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In memory of Konstantin Petrovich Belov

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Konstantin Petrovich Belov, outstanding experimental physicist, expert in the physics of magnetism, died on June 19, 2001, approaching his 90th birthday.

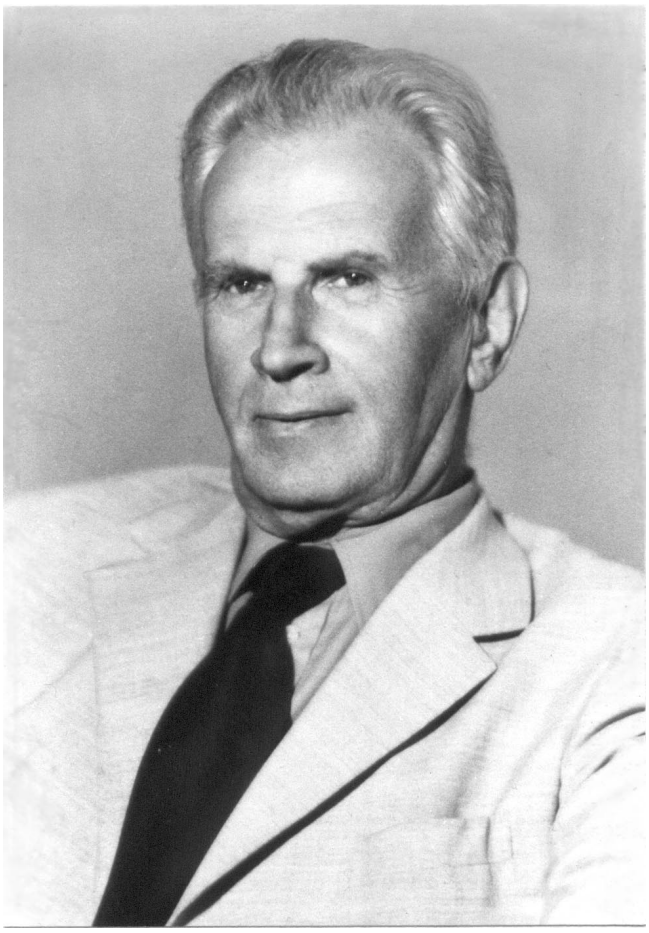
Konstantin Petrovich Belov was born on November 4, 1911 in Egor'evsk of the Moscow region, in a worker's family. The entire scientific and pedagogical activity of K P Belov was played out in Moscow State University. Having graduated from the Physics Department of Moscow State University in 1934, he entered the post-graduate course and then started working there first as a lecturer, then associate professor, full professor and head of chair. He organized the Laboratory of Problems for Magnetism of the Physics Department of Moscow State University which became, under his guidance, one of the main research centers of magnetism in solids in the USSR.

K P Belov focussed his life in science on the physics of magnetic phenomena. In this field of physics he published a number of fundamental papers and is undoubtedly one of those who laid the foundations of the current science of solid-state magnetism. Konstantin Petrovich's research style was characterised by a profound understanding of the essential physics of the phenomena under study, by rigorousness and simplicity of the experimental setting, and by clear presentation of the results obtained. Furthermore, the main quality of Konstantin Petrovich Belov was that he had that talent for defining the important directions of research at specific moments of time, for finding the fulcrum points in the progress of science in the field he chose.

K P Belov started his life in physics by studying magnetoelastic and electric phenomena in ferromagnetic metals and alloys under a paraprocess, in which exchange interactions dominate. This work was very topical because the problem of the exchange interaction in magnetically ordered materials is central in solid-state magnetism. K P Belov did not lose interest in these phenomena in subsequent years. On his initiative, the Laboratory of Problems for Magnetism of M V Lomonosov Moscow State University studied the non-Heisenberg Dzyaloshinskiĭ – Moria exchange that leads to non-collinear ferromagnetism in rare-earth orthoferrites and other weak ferromagnets.

In the post-war years K P Belov led an extensive program of research into ferrite magnetism. The work of K P Belov and his students on magnetic phase transitions, magnetostriction, magnetocaloric and galvanomagnetic phenomena revealed specific features of magnetic ordering and electric conduction processes in ferrites and stimulated extensive penetration of these materials into technological fields.

K P Belov was one of the pioneers of research into magnetic phase transitions of the second kind in ferro- and ferrimagnets. Together with his students, he also studied order – disorder-type transitions accompanied by the reorientation of magnetic moments in rare-earth orthoferrites and ferrite garnets. The physical mechanisms that lead to such transitions were first identified in his laboratory. The personal contribution of K P Belov to the physics of phase transitions in ferro-, ferri- and antiferromagnets is indisputable and can hardly be overestimated. This work is of fundamental importance for the theory of magnetism.



Konstantin Petrovich Belov
(04.11.1911 – 19.06.2001)

The physics of magnetic phenomena and certain fields in technology were powerfully stimulated in recent decades by the realization that a huge number of alloys and compounds based on rare earths manifested magnetic ordering. A systematic study of rare-earth magnets was started in this country at the end of the 1950s under Belov's guidance at Moscow State University; later this field of research spread to many research centers of the country, an effect largely owing to the work of Konstantin Petrovich and his students.

The Laboratory of Problems for Magnetism reported a number of results that significantly extended our understanding of the physics of magnetism in rare-earth metals, their alloys and compounds. Many of these physical phenomena are of practical importance. K P Belov and his students

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discovered the phenomenon of giant magnetostriction in rare earth and uranium compounds and gave a physical interpretation of this phenomenon (a discovery certificate was issued). The huge magnetic anisotropy of rare-earth magnets discovered in K P Belov's laboratory created conditions for developing high-strength permanent magnets of extremely high energy, which are now used increasingly in technological applications.

The research work on rare-earth magnets met with the appreciation it deserved: K P Belov and a group of researchers from his chair and from academic research institutions received the USSR State Prize for their work on the magnetism of rare-earth and uranium compounds. K P Belov was the founder of an important branch of the physics of magnetic phenomena: the physics of rare-earth magnetism.

In recent years scientists of his chair worked under his guidance on a study of magnetic semiconductors; this work resulted in the discovery of a new class of magnetic semiconductors with high Curie temperatures (above room temperature) and experimentally established the presence of specific states of self-localized charge carriers in chalcogenide spinels. Belov was one of those who pioneered the study of the physical processes that lead to gigantic magnetoresistance in substituted rare-earth manganites.

The scientific longevity of Konstantin Petrovich is awe-inspiring. Until his very last day he refused to interrupt his work on the magnetism of a broad class of ferrimagnets possessing 'weak' sublattice. He was able to show that in contrast to classic ferrimagnets the presence of a magnetic sublattice which finds itself in a weak exchange field applied by the stronger magnetic sublattice results in low-temperature anomalies of magnetic properties and in effects due to a paraprocess (at the Belov point).

The results of the fruitful and intense creative work of Konstantin Petrovich Belov together with the team of physicists that he supervised are summarised in ten monographs. These books help to train and prepare new experts in the physics of magnetism and impart a creative impetus to their scientific careers. Each became a 'must' desktop book for students, postgraduates, engineers and researchers.

K P Belov's name is inseparable from the school of magnetism that he built up and which is well known both in this country and in the West. Ten DSc and more than fifty PhD degrees for physics and mathematics were conferred on students advised by K P Belov. K P Belov's students carry on fruitful work in many universities and research institutions in this country and abroad. K P Belov's achievements received plentiful recognition: he was an Honoured Activist in Science and Technology of the Russian Federation and received the State and M V Lomonosov Prizes. K P Belov's activities hugely affected the progress in the physics of magnetic phenomena in Russia and other countries.

Konstantin Petrovich Belov's exceptional abilities as a science manager, his faithful service to science, his important achievements in physics, his human warmth and engaging personality brought him respect, love and wide recognition throughout the scientific community.

We, his friends and pupils, will always keep the warm memory of Konstantin Petrovich Belov.

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I K Kamilov, G I Kataev, L I Koroleva,
R Z Levitin, I S Lyubutin, S A Nikitin,
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