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**ANTONINA FEDORIVNA PRYKHOTKO**  
(to her 100th birthday)



In April 2006, there will be the centennial of the birthday of Antonina Fedorivna Prykhotko, a world-recognized physicist in the domain of solid-state physics, Academician of the National Academy of Science of Ukraine. She experimentally discovered the collective character of electron excitations in molecular crystals under the interaction of the latter with light. She was an immediate participant in the creation and the

development of a new direction in solid-state physics, the physics of exciton states in molecular crystals, and the founder of a scientific school in the field of the low-temperature spectroscopy of molecular crystals.

A.F. Prykhotko's scientific activity began in her third year at the Leningrad Polytechnical Institute. She worked at the Laboratory of Crystals of the Leningrad Physicotechnical Institute under the direction

of I.V. Obreimov. In 1929, a group of scientists, including Antonina Fedorivna, departed for Kharkiv to create a new center of physical science there — the Ukrainian Physicotechnical Institute (UPTI). It was in Kharkiv that I.V. Obreimov and A.F. Prykhotko have elaborated a method for the low-temperature studies of crystals in polarized light, which became the basis for the formation of a new branch of spectroscopy — low-temperature spectroscopy of crystals. In the war years, Antonina Fedorivna headed a laboratory at the Institute of Physical Chemistry at the town of Ufa (Russia), where the important spectral researches for the needs of the front were carried out. In 1943, she successfully defended her thesis for a Doctor's degree and became the first woman in the former Soviet Union possessing the title of Doctor in physics and mathematics.

The formation of Academician A.F. Prykhotko's scientific school of low-temperature spectroscopy and optics of nonmetallic crystals was initiated in Kyiv after Ukraine had been liberated from German occupation. Antonina Fedorivna began her activity at the Institute of Physics of the Academy of Sciences of Ukraine with the creation of a cryogenic laboratory, the second in Ukraine and the third in the USSR. Here, for the first time in the world, the groundwork for the modern technologies in the design and production of cryostats and the corresponding measuring systems for spectral and other researches had been laid.

Essentially new results of a fundamental character were obtained by A.F. Prykhotko while studying the low-temperature spectra of molecular crystals of some aromatic compounds in polarized light and comparing them to the spectra of free molecules. In the spectra of naphthalene crystals, the doublets of highly polarized absorption bands, which were absent in the spectra of free molecules, have been observed for the first time. This experimental fact was used as the basis for the exciton theory developed by O.S. Davydov for molecular crystals. The experimental and theoretical works have initiated a new direction in solid state physics, the physics of exciton states in molecular crystals.

In 1946–1965, the scientists of the department headed by Antonina Fedorivna at the Institute of Physics fulfilled a large cycle of fundamental experimental researches of nonmetallic crystals. This cycle of experimental and theoretical works, “Excitons in crystals”, was awarded the Lenin Prize in 1966. The employees of the Institute of Physics — A.F. Prykhotko, O.S. Davydov, V.L. Broude, M.S. Brodyn, E.I. Rashba, and A.F. Lubchenko — became prize-winners.

In 1948, A.F. Prykhotko was elected Corresponding member of the AS of the UkrSSR and, in 1964, Academician of the AS of the UkrSSR. In 1966, she was honored with the title of Honored Worker of Science of the Ukrainian SSR. For her scientific merits, she was conferred the rank of the Hero of Socialist Labor, awarded two Orders of Lenin, the Order of the Red Banner of Labour, and medals.

Together with the workers of her department and the theorists of the Institute for Theoretical Physics of the National Academy of Sciences of Ukraine, A.F. Prykhotko carried out important researches of the spectra of various modifications of crystalline oxygen. In the course of the studies, the interexcitonic interaction, unknown up to that time, and various types of excitons (bi- and multiexcitons) were discovered. For the monography “Elementary Excitations and Their Interaction in Cryocrystals”, its authors A.F. Prykhotko, L.I. Shanskyi, I.Ya. Fugol, V.G. Manzhelii, Yu.B. Gaididei, and V.M. Loktev were awarded the State Prize of Ukraine in 1977.

While carrying on the spectral researches of crystals, there appeared a number of new directions which are successfully developed now and concern not only molecular crystals but also semiconductors, antiferromagnets, and other types of crystalline substances. Antonina Fedorivna initiated the formation of new departments and laboratories headed by her disciples at the Institute of Physics.

A.F. Prykhotko actively promoted the development of new techniques for the study of crystals: high-frequency spectroscopy at low temperatures, X-ray diffraction analysis, and high-speed laser spectroscopy. Works dealing with the creation of special devices for low-temperature surgery and the study of the physics of ceramic superconductors have been actively carried out for some years at Antonina Fedorivna's department.

In 1965, Antonina Fedorivna initiated the All-Union seminar “Excitons in crystals” which was organized annually at various towns of the former Soviet Union. The seminar favored both the consolidation of scientists from various former Soviet republics, which were engaged in the study of excitons in molecular and semiconductor crystals, and the further development of the physics of excitons, being a true school for scientific youth. Later on, she also initiated the Republican seminar “Cryocrystals”. At the Institute of Physics, A.F. Prykhotko guided the joint seminar of all solid-state departments.

At the administrative posts, Antonina Fedorivna exerted much efforts as well. In 1965–1970, she was

Director of the Institute of Physics of the AS of the UkrSSR. A.F. Prykhotko was the member of the scientific councils of the AS of the USSR on spectroscopy, low-temperature physics, and solid-state physics, as well as the member of the scientific councils of the AS of the UkrSSR and the editorial boards of several scientific journals.

Antonina Fedorivna's name is imprinted in the history of solid-state physics, especially, the physics of molecular crystals. The results of her works remain challenging until now. The scientific school created by A.F. Prykhotko is successfully functioning and

is actively developed, by forming new branches and expanding the scope of creative activity towards new directions — the physics of nanostructures, liquid crystals, polymers, and heterogeneous systems; laser optics and spectroscopy; etc. The traditions of this school are preserved and cherished by Antonina Fedorivna's disciples and the disciples of her disciples, who work at the Institute of Physics and other scientific institutions of Ukraine.

*Disciples, colleagues, and the Editorial Board of the Ukrainian Journal of Physics*