

PERSONALIA

Moiseĭ Izrailevich Korsunskii (on his Seventieth Birthday)

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Moiseĭ Izrailevich Korsunskii, one of the great Soviet physicists who made an essential contribution to the development of the physical sciences, turned seventy on April 19, 1973.

Korsunskii is an alumnus of the Leningrad Physico-technical Institute (LFTI), which was headed by A. F. Ioffe. The beginning of his scientific career coincided with the coming into being and vigorous development of physics in our country. The Ukrainian Physico-technical Institute (UFTI) was organized in Kharkov, as were the institutes at Dnepropetrovsk, Tomsk and in the Urals. For each one of them Ioffe selected a group of skilled scientific workers from the LFTI staff to serve as the nucleus of the new institutes.

In 1929 Korsunskii moved to Tomsk, where he became one of the founders of the Siberian Physico-technical Institute. He organized first an x-ray, then a nuclear laboratory. Simultaneously he lectured in the Physics and Mathematics Department of Tomsk State University. His first scientific contributions were devoted to the analysis of chemical composition of matter with the help of x-rays, to the determination of the absolute wavelength of x-radiation, and to questions of x-ray optics. These studies served as a foundation for the writing of a monograph "The Physics of X-Rays," the first to be written in our country, published in 1936. Korsunskii's monograph "The Neutron" appeared in print the same year.

From May 1934 through 1938 Korsunskii headed the laboratory in one of the Leningrad research institutes. At the same time he served as professor of experimental physics at the Leningrad Industrial Institute. Since 1938 he headed the Surge-Voltage Laboratory at the USSR Academy of Sciences, a laboratory absorbed by the UFTI in 1939. Korsunskii concerned himself during that period of his scientific activity with the research of pulsed methods of acceleration of charged particles from the point of view of their application in nuclear physics, and also with the question of obtaining large ion currents.

During World War II when the UFTI was evacuated to Kazakhstan, Korsunskii did a great deal to help the nonferrous metallurgy of Kazakhstan. He became a member of the State Plan of the Kazakhstan Scientific-Technical Soviet and was twice rewarded for his work with citations from the Kazakhstan Supreme Soviet.

After the re-evacuation (April, 1944), Korsunskii headed the laboratory of the UFTI and served at the same time as professor at the Cement Institute. In 1952 he was transferred to the Kharkov Polytechnic Institute, where he was professor of general and experimental physics until 1962. The comprehensive laboratory of semiconductor materials, the comprehensive laboratory of gas discharges and also the x-ray spectrum laboratory were organized during his tenure. In 1962 he was elected Academician of the Kazakhstan Academy of Sciences. He moved to Alma-Ata and is at



present head of the Department of Solid State and Semiconductor Physics at the Kazakhstan Institute of Nuclear Physics.

Korsunskii's publications are extensive and varied. He wrote more than 250 articles and a number of monographs and textbooks. A significant number of his books is devoted to the method of focusing beams of charged particles. His research on the motion of electronic charges in various electrostatic and magnetic fields probed the feasibility of building electrostatic and magnetic analyzers of the deflecting type with large resolution. The large-transmission beta-spectrograph principle developed by Korsunskii and his co-workers is the basis for the presently employed precision beta-spectrographs. An electric analyzer of the cylindrical mirror type, whose characteristics meet the highest contemporary world standards, was built under his leadership at the Nuclear Physics Institute of the Kazakhstan Academy of Sciences.

Korsunskii is one of the pioneers in the research on nuclear isomers. His work in this area culminated in the monograph "Isomers of Atomic Nuclei," which was re-published in East Germany in 1956. He was also a pioneer in the use of multiply-charged ions in nuclear physics. His work on the production of multiply-charged ions by charge exchange was pioneering.

Of great significance are the methods developed by Korsunskii and his students for the correction of emission spectral bands. As a result it was possible to determine from data on x-ray spectra the character of the interatomic bonds in solids and the distribution of valence electrons by states and to determine such important parameters as the position of the Fermi boundary and the level width is due to nonradiative transitions of the valence-band electrons.

The x-ray spectral research and the study of physical properties and of the electronic structure of transition metals of the yttrium-palladium series and their alloys led Korsunskii and his co-workers to propose a model of electronic structure of the mentioned substances. The model is based on the idea of dividing the electrons into groups of collectivized (C), locally-binding (L) and remainder (R) electrons (CLR model). With the help of the CLR model it was possible to explain many characteristics of x-ray emission bands, the characteristic energy-loss spectra of electrons passing through layers of transition metals, and also the weak magnetic properties of the indicated materials.

This model made possible a calculation of the complex dispersion curve of the phonon spectra of niobium and molybdenum along high-symmetry directions. These dispersion curves agreed well with the experimental data obtained by scattering of slow neutrons. A calculation was also made of electron-phonon interaction in the metals of the indicated series, and the critical temperatures of the superconducting state were estimated. Korsunskii and his co-workers performed important work in which the role of the optical branches of the phonon spectra in the high critical parameters was estimated.

Many of Korsunskii's works are devoted to research on the photoelectric properties of selenium. These works led to the discovery of a new type of photoconductivity, in which the photoresponse produced in the sample is independent of the intensity of the incident light, but is dependent only on the wavelength. A photoresistor based on this principle is not a photometric but a spectral device. It was found that owing to their

prolonged "spectral memory" such semiconductors can be used in semiconductor instruments. Examples are the already-developed low-resistance photoresistors based on selenium with anomalous photoconductivity. The main results of this research and the prospects of the use of this phenomenon are reported in Korsunskii's monograph "Anomalous Photoconductivity," published in 1972.

Korsunskii is distinguished by a rare ability to formulate simply and lucidly the most difficult problems of contemporary physics. Precisely for this reason, his remarkable popular-science book "The Atomic Nucleus" was reprinted five times in the USSR, in Russian and other languages of the USSR, and in many countries of the world. His textbook "Optics, Atomic Structure, and the Atomic Nucleus" enjoys great popularity and was published three times in the USSR and in Czechoslovakia.

Being a person of a rich life's experience and of great knowledge, Korsunskii shares generously with his co-workers, inspiring them with his own enthusiasm. He educated many scholars, of whom thirty-five young people defended their candidate's and doctoral theses.

Heading the department of solid-state physics and semiconductors of the Nuclear Physics Institute of the Kazakhstan Academy of Sciences Korsunskii combines a productive scientific activity with great organizational work in research on solid-state and semiconductor physics in Kazakhstan. He organized the training of cadres in these specialities in the Republic. Instructors from universities and workers from industrial enterprises of various cities of Kazakhstan were trained and did their graduate work at his department. The department of solid-state physics of the Kazakhstan State University, which was organized in 1967 under Korsunskii's leadership, has already graduated nearly one hundred highly trained specialists for national economy.

In commemorating M. I. Korsunskii's seventieth birthday, the scientific world wishes him health and a successful realization of his many creative ideas during his lifetime.