PERSONALIA

Yakov Grigor'evich Dorfman (obituary)

S. V. Vonsovskiĭ, P. L. Kapitza, I. K. Kikoin, M. N. Mikheev, N. N. Semenov, and Ya. S. Shur

Usp. Fiz. Nauk 117, 705–711 (December 1975)

PACS numbers: 01.60.+q

Soviet physics has suffered a great loss: Doctor of Physico-mathematical Sciences and Professor Yakov Grigor'evich Dorfman, a prominent Soviet physicist, died on November 5, 1974 at the age of 76. Dorfman's name is linked to the discovery and prediction of many important phenomena in various divisions of magnetism and solid-state physics, and is also associated with profound research on the history of physics. Dorfman was well known by name and by his work to both Soviet and foreign scientists.

Dorfman was born on March 26 (N.S.), 1898, into a family of a physician at St. Petersburg. In 1915, after completing the classical gymnasium, he entered the Electromechanics Department of the St. Petersburg Polytechnic Institute (PPI; now the Leningrad Polytechnic Institute). At the Institute, he soon developed a lively interest in scientific research. In 1916, as a second-year student, he embarked on research work in the laboratory directed by A. F. Ioffe and participated in the celebrated seminar of this laboratory. Dorfman was one of the Ioffe's first students, among whom Ya. I. Frenkel', P. I. Lukirskiĭ, and others were later to become prominent.[1)] As we know, the seminar of Ioffe's laboratory was to play an enormous role in the shaping of Soviet physics.

After the Great October Revolution of 1917, Dorfman held various positions in the Petrograd National Economic Council. In 1921, on the advice of Ioffe, Dorfman returned again to physics and continued his education in the physicomechanical department of the PPI, from which he graduated in 1925. From that time on, Dorfman took a highly active part in the work and organization of the Physicotechnical Institute headed by Academician Ioffe, first as an assistant and then as head of the Magnetic Laboratory. At the same time, he taught in the physicomechanical department of the PPI.

From his very initiation to science, Dorfman became the developer of an original trend in the physics of magnetic phenomena, to which he devoted his entire life. While still a student, he authored a very important study of the paramagnetism phenomenon in metallic solids. He was the first to advance the idea (in 1923) that conduction electrons possess paramagnetic properties in all metals and that this paramagnetism can be observed in experiment if it is not masked by the diamagnetism of the ionic cores of the metal, which is larger in absolute magnitude. Dorfman defended his conclusion by pointing out that when the experimentally observed susceptibilities of diamagnetic metals and their ions are compared, the susceptibility of the ions is always found to be larger. This was what permitted him to state that conduction electrons possess paramagnetism. Since the susceptibilities of diamagnetic metals do not depend on temperature, Dorfman drew the very important conclusion that the paramagnetism of conduction electrons should also be temperature-independent, as is characteristic for the paramagnetism of alkali and alkaline-earth metals. Dorfman's physical ideas were subsequently confirmed theoretically in the work of W. Pauli (1927). Resolution of thie "catastrophe" of the classical electron theory of metals made it possible to found a consistent quantum theory of solids; Dorfman's paper "On the Mechanism of Magnetic Phenomena" (Zs. Phys. **17**, 98 (1923)) can therefore be regarded as one of the preludes to the quantum theory of metals.

In the same paper, Dorfman was first to predict theoretically the phenomenon of electron paramagnetic resonance (EPR), to which he then referred as the photomagnetic effect. At the time, the state of experimental technique did not permit experimental observation of this phenomenon, and it was discovered twenty years later in the brilliant experiments of the Soviet physicist Academician E. K. Zavoiskiĭ (1942). EPR is now a highly important division in the study of magnetism—the EPR method has become one of the physically most profound and widest-ranging applied methods for the study of structure in various types of materials. The EPR effect predicted by Dorfman in 1923 has come to be our most powerful tool for the acquisition of extremely subtle information on the structure of matter at the electronic level; it is used by representatives of literally all divisions of natural science.

Dorfman also made a major contribution to the development of the theory of another extremely important magnetic phenomenon—ferromagnetism. His famous 1927 experiment aimed at establishing the physical nature of the Weiss molecular field in ferromagnets is well-remembered. It had been supposed ever since Weiss published his first papers (1907) that the spontaneous magnetic moment of ferromagnets arises under the action of an internal molecular field of magnetic origin, which, like the external magnetic field in the case of paramagnets, results in parallel orientation of the elementary magnetic moments. However, observing the deflection of a beam of beta-rays passing through magnetized and unmagnetized nickel foils, Dorfman showed convincingly that the internal magnetic field is of nonmagnetic nature. This experimentum crucis implied that the molecular field can be of only electrical nature, as Frenkel'[2)] and W. Heisenberg became the first to demonstrate (a year later, in 1938).

A series of studies of the heat capacity and thermo-

[1)]They also include P. L. Kapitza, N. N. Semenov, and I. K. Kikoin.—Ed.

[2)]As its author states, Frenkel's paper (Zs. Phys. 49, 31 (1928)) was based to a considerable degree on Dorfman's ideas and discussions with him.

electric properties of ferromagnetic nickel near the Curie point was highly important for the development of the electronic (quantum) theory of ferromagnetism; Dorfman undertook this project jointly with his closest co-workers (I. K. Kikoin, R. I. Yanus, and others) in 1929-1933. The basic purpose of these high-precision experimental studies was to clarify the question as to whether the current and magnetic-moment carriers in ferromagnetic metals are the same conduction electrons or two different groups of electrons of the metal. In his fundamental review of magnetism theory, the noted American physicist Herring attaches great importance to these studies by Dorfman and his colleagues. In 1930, Dorfman and Kikoin predicted and made qualitative observations of a new effect—the change in the contact potential in a magnetic field. Dorfman read this paper at the 1930 Solvay Congress, and it was also fully confirmed experimentally by the American Physicist Wolmsley in 1962.

The theory of partitioning of the ferromagnetic sample into magnetic domains (regions of spontaneous magnetization) was of very great fundamental importance for the theory of paramagnetism. Although the idea that a domain structure exists in ferromagnets was first advanced by Weiss (in 1907, simultaneously with the appearance of the hypothesis of the existence of spontaneous magnetization irrespective of the presence of an external magnetic field), the physical cause of formation of the domains remained a mystery. Dorfman (jointly with Frenkel') was responsible for the creation of the first theory of domain structure (1930). According to this theory, the appearance of domain structure results from the demagnetizing action of the surface of the ferromagnetic specimen, and the size of the domains is determined by competition between volume forces and the demagnetizing fields. Magnetic domains were eventually observed in experiment, and the theoretical calculation of domain size as a function of specimen size was confirmed.

In 1933, Dorfman made the first attempt to establish the electronic structure of ferromagnetic alloys from data on the atomic magnetic moments. Despite the later development of this problem by numerous authors, this work has retained its "pioneering" importance.

All of these studies by Dorfman in the physics of ferromagnetism played important roles in the inception of the basic quantum-mechanical models of present-day ferromagnetism theory.

A number of Dorfman's studies in magnetism and solid-state physics were reflected in the familiar book "The Physics of Metals," which he wrote jointly with I. K. Kikoin; the book was the first monograph on this problem in the Russian language and one of the first in the world's literature. He published a number of papers on the same problems in the monograph "Magnetic Properties and Structure of Matter" (1955), which also won recognition from a broad range of readers. Dorfman participated actively in the organization and expansion of the Urals Physico-technical Institute (UralFTI; now the USSR Academy of Sciences Urals Scientific Center Institute of Metal Physics), which was founded in the early 1930's at the suggestion of Academician Ioffe on the basis of several laboratories of the Leningrad Physico-technical Institute. Dorfman was the First Deputy Director for Science of the UralFTI (until 1938). In that year, he transferred to Baku, where he took responsibility for the Physics Sector of the Azerbaĭdzhan Branch of the USSR Academy of Sciences and headed the Physics Department of Azerbaĭdzhan University. Here, with his co-workers, he developed new methods for electrical modeling of oil-bearing strata for calculation of optimum well siting and a new apparatus for determination of the hydraulic permeability of rocks. During the Second World War, Dorfman was engaged in defense work.

In 1944, he moved first to Moscow and then Leningrad, where, from 1945 through 1958, he headed the Physics Department of the Leningrad Hydrometeorological Institute.

Dorfman's series of studies of the magnetic properties of atomic nuclei is highly interesting. Here we should take note of his studies of nuclear paramagnetism (1930 and 1935), which indicated a method for direct observation of this phenomenon in experiment (as was done by B. G. Lazarev and L. V. Shubnikov in 1937). In 1947, Dorfman proposed an original method for experimental determination of nuclear magnetic moments and spins. This method was applied by British and Dutch physicists in 1950's and 1960's. This series culminated in Dorfman's monograph "The Magnetic Properties of the Atomic Nucleus," which was published in 1948.

In 1951, he predicted yet another resonance effect: resonance in electronic conductors, or cyclotron resonance. He also indicated the possibility of using this effect to determine carrier effective masses in semiconductors. The British physicist Dingle arrived at a similar conclusion a few months later. Cyclotron resonance in semiconductors was observed experimentally by American investigators (Dresselhaus, Kip, and Kittel) in 1955.

In 1958, Dorfman became head of the Solid State Physics and Molecular Physics Sector of the All-Union Institute of Scientific and Technical Information in Moscow.

As a noted scientist in the field of the magnetic properties of matter, Dorfman was a prominent specialist in magnetochemistry, where he did pioneering work. In the years from 1957 through 1960, Dorfman developed a new method for study of chemical shifts in diamagnetic molecules and crystals on the basis of experimental study of magnetic susceptibility and molecular refraction. He published a series of papers on this problem, and his widely known monograph "Diamagnetism and the Chemical Bond" appeared in 1961; it was republished in 1962 in East Germany and in 1964 in England. A 1962 theoretical paper by Dorfman first drew attention to the fact that because of the wide variation of the energies of diamagnetic macromolecules in a magnetic field, it could be expected that this field would have a strong influence on the kinetics of biochemical reactions. In 1965, the German physical chemist Haberdietzel confirmed this experimentally. In 1963-1965, experimental magnetochemical research was instituted under Dorfman's supervision at the USSR Academy of Sciences Institute of Petrochemical Synthesis, and several papers on the chemical bound in organic compounds of silicon were published.

From early in 1965 to the end of his life, Dorfman was chief of the History of Physics and Chemistry Sector at the USSR Institute of the History of Natural Science and Technology, in which he did a great deal of scientific and scientific-organizational work. He headed a scientific seminar on the history of physics in which physics historians working in Moscow and other cities of the country took part.

Dorfman devoted much work and interest to problems of physics history throughout his scientific career, and especially in his later years. He made a notable contribution to this important field of science. Here he was aided by his broad erudition in the natural sciences and humanities, his literary talent, and his profound general intelligence, together with complete mastery of the classical ancient and basic European languages.

Dorfman began intensive creative work in the history of physics and chemistry at the Leningrad Division of the USSR Institute of the History of Natural Science and Technology (1945-1958). His familiar monograph "Lavoisier" appeared during this period (1948); following publication of its second edition in the USSR (1962), translations appeared in Rumania (1967) and Bulgaria (1968). Dorfman had begun work on this monograph (familiarizing himself with the documentary sources and Lavoisier's works in the original) back in 1933. In the opinion of prominent specialists in the history of the natural sciences,[3)] "Dorfman's monograph displays a number of characteristic features that distinguish it favorably from other works of similar nature."

While in Leningrad, Dorfman wrote several papers on the history of physics: "Aepinus and his Treatise on the Theory of Electricity and Magnetism" (1950), "The Role of M. V. Lomonosov in the Development of the Molecular-Kinetic Theory of Heat" (1951), "The Prominent Russian Physicist Rikhman and his Role in the History of the Science of Electricity" (1953), "The Appearance of Ampere's Electrodynamics and Its Place in the History of Physics" (1955), and a number of others. All of these papers bear the imprint of profound scientific analysis and are brilliantly written.

Dorfman also continued his intensive creative activity in the history of physics while in Moscow. He published the paper "The Physical Views of Leonhard Euler (1959), a second revised and expanded edition of the monograph "Lavoisier" (1962), articles on "The Evolution of the Structure of Physics" (1968-1969), and various other works. During the later years of his life, Dorfman began to work with tremendous enthusiasm on what was to be his most significant work on the history of physics from ancient times to the present. Like a Mozart "Requiem," the first part of this monograph, "A Universal History of Physics from Ancient Times to the End of the Eighteenth Century," was published by Nauka in 1974. Shortly before his death, the author completed the manuscript of the second part, "A Universal History of Physics from the Beginning of the Nineteenth to the Middle of the Twentieth Century."

Death took from us a man full of new inspirations that he did not have time to set down and transmit to us.

A patriot of his Motherland, Soviet Science, Dorfman earned the deep respect and appreciation of his colleagues and the entire Soviet nation by a lifetime of tireless effort and genuine enthusiasm for science, which will forever preserve his memory.

[3)]See the paper by B. M. Kedrov, L. S. Polak, and I. D. Rozhanskiĭ, "Ya. G. Dorfman (on his Seventieth Birthday)" in the collection "Historical Problems in the Natural Sciences and Engineering" No. 2, (31), Nauka, Moscow, 1970, p. 91).

PUBLISHED WORKS OF YA. G. DORFMAN

[1]On the Mechanics of Magnetic Phenomena, Zs. Phys. **17**, 98 (1923).
[2]The Numbers of Magnetics and the Structure of Atoms, ibid. **23**, 286 (1924).
[3]Magnetic Properties and Structure of Atoms, in: "Novye idei v fizike" (New Ideas in Physics), Collection II, Moscow, 1925.
[4]The Nature of the Molecular Field in Ferromagnets, Nature, **119**, 353 (1927).
[5]The Role of Free Electrons in the Ferromagnetism of Nickel, Zh. Russk. Fiz.-Khim. Ob-va **60**, 519 (1928) (jointly with R. I. Yanus).
[6]The Magnetic Moment and the Number of Free Electrons in Nickel, Zh. Russk. Fiz.-Khim. Ob-va 61, 159 (1929) (jointly with I. K. Kikoin).
[7]The Role of Free Electrons in Ferromagnetism. I, Zs. Phys. **54**, 277 (1929) (jointly with R. I. Yanus).
[8]The Role of Free Electrons in Ferromagnetism. II, ibid. 289 (jointly with I. K. Kikoin).
[9]Spontaneous and Induced Magnetization in Ferromagnetic Solids, Nature **126**, 274 (1930) (jointly with Ya. I. Frenkel').
[10]Ampere Currents, Zh. Russk. Fiz.-Khim. Ob-va **62**, 119 (1930).
[11]Magnetic Moments of Atomic Nuclei, Zs. Phys. **62**, 90 (1930).
[12]The Magnetic Moment of the Atomic Nucleus, C. R. Acad. Sci. **190**, 924 (1930).
[13]The Role of Free Electrons in the Ferromagnetism of Iron. III, Zs. Phys. **64** (1932) (jointly with R. I. Yanus, K. V. Grigorov, and M. G. Chernikhovskiĭ).
[14]On the Mechanism of Superconductivity, Phys. Zs. UdSSR **3**, 366 (1933).
[15]Magnetic Properties and the Interatomic Bond in Alloys, Zh. Eksp. Teor. Fiz. **3**, 293 (1933); see also Phys. Zs. UdSSR **3**, 399 (1933).
[16]An Improved Balance for Magnetic Investigations, Phys. Zs. UdSSR **3**, 421 (1933) (jointly with I. K. Kikoin).
[17]Recent Studies in the Physics of Metals, Metallwirtschaft **12**, 221, 235 (1933).
[18]The Urals Physico-technical Institute, Phys. Zs. UdSSR **3**, 335 (1933).
[19]Fizika metallov (The Physics of Metals), GTTI, Moscow-Leningrad, 1934 (jointly with I. K. Kikoin).
[20]The Magnetic Properties and Moments of Atomic Nuclei, Phys. Zs. UdSSR **7**, 126 (1935).
[21]The State of the Nickel Atom in the Gamma Phase of the Nickel-Zinc System, Dokl. Akad. Nauk SSSR **19**, 381 (1938) (jointly with S. K. Sidorov).
[22]The State of the Nickel Atom in the Gamma Phase of a Nickel-Zinc Alloy. Zh. Eksp. Teor. Fiz. **9**, 25 (1939) (jointly with S. K. Sidorov).
[23]Effects of Metallic Impurities on the Hall Effect in Silver, ibid. 51 (jointly with P. N. Zhukova).
[24]The Nature of the Interatomic Bond in Alloys of Group VIII Elements, Izv. Azerb. Filiala Akad. Nauk SSR, No. 5, 105 (1939).
[25]The Reality of the Bernoulli Effect for the Electron Gas in Metals. Zh. Eksp. Teor. Fiz. **10**, 358 (1940) (jointly with A. S. Kagan).
[26]Application of Physical Methods to the Siting of Oil

Wells, J. Phys. USSR 3, 393 (1940) (jointly with L. A. Sergeev).
[27]Twenty Years of Physics and Geophysics in Azerbaĭdzhan, Izv. Azerb. Filiala Akad. Nauk SSSR, 140 (1940) (jointly with A. I. Mikhalevskiĭ).
[28]Physics in the Claws of German Fascism, ibid. 39 (1941).
[29]M. V. Lomonosov, Baku, 1941.
[30]On the Nature of Lubrication, Izv. Azerb. Filiala Akad. Nauk SSSR, No. 5, 33 (1941).
[31]The Nature of Liquid Metal Solutions, ibid. No. 3, 41 (1942).
[32]On the Theory of the Surface Tension of Metals, Dokl. Akad. Nauk SSSR 16, 372 (1943).
[33]Magnetic Properties and Chemical Nature of Solid Solutions of Weakly Magnetic Elements in Nickel and Iron, Zh. Eksp. Teor. Fiz. 16, 349 (1946).
[34]Atomic Magnetic Moments in Solids and Liquids, Izv. Akad. Nauk SSSR, Ser. Fiz. 11, 598 (1947).
[35]A New Resonant Method for Determination of the Magnetic Moments of the Atomic Nucleus, Dokl. Akad. Nauk SSSR, 17, 769 (1947).
[36]A. Lavuaz'e (Lavoisier), Izd-vo Akad. Nauk SSSR, Moscow-Leningrad, 1948.
[37]Magnitnye svoĭstva atomnogo yadra (The Magnetic Properties of the Atomic Nucleus), Gostekhizdat, Moscow, 1948.
[38]Besedy o magnetizme (Conversations on Magnetism), Izd-vo Akad. Nauk SSSR, Moscow, 1950.
[39]Aepinus and His Treatise on the Theory of Electricity and Magnetism, in: Epinus, Teoriya Élektrichestva i Magnetizma (Aepinus, The Theory of Electricity and Magnetism) (Seriya "Klassiki Nauki ("Classics of Science" Series)), Izd-vo Akad. Nauk SSSR, Moscow, 1950.
[40]Paramagnetic and Diamagnetic Resonance of Conduction Electrons. Dokl. Akad. Nauk SSSR, 81, 765 (1951).
[41]The Role of M. V. Lomonosov in the Development of the Molecular-Kinetic Theory of Heat, in: "Lomonosovskiĭ Sbornik" (Lomonosov Collection), Izd-vo Akad. Nauk SSSR, Moscow, 1951, p. 33.
[42]Ferromagnetic and Antiferromagnetic Semiconductors as a Problem of Solid-State Physics, Izv. Akad. Nauk SSSR, Ser. Fiz. 16, 412 (1952).
[43]The Prominent Russian Physicist Rikhman and His Role in the History of the Science of Electricity (on the 250-th Anniversary of His Death), Élektrichestvo, No. 8, 61 (1953).
[44]The Appearance of Ampere's Electrodynamics and Its Place in the History of Physics, in: Amper, Élektrodinamika (Ampere, the Electrodynamics), Izd. Akad. Nauk SSSR, Moscow, 1955.
[45]Atomnaya énergiya i ee primenenie (Atomic Energy and Its Applications) Izd. Vsesoyuzn. Obshch-va po Rasprostraneniyu Znaniĭ, Moscow, 1955.
[46]Diamagnetic Resonance in Electronic Conductors, Phys. Rev. 86 (1955).
[47]Magnitnye svoĭstva i stroenie veshchestva (Magnetic Properties and Structure of Matter), Gostekhizdat, Moscow, 1955.
[48]Istoriya vozniknoveniya sovremennoĭ yadernoĭ fiziki (A History of the Shaping of Modern Nuclear Physics), Izd. Vsesoyuzn. O-va po Rasprostraneniyu Znaniĭ, Moscow, 1955.
[49]The Evolution of the Theory of Magnetism in the Twentieth Century, in: Trudy VIII Mezhdunarodnogo kongressa po istorii nauki (Florentsiya) (Proceedings of Eighth International Congress on the History of Science (Florence)), Nauka, Moscow, 1956, p. 250.
[50]Diamagnetic Resonance in Strongly Magnetic Solids, Dokl. Akad. Nauk SSSR 110, 201 (1956) [Sov. Phys.-Doklady 1, 534 (1957)].
[51]Benjamin Franklin, a Prominent Physicist of the Eighteenth Century (on the 250th Anniversary of His Birth), Priroda, No. 2, 72 (1956).
[52]Determination of the Separate Components of the Magnetic Susceptibility of Semiconductors, Izv. Akad. Nauk SSSR, Ser. Fiz. 21, 796 (1957).
[53]Pierre Curie's Contribution to the Science of Magnetism, in: Trudy In-ta istorii estestvoznaniya i tekhniki AN SSSR (Proceedings of the USSR Academy of Sciences Institute of the History of Natural Science and Technology), No. 19, Izd-vo Akad. Nauk SSSR, Leningrad, 1957, p. 70.
[54]Magnetochemistry of Diamagnetic Compounds and the Role of Polarization Paramagnetism, Izv. Akad. Nauk SSSR, Ser. Fiz. 21, 817 (1957).
[55]Book Review: Benjamin Franklin, "Experiments and Observations" of Electricity, Usp. Fiz. Nauk 63, 859 (1957).
[56]Thermoelectric Properties of Ferrites Near the Curie Point, Radiotekhn. i Élektron. 2, 345 (1957).
[57]On the term "Cyclotron Resonance," Usp. Fiz. Nauk 61, 133 (1957).
[58]Benjamin Franklin and Russian Students of Electricity of the Eighteenth Century, in: Trudy In-ta istorii estestvoznaniya i tekhniki AN SSSR (Proceedings of the USSR Academy of Sciences Institute of the History of Natural Science and Technology), No. 19, Izd-vo Akad. Nauk SSSR, Leningrad, 1957, p. 290 (jointly with M. I. Radovskiĭ).
[59]Diamagnetism and Interatomic Bonds in Molecules and Nonmetallic Crystals, Zh. Eksp. Teor. Fiz. 35, 533 (1958) [Sov. Phys.-JETP 8, 368 (1958).
[60]A New Method of Interpreting the Magnetic Susceptibility of Diamagnetic Organic Compounds, Dokl. Akad. Nauk SSSR 119, 305 (1958).
[61]Magnetochemistry of Organic Compounds, and "Chemical" Shifts of Nuclear Magnetic Resonance, ibid. 119, 518 (1958). [3, (1959)].
[62]The Life and Physical Discoveries of Torricelli, Usp. Fiz. Nauk 64, 653 (1958).
[63]The Physical Views of Leonhard Euler, in: "Leonard Éĭler,K 250-letiyu so dnya rozhdeniya" (Leonhard Euler: on the 250-th Anniversary of his Birth), Izd-vo Akad. Nauk SSSR, Moscow, 1959, p. 377.
[64]A New Method of Interpreting the Magnetic Susceptibility of Diamagnetic Organic Compounds, Zh. Fiz. Khim. 33, 1299 (1959).
[65]Properties and State of Metal Atoms in Certain Organometallic Compounds, Dokl. Akad. Nauk SSSR 125, 765 (1959) [Sov. Phys.-Doklady 4, 373 (1959).
[66]Chemical Shifts of Nuclear Magnetic Resonance in the Light of the Latest Magnetic-Property Studies, ibid. 134, 789 (1960) [5, 1033 (1961)].
[67]The Law of Mass Conservation in Chemical Reactions, and Lomonosov's Physical Views, in: V. Lomonosovskiĭ sbornik (Fifth Lomonosov Collection), Izd-vo Akad. Nauk SSSR, Moscow, 1961, p. 182.
[68]A Prominent Physicist of Our Country (A. F. Ioffe), Priroda, No. 12 (1960).
[69]Diamagnetizm i khimicheskaya svyaz' (Diamagnetism and the Chemical Bond), Fizmatgiz, Moscow, 1961.
[70]The Physics of Magnetism and Chemistry, Vestn. Akad. Nauk SSSR No. 8, (1961).
[71]On the Nature of Unusual Magnetic Phenomena Ob-

served in Organic Substances, Dokl. Akad. Nauk SSSR 142, 815 (1962) [Sov. Phys.-Doklady 7, 121 (1962)].
[72]The Specifics of the Magnetic-Field Effect on Macromolecules, Biofizika 7, 733 (1962).
[73]A. Lavuaz'e (Lavoisier), Second Edition, Revised and Expanded. Izd-vo Akad. Nauk SSSR, Moscow, 1962.
[74]Magnetochemical Studies of Diamagnetic and Weakly Paramagnetic Complex Compounds, Using a New Method, Zh. Fiz. Khim. 37, 2496 (1963).
[75]On the So-Called Quasiferromagnetism, Zh. Strukt. Khim. 4, 624 (1963).
[76]Magnetochemistry, Priroda No. 3, 27 (1964).
[77]Resonant Absorption Spectra and Magnetic Susceptibility, Zh. Fiz. Khim. 33 (1964) (jointly with Ts. Ts. Aleksandrov, O. L. Lependina, L. S. Polak et al.).
[78]Magnetochemical Studies of Certain Alkyl Derivatives of Tin, Zh. Strukt. Khim. 5, 632 (1964) (jointly with O. L. Lependina).
[79]On the Paper by F. I. Polovikov and V. V. Volchanskaya "On the Magnetic Susceptibility of Electrets," Fiz. Tverd. Tela 6, 3464 (1964) [Sov. Phys.-Solid State 6, 2768 (1965)].
[80]Diamagnetismus und Chemische Bindung (Diamagnetism and the Chemical Bond) (German translation of [69]), B. G. Teubner Verlagsgesellschaft, Leipzig, 1964.
[81]Diamagnetism and the Chemical Bond (English translation of [69]), Arnold, London, 1965.
[82]Toward a Theory of the Influence of Ferromagnetic Particles on EPR Spectra in Dielectrics, Zh. Eksp. Teor. Fiz. 48, 715 (1965) [Sov. Phys.-JETP 21, 472 (1965)].
[83]The Magnetochemical Method of Investigating the Chemical Bond as Exemplified by Diamagnetic Complex Compounds, in: Khimicheskaya svyaz' v poluprovodnikakh i tverdykh telakh (The Chemical Bond in Semiconductors and Solids), Nauka i Tekhnika, Minsk, 1965, p. 5.
[84]O fizicheskom mekhanizme vozdeĭstviya staticheskikh magnitnykh poleĭ na zhivye sistemy (The Physical Mechanism of the Action of Static Magnetic Fields on Living Systems), VINITI, Moscow, 1966.
[85]Interaction Between Atoms of Group IV Elements and the Multiple Bond or Benzene Ring in Certain Organoelementary Compounds, Zh. Strukt. Khim. 7, 200 (1966) (jointly with O. L. Lependina et al.).
[86]The Physics of the Wave Half-Century, Priroda No. 1, 24 (1967).
[87]50 Years of Soviet Physics. Part 1, Wissenschaft und Fortschritt, No. 11, 502 (1967).
[88]50 Years of Soviet Physics. Part 2, ibid. No. 1, 26 (1968).
[89]The Magnetic Voltaic Effect and Certain Problems in the Magnetism of Metals, in: Trudy In-ta fizika metallov AN SSSR (Proceedings of the USSR Academy of Sciences Institute of Metal Physics), No. 26, Sverdlovsk, 1967, p. 42.
[90]Magnetism, in: Razvitie fiziki v SSSR (Development of Physics in the USSR), Book 1, Nauka, Moscow, 1967, p. 344.
[91]Antoine Lavoisier (Rumanian Translation of [73]), Editura stintifica, Bucharest, 1967.
[92]A. Lavuaz'e (Lavoisier) (Bulgarian Translation of [73]), Tekhnika, Sofia, 1967.
[93]History of Physics, in: Voprosy istorii estestvoznaniya i tekhniki (Problems in the History of Natural Science and Technology), No. 23, Nauka, Moscow, 1968, p. 32 (jointly with O. A. Lezhneva).
[94]The Evolution of the Structure of Physics, Organon, 5, Miscellanea, 1968, p. 205.
[95]Problems and Approaches in the Study of Scientific History, in: Voprosy istorii estestvoznaniya i tekhniki (Problems in the History of Natural Science and Technology), No. 24, Nauka, Moscow, 1968, p. 26.
[96]Evolution of the Structure of Physics, in: Ocherki istorii i teorii razvitiya nauki (Outlines in the History and Theory of the Development of Science), Nauka, Moscow, 1969, p. 303.
[97]Leninist Philosophical Analysis and the Development of Physics in the Twentieth Century, in: Voprosy istorii estestvoznaniya i tekhniki (Problems in the History of Natural Science and Technology), No. 1 (30), Nauka, Moscow, 1970, p. 10.
[98]The Birth of Quantum Mechanics, in: Filosofskie voprosy kvantovoĭ fiziki (Philosophical Problems of Quantum Physics), Nauka, Moscow, 1970, p. 5.
[99]Physical Phenomena Occurring in Living Objects Under the Action of Constant Magnetic Fields, in: Vliyanie magnitnykh poleĭ na biologicheskie ob''ekty (Influence of Magnetic Fields on Biological Objects), Nauka, Moscow, 1971, p. 15.
[100]New Results from Study of Platonic Physics, Usp. Fiz. Nauk 103, 772 (1971) [Sov. Phys.-Usp. 14, 230 (1972)].
[101]Paul Langevin (on the 100th Anniversary of His Birth), Priroda No. 1, 60 (1972).
[102]A. F. Ioffe, in: Vospominaniya ob A. F. Ioffe (Memoirs of A. F. Ioffe), Nauka, Leningrad, 1973, p. 85.
[103]The Molecular Physics of Plato, in: Trudy Mezhdunarodnogo kongressa po istorii nauki (1971) (Proceedings of the International Congress on the History of Science (1971)), Sections 3-4, Nauka, Moscow, 1974, p. 30.
[104]Vsemirnaya istoriya fiziki s drevneĭshikh vremen do kontsa XVIII veka (A Universal History of Physics from Ancient Times to the End of the Eighteenth Century), Nauka, Moscow, 1974.

Translated by R. W. Bowers