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LEONID VASIL'EVICH KIRENSKIĬ (on his sixtieth birthday)

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ON April 7, 1969 was the sixtieth birthday of a famous Soviet scientist in the fields of physics of magnetic phenomena and of special biological-technical systems, Leonid Vasil'evich Kirenskiĭ, a full member of the USSR Academy of Sciences.

Kirenskiĭ was born in Yakut, in the town of Amga in a peasant family. He received his elementary education in the Amga parochial school. This school, incidentally, recently celebrated its hundredth year, and is named after V. G. Korolenko who had been exiled to Amga.

After finishing high school in 1927 in Yakutsk, Kirenskiĭ worked for four years as teacher in the Yakutsk Asian Soviet Socialist Republic.

In 1931, he entered the Moscow State University physics faculty, where his specialty and future scientific activity were determined. An energetic, inquisitive student, he took an active part, beginning from the third year of his studies, in the department of magnetism under the leadership of professor N. S. Akulov. His graduation thesis on the temperature dependence of the energy anisotropy of iron was one of the first studies in this field.

After his graduation from the University, Kirenskiĭ remained as a graduate student at the department of magnetism. The years spent as a graduate student turned out to be very fruitful. It is at this time that investigations were carried out and laws established regarding the onset of magnetization saturation, with account taken of both directed and diffusely scattered elastic stresses in ferromagnetic metals; a new magneto-thermal effect was discovered, and the temperature dependence of the constants of magnetic anisotropy of nickel and iron crystals was established in collaboration with N. L. Bryakhatov. This law was verified more than once by Soviet and foreign scientists both for metallic ferromagnets (pure metals and their alloys) and for various ferrites in the absence of phase transformations.

In 1939, after the successful defense of his candidate's dissertation and a year as an assistant at the physics department of Moscow State University, Kirenskiĭ was directed to Siberia to the Krasnoyarsk region, for duties as head of the physics department of the Krasnoyarsk State Pedagogic Institute. From this time on all his scientific and organizational activities have been connected with the Krasnoyarsk region.

Scientific work at the physics department of Krasnoyarsk Institute was begun immediately. Seminars were conducted, instruments were constructed and obtained, and experimental apparatus was assembled. In 1946, at the All-union Conference in the Physics of Magnetic Phenomena at Sverdlovsk, the voice of the Krasnoyarsk magnetologists was first heard.

The rapid growth of the youthful scientific personnel, the interesting investigations in the field of saturation

with account taken of the higher terms of the expansion, the detailed investigation of the dependence of the anisotropy and magnetostriction constants on temperature and field, investigations of galvanomagnetic and thermomagnetic phenomena in ferromagnets, investigations of the temperature hysterisis phenomena, and the study of jumpwise magnetization all resulted in the fact that in the Soviet Union and abroad Krasnoyarsk came to be regarded as one of the important scientific centers in the physics of magnetism.

In 1950, Kirenskiĭ defended his doctoral dissertation.

During eight years, he headed simultaneously the physics department at Krasnoyarsk Medical Institute, where he began biophysical investigations. The scientific success achieved in these two directions made it possible to create at Krasnoyarsk an Academic Institute of Physics. The proposition was supported by Academician M. A. Lavrent'ev, and beginning in January 1957 there was opened at Krasnoyarsk a Physics Institute of the USSR Academy of Sciences, which was subsequently incorporated into the Siberian division of the USSR Academy of Sciences; Kirenskiĭ was chosen as its director.

The opening of the Institute sharply broadened the opportunities for scientific investigations by both Kirenskiĭ and the group he headed. An important con-

tribution was made by Kirenskiĭ and his school to the study of the domain structure of ferromagnets. The method of motion-picture photography of the domain structure, worked out and applied for the first time, made it possible to study in a more detailed fashion the dynamics of domain structures following application of a field and mechanical stresses. Kirenskiĭ was successful in creating for the first time methods of visual investigation of domains with the aid of the magneto-optical Kerr effect, which made it possible to carry out investigations in a wide range of temperatures up to the Curie point. In the course of this work, the interesting fact of the temperature stability of domain structures in the absence of a magnetic field was established.

Kirenskiĭ and his co-workers discovered the effect of re-orientation of the domain structure, corresponding as a rule to the maximal permeability of the sample; this resulted in substantial corrections to the classical magnetization curve: the displacement of boundaries, rotation, the paraprocess. He also carried out a number of interesting studies in establishing the connection between the Barkhausen effect and the dynamics of domain structure, studies in magnetoacoustics, dynamic magnetostriction, and various kinds of hysteresis effects in ferromagnets.

In recent years, Kirenskiĭ carried out many studies in the physics of thin magnetic films: he studied by various methods domain structures and their dynamics as a function of the film thickness and of the composition and the technology of its formation, and processes of quasistatistical and pulsed magnetic reversal were studied in detail. A number of new high-frequency effects (subharmonic oscillation, magnetostrictive instability, and others), which may have important applications in various fields of radio electronics, were discovered. The use of laser technology made it possible to bring the magneto-optical investigation of magnetic films to a high degree of perfection. All necessary magnetic characteristics are recorded on a film section of area five square microns, making it possible to study local film sections or individual small spots in a magnetic matrix.

Of great interest are multilayer film systems, first studied by Kirenskiĭ and his students, whose practical utilization as shown by these investigations may be of great importance in computer and in microwave technology.

Important work was carried out by Kirenskiĭ in obtaining and investigating magnetic single-crystal films of both pure ferromagnetic metals and binary or ternary alloys. The epitaxial characteristics of the growth of film monocrystals on various layers were investigated. Oscillations of the magnetization vector—the so-called magnetization "ripple"—were studied in detail. Detailed investigations were made of domain boundaries in monocrystallic films—their widths, structure, and changes as a function of temperature and imposed elastic stresses. Investigations were made of the crystallographic anisotropy of single-crystal and its change with temperature, as well as of induced uniaxial anisotropy. Perpendicular anisotropy was also studied.

At the present time, Kirenskiĭ is conducting important preparatory work in the creation of a laboratory for large-power stationary magnetic fields utilizing the unique power and water resources of Krasnoyarsk.

At the Physics Institute, work in the biophysical field has also become widely developed. One must note that this is one of the few cases of the development of biophysics in a physics environment, rather than in a biological institute. This work, begun at Kirenskiĭ's initiative, has fully justified itself.

The principal biophysical field to which L. V. Kirenskiĭ has contributed most effort is the parametric control of biosynthesis with the aid of physics technical systems. In addition to the great theoretical interest and the possibility of practical applications of industrial biosynthesis, this work turned out to be useful in the solution of the problem of maintaining human life during long duration flights in outer space. At the present time, when the technical problems of sending a man into outer space have been practically solved, the problem of his biological separation from the earth takes on special significance. During the comparatively short time of work in this field, Kirenskiĭ together with I. A. Terskov and I. I. Gitel'zon organized a complex group of physicists, mathematicians, engineers, biologists and physicians, who conducted an intensive study of the life-support problem. The level of biosynthesis which has already been attained makes it possible by using a surface of an area 4–5 m^2 illuminated by sunlight to regenerate air, water and partially the food for men in a closed system.

Lengthy experiments with life-support systems have shown the validity of the principles involved.

Kirenskiĭ devotes much effort and attention to the education of young scientists. He founded the Siberian school of magnetologists, well known both in the USSR and abroad. Among his students, there are about ten doctors of science, who at the present time themselves head large scientific groups; about fifty science candidates personally trained by Kirenskiĭ are successfully working in various cities of Siberia and the Far East.

Kirenskiĭ represents the Soviet Union at the Commission on Magnetism of the International Union of Pure and Applied Physics, and is a member of a number of scientific councils of the USSR Academy of Sciences.

Kirenskiĭ, a famous scientist, a talented scientific organizer, an active public figure, deputy of the USSR Higher Council, a Hero of Socialistic Labor, impresses people who work closely with him by his unusual love for science, his enormous enthusiasm and unending energy and working capacity.

L. V. Kirenskiĭ celebrates his sixtieth year filled with new plans and hopes. We wish him good health and success in the development of Soviet science.

Translated by L. C. Garder