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In memory of Sarra Samsonovna Kabalkina

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Sarra Samsonovna Kabalkina, DSc in physics and mathematics, a highly-reputed scientist, the founder of the Russian school of X-ray studies at high pressures, died on August 14, 1999.

Sarra Samsonovna Kabalkina was born on March 5, 1918 in the village of Perekopnoe in the Saratov region, in a family of state employees who moved to Moscow in 1923. She graduated from Moscow University in 1941. In 1949 she completed her postgraduate work at the Institute of Organic Chemistry of the USSR Academy of Sciences after receiving exceptionally good schooling in X-ray structural analysis from professor A I Kitaĭgorodsky. Kabalkina then worked at the Physics Institute in Kishinev (Moldavia) and returned to Moscow in 1954, to the Laboratory of Ultrahigh Pressures, headed by professor L F Vereshchagin. In 1958, this laboratory was transformed into the Institute of High Pressures Physics of the USSR Academy of Sciences (now IHPP of the RAS).

The systematic study of the behavior of solids under high pressure was pioneered at the beginning of this century by the American physicist Percy W Bridgman. He discovered stepwise changes of volume and electrical resistance in a large number of substances and attributed them to polymorphic transitions.

To extend Bridgman's work in phase transitions, it was necessary to find the laws governing the restructuring of crystal structures under uniform compression. For this research S S Kabalkina developed X-ray techniques for high-pressure experiments and new modelling approaches for solving the problems that arose. The outcome of this effort placed S S Kabalkina on an equal footing with the scientists in the West who laid the foundations of one of the most important fields in solid state physics — the analysis of polymorphism in high-pressure crystal structures.

S S Kabalkina began her work in this area with a study of the compressibility of crystals formed by weak van der Waals bonds, since these were easier to compress: layered graphite and boron nitride, and molecular crystals (homological sequences of urea and paraffin). She was able to find phase transitions in these materials, and for the first time determined the crystal structures of high-pressure phases.

In 1964 Kabalkina's research team was transformed into the Laboratory of X-Ray Structural Analysis that she headed. In 1963–1969 S S Kabalkina and her colleagues studied the effects of high pressure on the crystal structures of elemental substances — thallium, indium, tellurium, arsenic, antimony and bismuth. The work resulted in the formulation of the general laws of transformation of crystalline structures in phase transitions.

During this period the laboratory studied in detail the sequence of polymorphic phase transitions in A^{IV}B^{VI} com-

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pounds under high pressure and demonstrated its similarity to the behavior of group-V iso-electron elements. The structure of ionic compounds (manganese and zinc fluorides) under high pressure was also studied and the rutilefluorite transition was discovered.

A^{II}B^{VI} compounds and silicon were later analyzed. S S Kabalkina regarded as very important her efforts to improve the techniques of X-ray structural analysis under high pressure. She designed an enormous number of highpressure cells for various pressure and temperature ranges, including megabar-range diamond anvil cells.

In 1974 S S Kabalkina presented and successfully defended a DSc dissertation in physics and mathematics. Together with L F Vereshchagin, she wrote the monograph *X-Ray Structural Studies under High Pressure*, which is very well known to researchers in this field.

S S Kabalkina gave much of her time to her students. Among them we find the leading researchers of the Institute of High Pressures Physics, S V Popova and N A Bendeliani (both have now risen to the position of head of department) and the well-known experts on X-ray structural analysis T N Kolobyanina, L M Lityagina, T I Dyuzheva and G B Demishev.

Sarra Samsonovna retired in 1986, but she remained a consultant of the Institute of High Pressures Physics of the Russian Academy of Sciences.

S S Kabalkina was an outstanding woman and a brilliant scientist. Her originality in generating ideas and her methodological achievements are still important. Her friends and colleagues remember her with deep gratitude.

N A Bendeliani, G B Demishev, T I Dyuzheva,

G N Ermolaev, E S Itskevich, T H Kolobyanina,

Yu S Konyaev, Z V Malyushitskaya,

S V Popova, S M Stishov