Nikolaĭ Evgen'evich Alekseevskiĭ (on his seventieth birthday)

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Corresponding Member of the USSR Academy of Sciences Nikolaĭ Evgen'evich Alekseevskiĭ, a noted experimental physicist and a specialist in the physics of low temperatures, metal physics, and superconductivity, observed his seventieth birthday on May 23, 1982.

After graduating from the Leningrad Polytechnic Institute in 1936, Alekseevskiĭ worked at the Ukrainian Physicotechnical Institute at Khar'kov, where the Soviet Union's first cryogenics laboratory had been established at the initiative of I. V. Obreimov and L. V. Shubnikov. In 1938, Alekseevskiĭ was assigned to the Institute of Physics Problems, at which he has headed a laboratory since 1949.

The main area of Alekseevskiĭ's scientific activity has been the electron spectra of metals and superconductivity.

Studying the destruction of superconductivity in metals and alloys by electric currents, Alekseevskiĭ observed the appearance of an intermediate state (1936–1938). Developing an original magnetic-measurement technique, he observed an increase of the critical magnetic fields of superconducting films with decreasing thickness, an observation that confirmed his conception of the intermediate state of an alloy as a system of fine superconducting filaments (1939–1940).

Alekseevskiĭ's series of papers on the synthesis of intermetallic superconducting compounds from nonsuperconducting components is of great importance. He was the first to observe an increase in critical temperature under isostatic compression in some of the compounds that he had prepared. In the aggregate, the results indicated the existence of an electron-concentration optimum that is most favorable for the appearance of superconductivity (1945–1951).

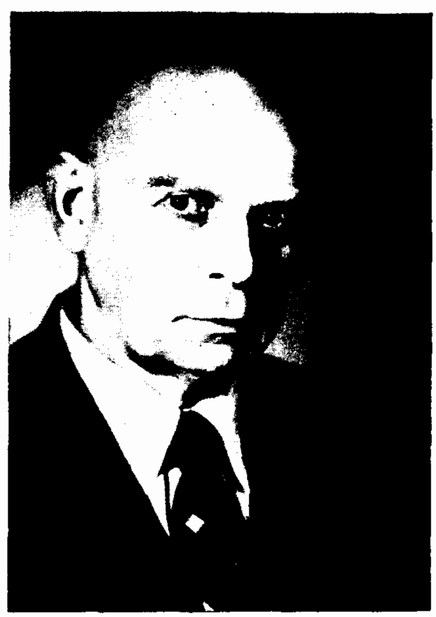
In 1965, working with N. V. Ageev, Alekseevskiĭ discovered superconductivity in a ternary Nb-Al-Ge alloy that had a critical temperature above 20 K, a mark that stood unsurpassed for a long time.

The diffusion method that Alekseevskiĭ proposed for making Nb_3Sn ribbon that is widely used in the manufacture of superconducting magnetic systems was a major contribution to practice (1966).

Alekseevskiĭ has produced several important results in recent years in his studies of superconductivity of cluster systems. For example, he discovered the isotope effect sign reversal with respect to tin in the compound $SnMo_6S_8$ and showed that ternary molybdenum chalcogenides have not only record-high critical-field values, but also high critical-current densities.

In 1958, Alekseevskiĭ and his co-workers proceeded with a systematic study of the anisotropy of the electrical-resistance tensor of metal single crystals in strong magnetic fields at low temperatures. This work resulted in a new trend in metal physics: galvanomagnetic studies of Fermi-surface topology.

Alekseevskiĭ was the first to determine experimentally the topological features of the Fermi surfaces of many metals. He established that the Fermi surfaces of most metals are open, and that the various ways in which resistance depends on magnetic field (square-law increase or saturation) are determined by the type of the carrier paths (open or closed) and by the ratio between the numbers of electrons and holes (whether or not the metal is compensated). In one of his first papers, Alekseevskiĭ established that the law of linearly increasing resistance of polycrystals in magnetic fields that was discovered by P. L. Kapitza in 1929 is a conse-



NIKOLAĬ EVGEN'EVICH ALEKSEEVSKIĬ

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quence of averaging of the angle dependences of the magnetic resistances of the single crystals.

Further development of these studies led to the discovery of a new quantum effect in a number of metals: coherent magnetic breakdown in which the macroscopic properties of the metal (electrical conductivity, thermal *emf*) are found to be sensitive to the phase of the wave function of the conduction electrons tunneling from one sheet of the Fermi surface to another.

Alekseevskiĭ made a major contribution to the development and perfection of methods of physical experimentation. He was the first investigator in the Soviet Union to produce a temperature of 0.05 K; he devised a procedure for measurement of the resistance of metals in pulsed magnetic fields, at ultralow temperatures, with the option of simultaneous application of high hydrostatic pressure; he used a superconducting solenoid operating in an undamped current mode to study nuclear magnetic resonance; he developed a string magnetometer that could be used to measure susceptibility in strong magnetic fields. Special note should be taken of a development of the early postwar years: a mass spectrometer with a nonuniform magnetic field, which made it possible to increase the resolution of the instrument by an order of magnitude.

Alekseevskiĭ has been awarded a USSR State Prize, three Orders, and three medals in recognition of his productive scientific activity. In 1951, he won the N. D. Papaleksi Prize of the USSR Academy of Sciences.

Alekseevskiĭ gives ungrudgingly of time and effort in conveying his knowledge and enormous experience to the young. He has brought up a large group of junior scientists who are actively at work in various areas of low-temperature physics.

Alekseevskiĭ gives a great deal of attention to scientific organizational work in the USSR Academy of Sciences Commission on Superconductivity and in the Academy's Scientific Council on the Problem of Low Temperature Physics. He is also the scientific leader of the "Low Temperature Physics" sector of the Multilateral Scientific Collaboration among Council for Mutual Economic Aid (SÉV) countries.

Alekseevskiĭ was one of the driving forces behind the 1968 organization of the International Laboratory of Strong Magnetic Fields and Low Temperatures at Wroclaw, Poland, and has since served continuously as Chairman of its Scientific Council. During these years, the Laboratory has become a major and well-equipped scientific center, where experimental research in stationary fields with intensities up to 230 kOe is conducted by physicists from Bulgaria, the GDR, Poland, and the Soviet Union.

The services of Alekseevskiĭ in the development of scientific collaboration with Polish physicists were recognized with the award of the Order of the Polish People's Republic.

Full of creative force and energy, Nikolaĭ Evgen'evich Alekseevskiĭ continues his untiring scientific search at the farthest frontiers of science.

Translated by R. W. Bowers