

In memory of Ivan Alekseevich Yakovlev

DOI: 10.1070/PU2000v043n05ABEH000812

Ivan Alekseevich Yakovlev, a wonderful man, an outstanding researcher and teacher, Scientist of Merit of the Russian Federation, distinguished professor of the M V Lomonosov Moscow State University (MGU), honorary professor of the University of Chuvashia, died on March 1, 2000 at the age of 88.

In his 70 years of work at the physics faculty of MGU, I A Yakovlev made a fundamental contribution to experimental research into piezoelectrics, ferroelectrics and semiconductors, and into the propagation of surface and pseudosurface elastic waves in solids.

He wrote a number of textbooks that continue to be very useful to students and teachers.

The lectures that Ivan Alekseevich read to students were wonderfully clear and profound.

Ivan Alekseevich Yakovlev was born in Moscow on October 13, 1912. His grandfather, Ivan Yakovlevich Yakovlev, was a well-known Educator of the Chuvash People, who created the Chuvash alphabet and the written Chuvash language. Ivan Alekseevich's father, Aleksei Ivanovich Yakovlev, was a student of professor Klyuchevskii and continued his projects; he became a corresponding member of the USSR Academy of Sciences. After graduating from school in 1929, Ivan Alekseevich entered the physico-mathematical faculty of Moscow State University and graduated in 1932, after completing the courses ahead of the regular time.

Yakovlev then worked for a year as assistant professor of the chair of physics at the Institute of Railway Transport Engineers and in 1934 transferred to the general physics chair in the physics faculty of Moscow State University as assistant professor. From this time until his death Yakovlev's work was based in Moscow State University.

From 1943 to 1946 I A Yakovlev was a postdoc at the Institute for Physical Problems of the USSR Academy of Sciences (currently the P L Kapitza Institute for Physical Problems of the Russian Academy of Sciences), working on his DSc thesis. He was able to show, from the study of light scattering in liquid helium, that in the He I to He II transition, the experimentally observed intensity of scattered light does not grow anomalously high, as was predicted by certain theories. Later Ivan Alekseevich studied electron scattering in metals and light absorption spectra in sapphire at low (liquid helium) temperatures.

In 1942 Ivan Alekseevich presented and defended his PhD thesis "Studies of light scattering at low temperatures". He defended his DSc thesis "Studies of phase transitions of second kind in solids;" in 1957. In 1959 he became an MGU professor. In 1974 he was elected to the Chair of crystal physics of the physics faculty, which he held for 15 years.

Yakovlev's main research was carried out at the physics faculty of Moscow State University.



Ivan Alekseevich Yakovlev
(13.10.1912 – 01.03.2000)

At the beginning of the 1950s I A Yakovlev carried out experiments on the molecular scattering of light in crystals. Observations in quartz single crystals revealed for the first time in world physics that light scattering intensity in the $\alpha \leftrightarrow \beta$ phase transition in the 0.1° temperature interval was higher by four orders of magnitude than at room temperatures. He also studied light scattering in course of phase transitions in other crystals, e.g. ammonium chloride.

His most significant results, also a world first, involve absorption of ultrasound in solids during phase transitions. Yakovlev discovered anomalous absorption of sound in potassium sodium tartrate crystals (Rochelle Salt) near the upper and lower Curie points. It was found that the position of the maximum of sound absorption on the temperature axis was independent of sound frequency. L D Landau gave a theoretical explanation of this anomaly and derived a formula for the sound absorption coefficient in ferro- and non-ferroelectrics. These results were generally recognized and generated a flux of similar studies in the world, and are widely cited.

I A Yakovlev contributed much to the study of the spectrum of Mandelstam–Brillouin scattering in piezoelectric semiconductors in an external DC field, when the acoustic

wave is amplified as a result of the electron-phonon interaction. In this extremely complex experiment, Yakovlev investigated the growth in intensity of one of the Mandelstam–Brillouin components from very low values in zero external field to levels that exceeded the initial values by four orders of magnitude.

During the last years of his life, Ivan Alekseevich studied the specific features of the propagation of surface waves in single-domain crystals, including crystals of high-temperature superconductors. In experiments of incomparable complexity, Yakovlev obtained unique data on the propagation of surface and pseudo-surface waves in crystals of germanium, gallium arsenide and some other compounds. These results are included in monographs and are widely known.

Parallel to his research, I A Yakovlev carried out much work of a pedagogical and methodological nature. He read wonderfully interesting lectures on the general physics course, on crystal optics, holography and other fields of physics, and his lectures were invariably popular.

After Moscow State University relocated to new buildings at the Vorob'evy Gory in 1953, I A Yakovlev spared no effort in creating an up-to-date range of practical tasks for the optics course (optical practicum); he set up more than 40 such experiments. In 1974 Ivan Alekseevich organized a completely new practicum on the physical foundations of holography, which became very popular.

Ivan Alekseevich devoted much energy to writing and publishing numerous textbooks. In 1976, in order to bring the 5th edition of G S Landsberg's *Optics* up to the current level, he wrote for it two new chapters, "Physical principles of holography" and "Optical quantum generators". Yakovlev was also very active in publishing G S Landsberg's three-volume *Elementary Textbook of Physics*. Yakovlev played an important role in creating a problem book for the general physics course; it ran through four editions and was translated into many languages. Yakovlev was among those who compiled the textbooks for the general physics practicum and wrote one of the chapters of the *Special Physics Practicum*. He created numerous demonstrations for lectures and co-authored the book *Demonstrations at Physics Lectures*.

From the Department of Retraining for Teachers in Higher Education Establishments foundation at the MGU, Ivan Alekseevich supervised the section of general physics and read lectures to students of this department.

During almost 70 years of work at the MGU physics faculty, Ivan Alekseevich supervised numerous graduate projects and PhD theses. Some of his students advanced to DSc degrees. He always followed the work of his students and was invariably ready to lend a helping hand — and, if circumstances demanded, not only for scientific help.

For 35 years, since 1966, I A Yakovlev sat on the editorial board of *Uspekhi Fizicheskikh Nauk* (Physics–Uspekhi) journal. This field of Yakovlev's activities was very significant for the journal. Ivan Alekseevich was a widely educated professional, competent in many fields of physics. He had an excellent knowledge of Russian and world history, had a profound understanding of the importance of studying nature and of the knowledge we thus gain and pass down to younger generations. He possessed a stupendous memory: he effortlessly quoted scientific information and passages from texts (in several languages), as well as historical analogues and biographical details. By unofficial tradition, Ivan Alekseevich considered all incoming papers dealing with optics, magnet-

ism, aspects of general physics and the history of physics, and everything concerning the teaching of physics (methodology notes). The reputation of the journal was of prime importance to him, and he was a very careful, uncompromising referee. He took an active part in the work of the *Uspekhi Fizicheskikh Nauk* (Physics–Uspekhi) journal until the very last days of his life.

I A Yakovlev always undertook a heavy load of voluntary work for the propagation of science. In 1965–1974 he chaired the Council for Dissemination of Physical, Mathematical and Astronomical Knowledge of the "Knowledge" Society of the Russian Federation.

Yakovlev's work brought him a number of governmental awards, including "The Badge of Merit" and the "Defence of Moscow" medal.

Ivan Alekseevich, with his wide-ranging knowledge in many and various fields, had an excellent memory and a gift for engaging talk. Any conversation with him was thus considerable pleasure, regardless of the topic. He was a noble, kind and responsive man. He was a person of refined culture, many-sided talents and extraordinary capacity for works.

Ivan Alekseevich made important contributions to science, to the teaching of physics, and to shaping the image of the physics faculty of the M V Lomonosov Moscow state university, and also to the progress of science and education in all of Russia.

This will forever belong to subsequent generations, who will never forget the name of Ivan Alekseevich Yakovlev.

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L P Kurakov, T V Laptinskaya, V A Sadovnichii,
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