

Aleksandr Il'ich Akhiezer (on his eightieth birthday)

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Academician of the Academy of Sciences of Ukraine Aleksandr Il'ich Akhiezer, a prominent Soviet theoretical physicist, attained his eightieth birthday on 31 October 1991.

The scientific activity of A. I. Akhiezer began in 1934 in Khar'kov at the Ukrainian Physico-Technical Institute (UPTI) the head of whose theoretical division was L. D. Landau. Aleksandr Il'ich successfully passed the famous "Landau theoretical minimum" and was given by L. D. Landau as the subject of his first scientific work the problem of the scattering of light by light in the region of high frequencies (the low-frequency region has been already investigated by Euler and Heisenberg). The problem was not a simple one as this was an effect of the fourth order of perturbation theory and in addition to the purely computational difficulties one had to eliminate the divergences. This was successfully accomplished with the aid of the requirement of gauge invariance, and the problem was completed with the participation of I. Ya. Pomeranchuk. A brief report of the results of their first joint paper was published in 1936 in *Nature*. At the same time A. I. Akhiezer together with I. Ya. Pomeranchuk investigated the process of coherent scattering of γ rays by nuclei.

In the 1930's the UPTI became one of the leading physics institutes, maintained contacts and exchanged specialists with the leading physics centers of our country and of Europe. Among the guests who came to work for long periods were such prominent physicists as V. Weisskopf, R. Peierls, G. Placzek, B. Podolsky, F. Houtermans and others. Conferences were arranged in which among the participants were N. Bohr, P. A. M. Dirac, V. A. Fock, I. E. Tamm, Ya. I. Frenkel, G. A. Gamov, P. L. Kapitza, I. V. Kurchatov, and others. Interaction with Landau and other outstanding physicists, and the creative atmosphere prevailing in the institute, favored the development of A. I. Akhiezer as a scientist, and the flowering of his talent.

In 1936 he defended his candidate's dissertation, in 1938 he was placed in charge of the theoretical division of the UPTI (until 1988), and in 1940 he defended his doctoral dissertation and was appointed (concurrently) to be in charge of the department of theoretical physics of Khar'kov University (until 1975).

At the end of the 1930's the interaction of ultrasound with crystals became a central theme of the scientific interests of Aleksandr Il'ich. In 1938 he solved the problem concerning the energy of quasiparticles in a crystal in which a low-frequency sound wave propagates. A. I. Akhiezer showed that the sound field modulates the energy of the quasiparticles so that this energy becomes a function not only of the quasimomentum, but also of the coordinate of the



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quasiparticle. He developed a kinetic equation for the quasiparticle, established the H -theorem for a gas of quasiparticles and developed the kinetic theory of the absorption of the energy of the sound in insulators and metals. The mechanism of absorption due to the modulation of the energy of the quasiparticles by an external field is known in world physics literature as the "Akhiezer absorption mechanism."

During World War II, A. I. Akhiezer lived in Alma-Ata working at the UPTI evacuated there, and taught in the Kazakh Mining Institute. In 1944 he was called back to Moscow where he worked (together with I. Ya. Pomeranchuk) in the laboratory of I. V. Kurchatov (the I. V. Kurchatov Institute of Atomic Energy). During the "Moscow period" of A. I. Akhiezer's life, he and I. Ya. Pomeranchuk began working at the invitation of I. V. Kurchatov on the problem of scattering of slow neutrons in crystals. They established (independently of E. Fermi) the possibility of obtaining "cold" neutrons, and also developed the theory of refraction of neutrons and the theory of resonance absorp-

tion of neutrons in homogeneous media. In 1947 A. I. Akhiezer and I. Ya. Pomeranchuk wrote a book (not published at the time) "The Theory of Neutron Multiplying Media." A small portion of the material from it was incorporated in their book "Some Problems of the Theory of the Nucleus" (1948 and 1950) which was awarded the L. I. Mandel'shtam Prize of the Academy of Sciences of the USSR. Many generations of nuclear physicists studied this book.

After returning to Khar'kov, Aleksandr Il'ich continued to maintain close contact with the Moscow physicists, and he and his pupils reported on their work at the seminars of L. D. Landau and I. Ya. Pomeranchuk. The field of activity and the scientific interests of A. I. Akhiezer became very broad. They include quantum electrodynamics and the physics of elementary particles, nuclear physics and the theory of linear accelerators, solid state physics and magnetism, plasma physics and magnetohydrodynamics, the theory of the interaction of charged particles with crystals.

Of great significance are the monographs and reviews by A. I. Akhiezer, using which, more than one generation of physicists received their training. The book "Quantum Electrodynamics" which he wrote together with V. B. Berestetskii which went through four editions in the USSR and which has been translated into many foreign languages, is

one of the best monographs on quantum field theory. A. I. Akhiezer (as a coauthor with his pupils and colleagues) has written more than 15 monographs and textbooks in different fields of theoretical physics, and a number of popular science books.

The contribution of A. I. Akhiezer to the preparation of scientific manpower for our country is very great. His pedagogical activity lasted without interruption for more than half a century. He is one of the founders and guiding spirits of the Khar'kov school of theoretical physics. Many pupils of Aleksandr Il'ich work in Kiev, Tbilisi, Leningrad and Novosibirsk. Among them there are 7 academicians and corresponding members of the Academy of Sciences of Ukraine, more than 25 doctors of science. He has been elected a member of the Creative Academy of the USSR.

For his considerable scientific attainments, and for his scientific-pedagogic activity, A. I. Akhiezer has been awarded two Orders of the "Red Banner of Labor," the Order of "Badge of Honour" and several medals.

The pupils and colleagues of A. I. Akhiezer wish him good health and further creative successes.

Translated by G. M. Volkoff