Antonina Fedorovna Prikhot'ko (on her seventieth birthday)

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April 26, 1976 was the 70th birthday of Antonina Fedorovna Prikhot'ko. Prikhot'ko is among the outstanding specialists in the physics of nonmetallic crystals, a Doctor of Physicomathematical Sciences, a Professor, a Member of the Ukrainian Academy of Sciences, an Honored Scientific Worker of the Ukrainian SSR, a Lenin Prize Winner, and a Hero of Socialist Labor.

Prikhot'ko was born at Pyatigorsk in 1906. On graduation from intermediate school in 1923, she accepted a teaching post in the Physico-technical Department of the Leningrad Polytechnic Institute. As a third-year student at the Institute under the supervision of Ivan Vasil'evich Obreimov (now an Academician), she became interested in scientific work in the Leningrad Physico-technical Institute of the USSR Academy of Sciences. On graduating from the Institute in 1929, Prikhot'ko worked as a scientific staff member of the LPTI until 1930, when she transferred with a group of young scientists to the newly organized Ukrainian Physics-technical Institute (UPTI) in Khar'kov, where she worked until 1941.

In 1927–1929, Obreimov was engaged in pioneering research on the absorption spectra of molecular crystals that had been cooled to low temperatures. It was shown for the first time in the case of the azobenzene crystal that deep cooling of molecular crystals results in the appearance of many narrow bands in their spectra—bands that can be grouped into series similar to the series in the spectra of the corresponding free molecules. These investigations marked the beginning of a new trend in spectroscopy—the low-temperature spectroscopy of molecular crystals—and was continued by Obreimov and Prikhot'ko at Khar'kov.

In the early 1930's, absorption sepctra of naphthalene, anthracene, and phenanthrene crystals that had been cooled to the boiling point of liquid hydrogen were obtained in polarized light; the structure of the spectra was analyzed, the bands were classified, and the intramolecular vibration frequencies were determined in the excited state. In 1935–1940, Prikhot'ko carried out a major cycle of studies of the absorption spectra of various crystalline modifications of oxygen, solid mixtures of oxygen with nitrogen and argon, and halogen crystals. During the same period, Prikhot'ko developed a series of methods for growing ultrathin crystals of organic compounds suitable for low-temperature spectral investigations.

The Second World War and the evacuation of the UPTI from Khar'kov interrupted this research. Prikhot'ko spent the war years at Ufa, participating actively in work in support of the front. In 1943 she defended her doctorate dissertation.

After liberation of the Ukraine from the Hitlerite invaders, Prikhot'ko moved to Kiev and organized a spectral laboratory in the Ukrainian Academy of Sciences Institute of Physics; it eventually became the world's foremost center for the low-temperature spectroscopy of nonmetallic crystals. One of the first papers prepared by Prikhot'ko at Kiev was devoted to the spectra of ultrathin (10^{-4}–10^{-6} cm) naphthalene single crystals cooled to the temperature of liquid hydrogen. The experimental mastery demonstrated in performance of this study was long a model for spectroscopists.

The most important scientific results obtained by Prikhot'ko at the end of the 1940's pertain to the observation of band multiplets in the absorption spectra of molecular crystals (naphthalene, anthracene, benzene, naphthacene, etc.). These multiplets are absent in the spectra of the free molecules and sharply polarize in the crystallographic directions. These investigations formed the experimental base for creation of the theory of exciton states in molecular crystals by A. S. Davydov.

Prikhot'ko and Davydov's discovery of collective excitations that are specific for the crystalline state of matter—the excitons that appear under electromagnetic

excitation—is one of the most important advances that have been made in solid-state spectroscopy and has influenced all of the subsequent development of solid-state physics. Exciton concepts are now widely used not only in physics, but also in chemistry and biology. Prikhot'ko was among the scientists awarded the Lenin Prize in 1966 for the cycle of papers on excitons in crystals.

In the 1950's and 1960's, Prikhot'ko (with V. L. Broude) made systematic studies of the absorption spectra of a homologous series of benzene compounds. The detection of polymorphic transformations in this series made possible more profound analysis of the relationships between the crystal structures and absorption spectra of the corresponding substances. Exciton luminescence was discovered and investigated, and the effects of impurities and lattice defects on the luminescence of these crystals was investigated (jointly with V. L. Broude, É. I. Rashba, and M. T. Shpak); high-precision quantitative methods were developed for measurement of the absorption and dispersion of light in molecular crystals, thus making it possible to establish a number of new relationships in the absorption of light in crystals (with M. S. Brodin); the shapes of exciton absorption bands at low temperatures were measured for the first time (with M. S. Soskin), originating a new trend in work on the crystal optics of absorbing media. In recent years, Prikhot'ko has supervised interesting research on the absorption spectra of α-oxygen in strong magnetic fields at temperatures near 1 °K, making it possible to establish, along with the exciton states, biexcitonic exciton-magnon interaction processes. These studies are of fundamental importance for the spectroscopy of the antiferromagnetic state.

Prikhot'ko has had a strong influence on the development of cryostat design at the Institute. Metallic cryostats were first developed and used at the Institute under her supervision and have now become firmly entrenched in laboratory practice, having practically displaced the glass types.

Prikhot'ko has taught many Candidates and Doctors of Sciences, among them three Corresponding Members of the Ukrainian Academy of Sciences. All of the work now being done in solid-state physics at the Ukrainian Academy of Sciences Institute of Physics represents a continuation of studies conducted earlier in Prikhot'ko's division.

Prikhot'ko is the author or coauthor of about 150 scientific papers and two monographs.

She was elected a Corresponding Member of the Ukrainian Academy of Sciences in 1948 and a full member in 1964. She was named an Honored Scientific Worker of the Ukrainian SSR in 1966. Her scientific activity is held in high esteem by the Soviet Government; she has been awarded the title of Hero of Socialist Labor, and Order of Lenin, an Order of the Red Banner of Labor, and various medals.

Her 70th birthday finds Prikhot'ko full of creative thoughts and new ideas, and still instructing the next scientific generation.

We wish her good health and many creative successes in her continued work, which will undoubtedly be a major new contribution to science.

Translated by R. W. Bowers