Sergeĭ Vasil'evich Vonsovskiĭ (on his seventieth birthday)

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September 2 of this year was the seventieth birthday of Academician Sergeĭ Vasil'evich Vonsovskiĭ, one of the most illustrious of Soviet physicists.

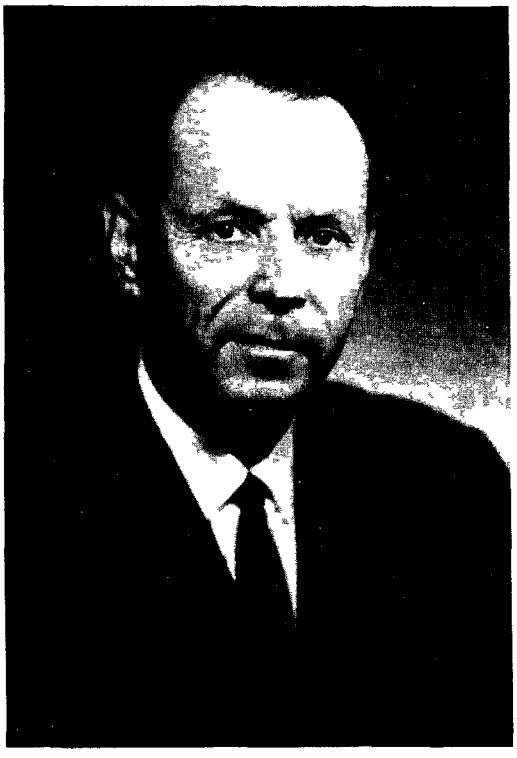
Vonsovskiĭ was the founder of the large Ural school of physicists, which has played an important part in the development of Soviet science. He has done pioneering work in several subdivisions of solid-state theory, primarily in the area associated with the physics of magnetic phenomena.

Vonsovskiĭ was born into the family of a schoolteacher in Tashkent. In 1932, after completing his studies at Leningrad University, Vonsovskiĭ was sent to Sverdlovsk, where one of the new physics centers—the Ural Physico-Technical Institute (now the Institute of Metal Physics of the Ural Scientific Center, Academy of Sciences of the USSR) was being established. Today, when there are dozens of physics institutes located outside of Moscow and Leningrad, it is patently clear that A. F. Ioffe was correct in calling for the vigorous development of science by creation of new centers. This not only made it possible to broaden the front of research and shorten the time from physical discovery to engineering application, but also created conditions favorable for application of the efforts of many talented young scientists.

Vonsovskiĭ began his work at the Ural Physico-Technical Institute as an engineer in the Theoretical Physics Division under the guidance of S. P. Shubin. This meeting with his teacher and friend largely predetermined Vonsovskiĭ's ultimate scientific destiny. Vonsovskiĭ's range of scientific interests centered on problems of statistical and solid-state physics.

During 1934-1936, he completed a series of papers devoted to solution of fundamental problems in quantum solid-state theory. The polar and s-d exchange model proposed by Shubin and Vonsovskiĭ are among the few "benchmark" models of solid-state theory, investigation of which has formed the basis for a general understanding of a broad class of phenomena. These early works already contain references to the importance of the interelectronic interaction in the metal-insulator criterion (actually, a Mott-type criterion was obtained); the possibility of charge ordering in a system of strongly interacting particles (a "state of maximum polarity") was noted, and a fundamental explanation was given of the fractional values of the magnetic moment per atom in magnetic metals.

The productivity of the approach developed in this series of papers is clearly demonstrated by the fact



SERGEĬ VASIL'EVICH VONSOVSKIĬ

that even today, 45 years later, its application makes it possible to obtain interesting new results without the use of any supplementary concepts (and this in the vigorously developing field of solid-state physics!). It is also worth noting that Hubbard's currently very popular model is only a particular case of the polar model.

The next series of studies, which was begun in the prewar years and finished during the latter half of the 1940s, pertained to elementary excitations in multielectron systems. The energy spectra of polar and polar-exciton models were investigated. These papers were important firstly in that they provided a multielectron basis for, and qualitative understanding of, the basic concepts of the band theory of metals and semiconductors. Secondly, they developed the elementary-excitation or quasiparticle method, which is now one of the basic methods of solid-state physics.

Many of Vonsovskiĭ's papers were devoted to the application of the s-d-exchange model to the study of the magnetic and electrical properties of transition metals and alloys. The basic ideas and methods of this model

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were then applied successfully in investigating the properties of the large and practically important group of rare-earth metals and their alloys. The *s-d*-exchange model has recently been used to study magnetic semiconductors, substances that exhibit exceptionally strongly interrelated electrical and magnetic properties.

Still another important area of Vonsovskiĭ's research has been the thermodynamics and statistical mechanics of magnetically ordered substances. He was the first to apply the theory of second-order phase transitions to ferromagnetic transformation effects, laid the foundations for a theory of ferromagnetism in alloys, developed a theory of the phenomena of magnetic anisotropy and magnetostriction of ferromagnetics, and contributed to the theory of the technical curve of magnetization and coercive force. A series of papers on the electrical, magnetic, and optical properties of ferro- and antiferromagnetics should also be mentioned in the context.

He summarized his research on the physics of magnetic phenomena in a series of monographs that have become highly popular in world science. He was awarded a USSR State Prize in 1975 for his major and fundamental work "Magnetism."

Development of the theory of superconductivity in transition metals occupies a significant place in Vonsovskii's scientific record. A series of studies performed under his direction during the 1960s brought out for the first time the destructive effects on superconductivity of exchange magnetization of electrons. Also in these papers the problem of the interaction of superconductive electrons with spin waves was investigated in detail, and the possibility of triplet-pair formation as a result of this interaction was established. He made a detailed and exhaustive analysis of the contemporary state of this problem in the monograph "Superconductivity of Transition Metals, Their Alloys, and Their Compounds" (1977).

Vonsovskiĭ devoted several papers to certain general problems of solid-state theory. Among them are: a 1939 paper in which he reported observation of finiteness of electron motion in the lattice in a constant electric field; a 1946 paper in which he proposed an approach to generalization of the kinetic equation. Several of Vonsovskiĭ's studies were devoted to general scientific and methodological problems.

Vonsovskiĭ is a theoretical physicist, but he has a thorough understanding of the problems that confront the experimenter. He has devoted a great deal of attention to the development of experimental techniques; for example, with his personal participation as Deputy Director of the Institute of Metal Physics, work was begun on low-temperature physics, neutron diffraction, and the radiation physics of the solid state.

During the Second World War, Vonsovskiĭ's scientific knowledge and experience were put to highly effective use in the work of the defense establishments.

Vonsovskiĭ's productive scientific activity has been inseparably linked to his teaching work. He has taught from the first years of his stay at Sverdlovsk to the present day, first at the Polytechnic Institute and later at the Pedagogical Institue and University. For several years he chaired the Department of Theoretical Physics at Ural University. His lectures are distinguished by extreme rigor, lucidity, and depth of exposition. He enjoys great respect among students and instructors.

He devotes an exceptional amount of attention to young people who are only starting out on their scientific careers. He has confidence in youth and is able to combine extreme generosity with strictness and adherence to principle. His ideas and active assistance have asserted a strong influence on all his students—among whom there are already over a dozen Doctors of Science. Many of the physicists whom Vonsovskiĭ guided at one time or another live and work not only in the Urals, a number of them have themselves become directors of various subdivisions.

The country's first winter workshops for theoretical physicists ("Kourovki," refresher courses) were set up in the Urals in 1960 at Vonsovskiĭ's intiative. There have now been eighteen meetings with about 200 participants from many cities and scientific centers. And all of them have found in the person of Sergeĭ Vasil'evich a charming and hospitable man who creates a special atmosphere in the "Kourovki"—the businesslike nature of the lectures and seminars, relaxed discussions, the holiday aspect of cross-country skiing.

There are many sides to Vonsovskiĭ's scientific-organizational work. He was one of the organizers of the USSR Academy of Sciences Ural Scientific Center, into which ten academic institutes were merged. Since the center was opened in 1971, Vonsovskiĭ has been the chairman of its presidium. He does a great deal of work to coordinate the scientific research aimed at development of the productive resources of the Urals.

Vonsovskii is a member of the Committee on Lenin and State Prizes and of the Presidium of the Academy of Sciences of the USSR and Chairman of the Academy's Council on Problems of Magnetism. He is editor-in-chief of the journal "Fizika Metallov i Metallovedenie," which was founded at his suggestion. He works with his characteristic consistency and determination on the solution of many problems relating to the development of science in the country. For a number of years, he has been a member of the Commission on Magnetism in the UNESCO International Union of Pure and Applied Physics. A whole series of major conferences have been held with his direct participation and leadership.

The high value of Vonsovskiĭ's work was recognized in 1953 with his election as a Corresponding Member of the Academy of Sciences of the USSR, and in 1966, when he became a full member. He was elected to the German Academy of Sciences in Berlin (GDR) in 1971 and to the Polish Academy in 1977.

Strong involvement in social activity, civic responsibility, and an inseparable bond to the people distinguish Academician S.V. Vonsovskiĭ, an illustrious Soviet scientist. He has been a Deputy of the RSFSR

Supreme Soviet at its last five sessions. His high human qualities, knowledge, and experience help him to perform the tasks of a deputy with success.

Sergeĭ Vasil'evich Vonsovskiĭ was named a Hero of Socialist Labor in 1969 for outstanding services to Soviet science. He holds the Order of Lenin and the Orders of the Red Banner of Labor and the Red Star.

Congratulating Sergeĭ Vasil'evich on his seventieth birthday, we wish him good health, vigor, and new successes for the well-being of our Motherland.

Translated by R. W. Bowers