
IN MEMORIAM

Fedor Ivanovich Fedorov (On the Occasion of His 100th Birthday)

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June 19, 2011, would be the 100th birthday of Academician Fedor Ivanovich Fedorov, prominent theoretical physicist; first academician—secretary of the Division of Physics, Mathematics, and Informatics of the National Academy of Sciences of Republic Belarus (1963–1987); and Hero of Socialist Labor.

F.I. Fedorov was a researcher of the highest level and a founder of a widely known and universally recognized scientific school. Throughout the many years (over six decades) of his scientific, pedagogical, and administrative activity, F.I. Fedorov made a unique contribution to the development of physics and mathematics, as well as to teaching, training, and the assignment of scientific personnel.

F.I. Fedorov was born in the village of Turets (Novogrudsk uезд, Minsk guberniya) into the family of Ivan Mikhailovich Fedorov, a village teacher who later became a well-known writer of children's books and published under the pen name Yanka Mavr. At the age of seventeen, F.I. Fedorov left high school in Minsk. Three years later he graduated from the Division of Physics and Mathematics of the Pedagogical Faculty of Belarusian State University. In 1931 he started work as a teacher of physics and mathematics at a pedagogical technical secondary school and at a

school in the town of Krichev, Mogilev oblast. Since 1936, F.I. Fedorov, being a talented scientist and outstanding pedagogue, completely devoted himself to the organization of the educational process and research at the Faculty of Physics and Mathematics of Belarusian State University. In 1936 he defended his candidate's dissertation on quantum electrodynamics, the basic results of which were obtained at Leningrad University. His scientific supervisor was a famous Soviet theoretical physicist, academician Vladimir Aleksandrovich Fock, who was later granted the honorary title Hero of Socialist Labor. The main stages of his career growth at Belarusian State University were associate professor, head (1938–1962) and professor at the Department of Theoretical Physics, and dean of faculty (1943–1960). In 1958–1959, F.I. Fedorov worked as a professor at Moscow State University at the Department of Crystallography and Physics of Crystals and gave lectures on crystal optics and the acoustics of crystals. As a result, some of his students devoted themselves to the application of covariant methods in these fields.

In 1954 Fedorov brilliantly defended his doctoral dissertation on theoretical crystal optics at State Optical Institute in Leningrad, a leading center of physical

optics. Thus he became the first doctor of physics and mathematics in Belarus whose scientific work was completely performed at the scientific institutions of Belarus.

In 1956 Fedorov was elected a corresponding member of the BSSR Academy of Sciences and, in 1966, he became a real member of the academy.

Fedorov's creative potential and his unique talent as a scientist and organizer of science strikingly manifested themselves when he worked at the BSSR Academy of Sciences. He was one of the founders and organizers of the Institute of Physics and Mathematics at the academy. Eventually, almost all institutes of the Division of Physics, Mathematics, and Informatics of the National Academy of Sciences of Belarus were organized on the basis of this institute. Being at the high rank of Academician—Secretary of this division for 25 years, Fedorov played a key role in the formation of research plans and the coordination of scientific studies in physics and mathematics.

At the Institute of Physics, Fedorov organized and headed (for 32 years) the famous Laboratory of Theoretical Physics (LTP). One significant evidence of the scope of scientific research, its wide range, and the rate of preparation of highly qualified scientific personnel under his guidance at this period is that, one after another, several potent research teams were formed at LTP which worked in different fields of both theoretical and experimental physics and rapidly developed (under Fedorov's initiative) into independent laboratories. Examples include the laboratories of optical electronics, crystal optics, and high-energy physics.

Fedorov was always an active researcher. Undeniably, his doctoral dissertation "Invariant Methods in the Optics of Anisotropic Media" is a very important part of his scientific biography. This a work of fundamental importance, which completely transformed the field of physics developed by a number of prominent scientists of previous centuries: Newton, Fresnel, Maxwell, Hamilton, Voigt, Drude, Foersterling, Gibbs, and many others. It should be noted that, by the beginning of the 20th century, theoretical crystal optics entered a "stagnation period" and, finally, its development completely stopped because of the limited possibilities of the coordinate method it was based on. Having applied a radically new approach, which was then referred to as the Fedorov covariant approach, Fedorov was the first to do anything new in crystal optics after a 50-year drought; he breathed a new life into this field of physics and made a fundamental contribution to the development of one of the most important sections of optical science. There are many obvious evidences of the international recognition of Fedorov's services in the development of modern crystal optics; however, they were most adequately appreciated by the well-known American physicist J.K. O'Loane. In his detailed review on the theory of optical activity of crystals (1980) he selected three

periods in the development of this science: pre-Fedorov, Fedorov, and post-Fedorov.

The phenomenon of a lateral shift of a light beam under total reflection, which was predicted by Fedorov, was officially registered as a scientific discovery in the Soviet Union. The French physicists who later experimentally revealed this shift named it after him.

The efficient methods for determining the optical parameters crystals that were proposed by Fedorov acquired great practical importance.

Fedorov's original results in the field of optics were summarized in three monographs: "Optics of Anisotropic Media" (1958, 2004), "Theory of Gyrotropy" (1976), and "Reflection and Refraction of Light by Transparent Crystals" (1976) (the latter was written with his student V.V. Filippov). In 1976 Fedorov was awarded the State Prize of the Soviet Union for this titanic scientific work.

Having successfully demonstrated the efficiency of his approach for problems of crystal optics, Fedorov extended it to the acoustics of crystals by developing the general theory of propagation of elastic waves in arbitrary anisotropic media. These results were generalized in the fundamental monograph "Theory of Elastic Waves in Crystals" (Moscow, 1965; New York, 1968), for which Fedorov was awarded the State Prize of BSSR in 1972. All these works became textbooks for a wide range of experts in many countries long ago.

Fedorov actively responded to almost all events occurring in quantum theory and physics of elementary particles, fields of theoretical physics, to which his candidate's dissertation was devoted and which appeared to be his favorite ones. Having applied the covariant approach, he solved a number of key problems in the theory of elementary particles and fundamental interactions. The new results that he obtained in this field were generalized in the original monograph "Lorentz Group" (Moscow; 1979, 2003).

Thus, Fedorov's scientific work can clearly be separated into three main directions: crystal optics, acoustics of crystals, and theory of fundamental interactions. However, the history and methodology of physics were also in the field of scientific interests of this prominent theoretical physicist. His considerable contribution to the solution of mathematical problems was highly appreciated by the American Mathematical Society: Fedorov was elected a foreign member of this organization.

Fedorov was the author of more than 400 scientific publications, including six large monographs. Forty candidate's dissertations were defended under his supervision, and more than ten of his students became doctors of sciences not only in Belarus but also in Russia. Among them are well-known scientists, academicians and corresponding members, and organizers of science and education.

Fedorov always combined creative scientific work with the popularization of scientific knowledge, an active fight against pseudoscience, and a large amount of public activity, as well as editing and publishing. He was a member of the Board of the Soviet Peace Foundation, a member of the Soviet Gravitational Committee, an editor-in-chief at the journal "Izvestiya AN BSSR. Seriya fizikoomatematicheskikh nauk" ("Bulletin the BSSR Academy of Sciences: Physics and Mathematics"), a member of editorial boards of other scientific journals, and the first president of the Belarussian Physical Society.

Fedorov's prominent scientific achievements and fruitful pedagogical, scientific-administrative, and public activity were highly appreciated: he was granted the honorary title Hero of Socialist Labor and awarded two Orders of Lenin, Orders of the Red Banner of Labor and Sign of Honor, medals of the Soviet Union, and diplomas of the Supreme Soviet of BSSR. He was also granted the honorary title Honored Scientist of BSSR.

Note that, in the history of Belarusian science, only five scientists were granted the title Hero of Socialist Labor. Along with Fedorov, these were academicians of the National Academy of Sciences of Belarus N.A. Borisevich, B.I. Stepanov, A.F. Sevchenko, and N.P. Erugin.

When Fedorov died, the National Academy of Sciences instituted the Fedorov Prize, which is awarded every three years for the highest scientific achievements in physics and mathematics.

Fedor Ivanovich Fedorov left an extremely rich heritage of everlasting importance for general culture. His main creation—his scientific school—survives and is successfully developing, continuing the tradition begun by this remarkable scientist and practically implementing his concepts.

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