

In memory of Aleksandr Il'ich Akhiezer

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The world community of scientists mourns a painful loss. Professor Aleksandr Il'ich Akhiezer, full member of the National Academy of Sciences of Ukraine, winner of the Ukraine State Prize in Sciences and Technologies, DSc in physics and mathematics, died on May 4, 2000 at the age of 88.

Aleksandr Il'ich Akhiezer was an outstanding physicist and teacher of physics, a person of exceptional moral qualities and a patriot of his country, who taught several generations of physicists and created the famous Kharkov school of theoretical physics.

A I Akhiezer was born on 31 October 1911, in the town of Chirikov in Belorussia, in the family of a local doctor. He started his research in 1934 in Kharkov. Having graduated from the Kiev Polytechnical Institute, A I Akhiezer started working at the Theoretical Department of the Kharkov Physico-Technical Institute (KhFTI, the Ukrainian Physico-Technical Institute at the time, currently the KhFTI National Science Center); the department was headed by Lev D Landau. Throughout his life, Akhiezer remained a grateful and loving student of Landau. In 1938, he succeeded L D Landau to the post of head of the Theoretical Department of KhFTI. During the second World War, Akhiezer continued to work at KhFTI after its evacuation to Alma-Ata. In 1944, he was called to work in Moscow and until 1952, worked part-time with I V Kurchatov at Laboratory No 2 (later renamed the I V Kurchatov Institute of Atomic Energy, currently the Russian Research Center “Kurchatov Institute”). From 1945 on, A I Akhiezer worked in Kharkov, heading the Theoretical Department of KhFTI.

A I Akhiezer was a teacher of extraordinary talent. His pedagogical activities cover more than half a century. He started in 1936 at the Kharkov Electrotechnical Institute. From 1936 to 1990, he taught at Kharkov University, and from 1951 to 1964 he also taught at the Military Engineering Radiotechnical Academy. Between 1940 and 1975, A I Akhiezer headed the Chair of Theoretical Physics of Kharkov University. He was one of the creators of the Physico-Technical Department of the University and organised the training of students majoring in theoretical physics.

A I Akhiezer was a true scientific leader, the mentor of several generations of physics theoreticians, one of the founding fathers of the extensive and respected Kharkov school of theorists. Some of Akhiezer's students grew to be founders of new physics schools. Among his students, 72 obtained PhD degrees and 33 — DSc degrees, and seven became members of the National Academy of Sciences of Ukraine (V G Bar'yakhtar, Ya B Faïnberg, D V Volkov, S V Peletminskii, A G Sitenko, K N Stepanov and P I Fomin).

It was through A I Akhiezer's initiative and efforts that the Institute of Theoretical Physics was founded within the KhFTI National Research Center; his students still work at this institute.



Aleksandr Il'ich Akhiezer
31.10.1911 – 04.05.2000

A I Akhiezer was a unique phenomenon in theoretical physics. He worked in the widest possible range of research fields. A I Akhiezer made outstanding contributions to a number of physics fields, being a scientist of truly encyclopedic knowledge and possessing the intuition of a genius. He worked and published in nuclear physics, quantum electrodynamics, elementary particle physics, plasma physics, magnetic hydrodynamics, solid state theory, magnetism, and the physics of interaction of high-energy particles with matter.

A I Akhiezer developed the theory of photon–phonon scattering at high energies and the theory of coherent scattering of photons in the field of the nucleus. Together with I Ya Pomeranchuk, he carried out pioneering research of the scattering of slow neutrons by crystals and predicted the feasibility of generating ‘cold’ neutrons; he constructed the theory of resonance nuclear reactions (1948) and developed the theory of diffractive scattering of fast charged particles by nuclei (1949). In 1955, he and Sitenko predicted the effect of diffractive dissociation of the deuteron and developed the theory of the effect. He contributed to the theory and

design calculations of linear accelerators of electrons and heavier particles. He worked out the theory of radiative corrections to a number of quantum electrodynamic processes (together with R V Polovin, 1963). He wrote a long string of papers on the electrodynamics of hadrons, and, in particular, formulated (together with M P Rekalov) the equidistance rule for various electromagnetic characteristics of hadrons (1964) and generalized the quark model to electromagnetic processes involving hadrons.

A I Akhiezer predicted, together with Ya B Faĭnberg, the beam-plasma instability; he formulated, together with G Ya Lyubarskiĭ and R V Polovin, the evolution condition and was able to establish the stability criterion for magneto-hydrodynamic waves. He pioneered the creation of a kinetic theory of oscillations of electron plasma in magnetic field. He succeeded in predicting (together with L E Pargamannik, 1948) the phenomenon of electron cyclotron resonance. He studied (together with A G Sitenko and I G Prokhoda, 1957) the scattering of electromagnetic waves in plasmas by electron and ion fluctuations.

A I Akhiezer was the first to formulate the concept of interacting magnons and then on this basis developed a general theory of relaxation processes in magnets (1946), predicting in 1956 (with V G Bar'yakhtar and S V Peletminskiĭ) a novel phenomenon — magnetoacoustic resonance; in 1959 he developed the theory of kinetic, relaxational and high-frequency processes in ferroelectrics. A I Akhiezer wrote seminal papers on the theory of absorption of sound in dielectrics and metals (1938), and developed the theory of absorption of ultrasound in metals (with M I Kaganov and G Ya Lyubarskiĭ, 1957). This work started the research in electronic acoustics in the USSR. Together with N F Shul'ga, A I Akhiezer developed the theory of QED processes in crystals at high energies.

The philosophical and fundamental aspects of physics occupied a special place in the multifaceted world of A I Akhiezer; this interest found its expression in the last book that he wrote — *The Evolving Physical Picture of the World*.

In all, A I Akhiezer wrote 23 books on physics. Among them are monographs recognized world over on the theory of nucleus, quantum electrodynamics, spin waves, plasma electrodynamics, high-energy electrodynamics in matter, physical kinetics, field theory and fundamental interactions, and textbooks on practically every branch of general physics. These books have played an outstanding role in the training of highly qualified physicists in most countries.

For his exceptional achievement in physics and for his organizational activities, A I Akhiezer was awarded the Order of the Red Banner of Labour (in 1971 and 1981) and the Order of Merit (1954). He was given the Scroll of Merit of the Supreme Soviet Presidium of Ukraine, the President's Order for Achievement of the 2nd and 3rd degree. A I Akhiezer is an Honored Scientist of Ukraine (the title was conferred on him in 1986), and won the L I Mandelshtam Prize of the Academy of Sciences of the USSR (1949), the N N Bogolyubov Prize of the National Academy of Sciences of Ukraine (1995), the A S Davydov Prize (2000), and the I Ya Pomeranchuk International Prize of the Institute of Theoretical and Experimental Physics (1998). A I Akhiezer also received the Ukraine State Prize in 1986.

A person of wonderful talent and enormous erudition, of inexhaustible energy, optimism and working potential, of extraordinary human charm, kindness and modesty, companionable and of excellent wit — this is how he is remembered by anyone lucky enough to have met him in life.

The memory of Aleksandr Il'ich Akhiezer will live forever in the hearts and minds of his friends and students.

*V G Bar'yakhtar, B G Lazarev, V I Lapshin,
S V Peletminskiĭ, A G Sitenko, K N Stepanov,
Ya B Faĭnberg, P I Fomin, N F Shul'ga,
B M Bolotovskĭ, B L Ioffe, E L Feĭnberg*