

German Stepanovich Zhdanov (Obituary)

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Professor and Doctor of Physical and Mathematical Sciences German Stepanovich Zhdanov, a well known scientist, a Foreign Member of the Academy of Sciences of Saxony, Laureate of several academic prizes, and an honored scientist and technologist of the Russian Soviet Federated Socialist Republic, died on September 2, 1991.

G. S. Zhdanov was born in St. Petersburg on August 11, 1906, into a family of Russian intellectuals. He graduated from the Department of Physics and Mathematics of Moscow University in 1930, and since then his scientific and educational activities have been largely connected with Moscow University. An effort to combine the pursuit of fundamental science with direct application and at the same time with educational activity are followed as very important trends from the very beginning in German Stepanovich's creative activity.

Already in his student years he started to work as a laboratory assistant, and then as an engineer at an aircraft factory, and he was one of the pioneers of the operational use of x-rays to check aircraft materials. He designed and built an x-ray grain camera which enabled one to determine polar diagrams of rolled metals and alloys with grains directly from the x-ray data. He became one of the founders of x-ray instrumentation construction; a camera for low temperature x-ray diffraction research was built and the creation of specialized electronic computers to study the structure of crystals was started by his initiative in the 1950s.

Soon after graduating from Moscow University, German Stepanovich started to engage in educational activity in the Physics Department of Moscow State University, first holding two concurrent positions as an assistant and lecturer, and then from 1935, as an official staff member. At that time he taught courses on x-ray diffraction analysis, and from 1936 he started simultaneously also to teach a general physics course. The experience of teaching x-ray diffraction courses enabled German Stepanovich to create the widely known textbook *Fundamentals of X-Ray Diffraction Analysis* (1940) and together with Ya. S. Umanskiĭ the two volume book *The X-Ray Diffraction Analysis of Metals* (1937–1940). The rank of professor was conferred on him in 1943.

In 1938 G. S. Zhdanov transferred to work at the L. Ya. Karpov Physicochemical Institute, where he created the best x-ray diffraction laboratory of that time, and whose main direction became the investigation of the structures of chemically complicated crystals. The interpretation of the structure of boron carbide, which became the basic doctoral dissertation defended by G. S. Zhdanov in 1941, was one of the first fundamental investigations.

Structural research was developed further in the years after the war. Interesting data on the multi-layer structures of silicon carbide were obtained under the direction of G. S.



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Zhdanov; the phenomenon of superperiodicity has been discovered in these crystals, a geometric theory has been given for the structure of polytypal forms of silicon carbide, and the Zhdanov number symbol which is widely used in describing packing defects, polytypicity, etc., has been proposed. Papers on the structures of oxygen compounds, of simple and complex cyanides and thiocyanates of metals, organoelemental compounds of the IV and V groups of the periodic table, and of nitro derivatives and halogen derivatives of benzene and naphthalene followed later. The papers on the crystal chemistry of thiocyanates written by G. S. Zhdanov and Z. V. Zvonkova were awarded the D. I. Mendeleev Prize of the Academy of Sciences of the USSR in 1952.

Structural research on crystals of ferroelectrics, semiconductors, and superconductors was started in the 1950s under the direction of G. S. Zhdanov; the purpose of this was to determine the relations between the compositions, structures, and the physical and chemical properties of these materials. The most important results were the prediction and discovery of a new class of crystals, the Seignette-magnetics, which possess distinctive electric and magnetic properties, the construction of a model theory of ferroelectrics for crys-

tals with perovskite structure, and determining the possibility for the occurrence of superconductivity in compounds with complicated cells and low symmetry. These papers became the basis for a number of papers for which G. S. Zhdanov was awarded the E. S. Fedorov Prize of the Academy of Sciences of the USSR (1977).

The performance of complicated research, including some with different diffraction methods, was a characteristic feature of G. S. Zhdanov's scientific creativity. By his initiative, structural research by the methods of nuclear physics, especially by means of neutron diffraction analysis and Mössbauer analysis, was started in the USSR. Fundamental knowledge in the field of solid state physics, which he used successfully in setting up many structural investigations and in interpreting the data obtained, distinguished him.

Simultaneously with his work at the Karpov Institute, from 1947 to 1952 he directed the Department of the Physics of Metals of the Moscow Engineering Physics Institute, and in 1953 he resumed work at Moscow State University as Director of the Department of Solid State Physics (1953–1987), directing that department.

The educational talent of German Stepanovich, who successfully taught different courses on diffraction and a solid state physics course (for students from the entire department), became known to an even greater degree in these years. He wrote the textbook *Solid State Physics* (1961), which was translated later into English, Japanese, and Spanish, and as a coauthor, *Diffraction and Resonance Structural Analysis* (1980) and *Lectures on Solid State Physics* (1988).

More than 60 candidate dissertations were completed under the direction of G. S. Zhdanov; many of his students became Doctors of Science. Due to his books and his active participation in international and All-Union conferences, many x-ray diffraction specialists of the USSR, who were not directly students of G. S. Zhdanov, felt his influence.

For a long time, G. S. Zhdanov headed the Commission on X-ray Diffraction Analysis of the Academy of Sciences of the USSR, and he was the chairman of many scientific conferences, including enormous conferences on the use of x-rays to investigate materials, which drew more than a thousand participants at each one. G. S. Zhdanov was an Associate Editor of the journal *Kristallografiya*, and a member of the editorial boards of three international journals. In the course of many years, he was a member of the executive committee of the International Union of Crystallographers, and participated several times in international conferences on crystallography, theoretical and applied chemistry, and on the peaceful use of atomic energy. He successfully gave lectures on solid state physics in the United States of America, Germany, Sweden, Spain, Italy, Poland, and Czechoslovakia. He was elected a member of the Academy of Sciences of Saxony in 1966.

G. S. Zhdanov was accorded very profound respect, love, and gratitude by his colleagues and students. His memory will live in the hearts of all those who were actively associated with him.

Translated by Frederick R. West