest associates. He simultaneously taught and did research at the Leningrad University. He transferred his principal scientific activities to the University in 1939, where he was in charge of the optics chair since 1934. Along with this, he administered for twenty years (1937-1957) the pedagogical and scientific work of the physics faculty — first as dean of the faculty, then as director of the Physics Research Institute of the Leningrad State University. In 1946 he was elected corresponding member of the U.S.S.R. Academy of Sciences and has been participating actively in the work of the academy. He is deputy chairman of the Commission on Spectroscopy, editor in chief of the journal "Optics and Spectroscopy," and a member of the UNESCO International Commission on Spectroscopy.

Frish began his scientific activity at the time when the theory of atomic structure was being developed. Particularly urgent problems at that time were the determination of atomic energy levels, the systematics of atomic spectra, and the study of the effect of external fields on atomic energy levels. These problems soon attracted Frish's attention. As early as in 1922, at the third congress of the Russian Association of Physicists, Frish reported on his investigations on the Zeeman effect in the spectra of sodium and potassium. In this work he discovered a new type of splitting of spectral lines of certain alkali metals in a magnetic field. Starting with 1927, Frish published a series of papers devoted to a study of the spark spectrum of sodium and to an analysis of the spectrum of neon and of other elements. He later went on to an analysis of complex spectra of the atoms of cerium and uranium. To carry out this research, Frish improved his spectral apparatus and developed new sources of light. Even in the early years of his work he demonstrated painstaking efforts to obtain clean and clear cut experimental results, a trait that characterized all his scientific activity.

The development of nuclear physics during the Thirties expanded substantially the scope of Frish's scientific interests. In 1930 he embarked on a large cycle of researches devoted to the application of optical methods to the investigation of the properties of the atomic nucleus. His work on the study of the hyperfine structures due to interactions between the atomic nucleus and the electron shell, won him great renown. He investigated the hyperfine structure of the sodium line and established

a rule that relates the spin of an atomic nucleus to its parity. He investigated the hyperfine structure and isotopic shift in the lines of potassium, silver, copper, barium, calcium, thallium, samarium, and other elements.

More than twenty-five years ago Frish became interested in gas discharge and called attention to the possibility of investigating it spectroscopically.

The work done by Frish and his students covers a wide range of problems in this field of physics. In particular, a series of investigations was devoted to a study of the motion of ions in the positive column of a gas discharge by investigating the contours of their lines. In many papers he traced the mechanism of excitation of high levels of atoms, and explained the role of second-order impacts. Methods of reabsorption, inversion, and dispersion were widely used to determine the concentrations of atoms in different energy states.

Of great importance to the understanding of the properties of the discharge are problems in the interaction of elementary particles. In this connection, Frish worked on a study of optical excitation functions. He succeeded in establishing the presence of a structure for the optical excitation functions and to clarify the role of cascade transitions.

Although engaged in the solution of problems in scientific spectroscopy, Frish always paid serious attention to practical applications. He developed new methods for the spectral gas analysis. His work in this field is extensively used in the industry and in modern technology.

Frish's scientific activity is inseparably linked with teaching, in which he has been engaged for more than thirty-five years. He has a large number of students, and is in fact the head of an entire school of spectroscopists. His monographs "Atomic Spectra" and "Spectroscopic Techniques" are still widely used by Soviet spectroscopists. Frish has been giving a course in general physics at the Physics Faculty of the Leningrad State University. Together with A. V. Timoreva he wrote a three-volume book that serves as the principal text in the physics faculties of all the universities of the Soviet Union and in the majority of technical colleges. The text was also translated into Chinese, Czech, Rumanian, German, Polish, and Lithuanian. Frish wrote many scientific-popular articles to disseminate information on the latest developments in physics among broad masses of readers. Strict coherence, clarity, and conclusiveness characterize all his scientific and pedagogical printed papers.

His numerous students and associates wish S. É. Frish health, and further success, and are convinced that he will continue to do much for the development of Soviet optics and spectroscopy.

LIST OF PRINCIPAL WORKS BY S. É. FRISH

1. Original Works

1. The Partial Paschen-Back Effect, Журнал Русск. физико-хим. о-ва, ч. физ., (J. Russ. Phys.-Chem. Soc., Phys. Sect.) **56**, 525 (1925).
2. The Spectrum of Ionized Sodium, Труды ГОИ (Trans. State Opt. Inst.) **5**, No. 46 (1929).
3. Doublet Nature of D-Terms of Potassium and Sodium (with A. A. Ferkhmin), loc. cit. ref. 1, **61**, 153 (1929); loc. cit. ref. 2, **5**, No. 49 (1930).
4. Hyperfine Structure of Spectral Lines and Magnetic Moments of Atomic Nuclei, loc. cit. ref. 2, **7**, No. 70, (1931).
5. Analysis of Complex Spectra, loc. cit. ref. 2, **8**, No. 81 (1932).
6. Properties of Atomic Nuclei of Certain Elements (with V. A. Matveev), Dokl. Akad. Nauk SSSR **1**, 460 (1934).
7. Glow of an Argon and Nitrogen Mixture (with V. A. Kovalov), J. Tech. Phys. (U.S.S.R.) **4**, 523 (1934).
8. Installation of Large Concave Diffraction Grating at the State Optical Institute in Leningrad (with F. M. Gerasimov), Usp. Fiz. Nauk **16**, 116 (1936).
9. Role of Second-Order Impacts in Gas Discharge. Izv. Akad. Nauk SSSR, Ser. Fiz. **3**, 431 (1936).
10. Absorption Spectrum of Monatomic Lead Vapor in the Extreme Ultraviolet (with V. I. Chernyaev), JETP **7**, 265 (1937); Transl. in Phys. Z. Sow. Union **11**, 344 (1937).
11. Influence of Nuclear Moment on the Zeeman Effect on Absorption Lines of Alkali Metals (with F. M. Gerasimov), JETP **8**, 267 (1938).
12. Isotopic Shift of Samarium Lines (with M. P. Vanyukov), Dokl. Akad. Nauk SSSR **23**, 39 (1939).
13. Concerning a Procedure for Spectral Analysis of Gas Mixtures, Izv. Akad. Nauk SSSR, Ser. Fiz. **4**, 56 (1940).
14. Ion Glow in the Positive Column of a Glow Discharge (with Yu. M. Kagan), JETP **11**, 286 (1941).
15. Spectroscopic Study of Ions in the Positive Column of a Glow Discharge (with Yu. M. Kagan), JETP **12**, 342 (1942).
16. Spectrographic Study of the Motion of Ions in a Plasma, I (with Yu. M. Kagan), JETP **17**, 577 (1947).
17. Spectrographic Study of the Motion of Ions in a Plasma, II (with Yu. M. Kagan), JETP **18**, 519 (1948).
18. Mechanism of Excitation of Spectral Lines in a High-temperature Vacuum Furnace (with

N. P. Penkin and A. M. Shukhtin), JETP **18**, 737 (1948).
19. Shift and Contour of Ion Lines in the Positive Column of a Gas Discharge (with Yu. M. Kaganov), Izv. Akad. Nauk SSSR, Ser. Fiz. **12**, 358 (1948).
20. Electrodeless Discharge as a Light Source for Spectral Analysis of Gases (with E. Ya. Shreĭder), ibid. **13**, 465 (1949).
21. Reabsorption of Light in a Discharge in Cesium Vapor (with I. P. Bogdanova) (Coll: Memorial to S. I. Vavilov), p. 220, 1952.
22. Determination of the Excitation Function for the Energy Levels of Mercury from the Optical Excitation Functions (with I. P. Zapesochnyĭ). Dokl. Akad. Nauk SSSR **95**, 971 (1954).
23. Spectral Instruments with Two Prisms of Constant Deviation Angle. Вестник ЛГУ (Bull. Leningrad State Univ.) No. 8, 151 (1954).
24. Qualitative Spectral Analysis of Gas Mixtures. ibid. No. 8, 157 (1954) [A resume of the same article appeared in Izv. Akad. Nauk SSSR, Ser. Fiz. **18**, 251 (1954)].
25. Determination of Effective Cross Sections of Second-order Impacts from Sensitized Fluorescence (with É. K. Kraulinya), Dokl. Akad. Nauk SSSR **101**, 837 (1955).
26. Role of Cascade Transition in the Excitation of Spectral Lines (with I. P. Zapesochnyĭ), Izv. Akad. Nauk SSSR, Ser. Fiz. **19**, 5 (1955), Columbia Tech. Transl. p. 1.
27. Investigation of Emission and Absorption Spectra of Uranium (with N. P. Penkin), Оптика и спектроскопия (Optics and Spectroscopy) **3**, 473 (1957).
28. New Data on the Excitation Functions of Helium Lines (with V. E. Yakhontova) ibid. **4**, 402 (1958).
29. Improved Method of Spectral Analysis of Inert Gases for Purity (with O. P. Bochkova and L. P. Razumovskaya), ibid. **5**, 93 (1958).
30. Excitation of Spectral Lines in the Negative Glow of a Gas Discharge (with I. P. Bogdanova), Izv. Akad. Nauk SSSR, Ser. Fiz. **22**, 659 (1958), Columbia Tech. Transl. p. 657.
31. Spectral Analysis of Microscopic Amounts of Gas (with O. P. Bochkova and L. P. Razumovskaya), loc. cit. ref. 27, **5**, 624 (1958).
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33. Role of Effective Cross Sections of Atoms in the Excitation of Spectra (with I. P. Bogdanova and Kraulinya), Материалы X Всесоюзного совещания по спектроскопии (Trans. Tenth All-Union Conference on Spectroscopy), L'vov Univ. Press, 1958, p. 54.

II. Survey Articles

1. Gas Discharge Spectroscopy (with Yu. M. Kaganov), loc. cit. ref. 23, No. 1, 14 (1948).
2. Study of Processes in Light Sources by the Intensity of the Spectral Lines, ibid. No. 8, 129 (1953).
3. Role of Effective Cross Sections of Atoms in Spectrum Excitation, Usp. Fiz. Nauk **61**, 461 (1957).
4. Concepts of Mass and Energy in Modern Physics, ibid. **48**, 167 (1952).
5. V. I. Lenin's book "Materialism and Empiriocritism" and Modern Physics, loc. cit. ref. 23, No. 2, 2 (1954).

III. Texts and Monographs

1. Атомные спектры (Atomic Spectra), Gostekhizdat, L-M, 1933, 436 pp, 172 figs.
2. Техника спектроскопии (Spectroscopic Techniques) (Lecture course), Leningrad Univ. Press, 1936, 189 pp, 144 figs.
3. Спектроскопическое определение ядерных моментов (Spectroscopic Determination of Nuclear Moments), Gostekhizdat, 1948, 151 pp, 41 figs.
4. Курс общей физики (General Physics Course) (with A. V. Timoreva). Vol. 1, 9th ed. 1958; vol. II, 7th Ed. 1957; vol. III, 4th ed. 1957 (translated into Lithuanian, Rumanian, Polish, Czech, German, and Chinese).

Translated by J. G. Adashko