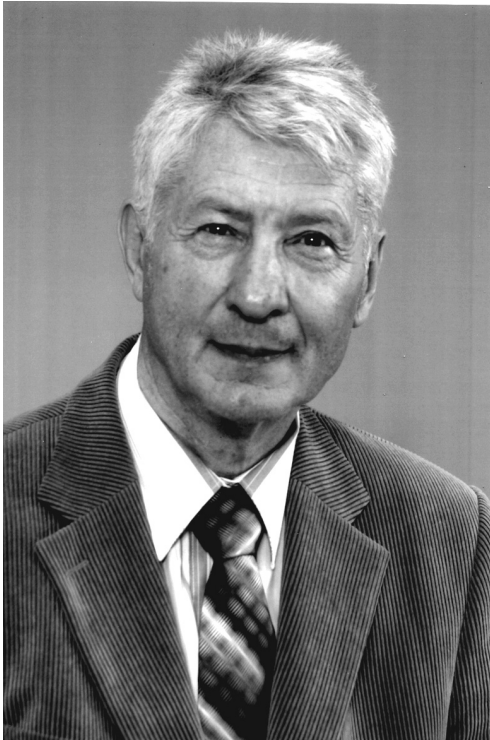

OLEKSANDR STEPANOVYCH BAKAI (on his 70th birthday)



On September 16, 2008, the famous Ukrainian physicist-theorist, Corresponding member of the National Academy of Sciences of Ukraine, Doctor of Phys.-Math. Sci., Professor Oleksandr Stepanovych Bakai celebrated his 70-th birthday.

O.S. Bakai was born in the family of a biologist in a town of Kharkiv. After leaving a secondary school, he entered the Phys.-Math. Faculty of Kharkiv State University in 1956. After the graduation of the University in 1961, O.S. Bakai was assigned to work at the Department of Theoretical Physics of the Kharkiv Physico-Technical Institute [now the National Scientific Center (NSC) "KhFTI" of the NASU]. The subsequent scientific and public activities of Oleksandr Stepanovych

were closely connected with KhFTI. At the Institute, he passed the way from a junior scientific researcher to Head of a laboratory (1976) and Head of a theoretical department (1981). From 1977 till 1999, O.S. Bakai lectured simultaneously at Kharkiv State University; in 1987, he was given the scientific degree of Professor. Its scientific activity includes a number of fundamental and applied studies of the nonlinear dynamics, theory of adiabatic invariants, plasma physics, condensed-matter theory, radiation physics, materials science, and nuclear power industry.

The first scientific work of O.S. Bakai was executed under the guidance of D.V. Volkov and dealt with the Regge theory. Then O.S. Bakai was enlisted, by the proposition of Head of a theoretical department O.I. Akhiezer, in the calculations of both magnetic structures and the dynamics of the movement of electrons in a high-energy linear accelerator which was planned to be constructed at KhFTI. O.S. Bakai together with G.Ya. Lubarsky, as a scientific supervisor, carried out the studies of stochastic effects in the motion of particles in a storage ring for electrons and positrons with energies up to 2 GeV.

In 1964–1966, O.S. Bakai executed a cycle of theoretical works on the dynamics of nonlinear systems which undergo the action of periodic and random perturbations. The results were used in calculations of the "lifetime" of particles moving in a storage ring.

In 1967–1975, O.S. Bakai studied nonlinear wave processes. Oleksandr Stepanovych developed some mathematical models of the nonlinear systems of waves which interact with one another. These results were applied to the description of the nonlinear dynamics of a plasma, beam-plasma systems, and magnetoactive media. In addition, he advanced the theory of parametric instability of spin waves and discovered the effect of nonlinear breaking of the symmetry of a spectrum on the parametric instability of spin waves. These studies resulted in his doctoral dissertation (1972).

O.S. Bakai constructed, for the first time, the nonlinear theory of the evolution of waves of the Bernstein-Green-Kruskal type. O.S. Bakai established a criterion of validity of the quasilinear approximation, described the transition of a weak turbulence into a moderate one, and deduced the equations of a moderate turbulence.

The subsequent works of O.S. Bakai are devoted to the theory of adiabatic invariants. In particular, he developed the method of integral manifolds in the theory of adiabatic invariants. From the middle of the 1980s, the scientific interests of O.S. Bakai concentrated on actual problems of the physics of amorphous bodies and materials science, the special attention being given to the structural materials of nuclear reactors. In the field of radiation physics, Oleksandr Stepanovych developed the kinetic methods to describe the structural-phase evolution of alloys under conditions of the reactor radiation. In particular, O.S. Bakai and his disciples constructed the structural-phase diagrams for a number of binary alloys under the action of radiation and established the presence of strong (as compared with thermodynamic fluctuations) heterophasic fluctuations. Just the latter define the mechanical properties and the radiation resistance of structural alloys. The theory developed by O.S. Bakai presents the physical basis for the long-term predictions of the behavior of reactor materials.

O.S. Bakai constructed the theory of recombination centers with variable polarity clarifying the increase in the radiation resistance of steels on their doping by rare-earth elements, which was discovered by physicists of NSC KhFTI, and proposed the theory of the phenomenon of induced polymorphic transformation on the implantation.

O.S. Bakai realized his theoretical studies in the close contact with experimenters of the Institute of Solid State Physics, Materials Science, and Technologies of NSC KhFTI. There, a radiation installation to study the effect of radiation on the corrosion of structural alloys, in particular to test the materials used in liquid-salt reactors, was constructed under the scientific guidance

of O.S. Bakai and with its active participation. O.S. Bakai takes the active participation in the formation and substantiation of the conception of the development of a safe nuclear power industry in Ukraine.

The weighty results were obtained by Oleksandr Stepanovych in the theory of amorphous media. For example, his works formulated a polycluster model of amorphous solids and presented the theory of mechanical, kinetic, and thermodynamic properties of polyclusters. O.S. Bakai advanced the theory of low-temperature polyamorphous transitions in glass and successfully used it for the description of the polyamorphism of orientation properties of glass. On the basis of the fluctuonic model of heterophasic fluctuations, he developed the theory of heterophasic states which was confirmed by numerical experiments.

For more than 25 years, O.S. Bakai has guided a theoretical department at O.I. Akhiezer Institute of Theoretical Physics of NSC KhFTI and has founded the scientific school on theoretical radiation physics. O.S. Bakai is the author of about 300 scientific works and 4 monographs. The scientific and scientific-organizational activities of O.S. Bakai have got a well-deserved recognition. His scientific works are marked by the State Prize of Ukraine in the field of science and technique for 1992 and O.I. Leipunsky Prize of the NAS of Ukraine for 2008. From 2007, O.S. Bakai is a member of T.G. Shevchenko Scientific Society. He has rank of Soros Professor (1996) and is a member of the editorial boards of a number of scientific journals.

The scientific community sincerely congratulates Oleksandr Stepanovych on his jubilee and wishes him good health and new scientific achievements.

V.G. Bar'yakhtar, I.M. Neklyudov, V.M. Loktev, A.G. Naumovets, A.G. Zagorodny, M.F. Shul'ga, Ya.S. Yatskiv, V.M. Azhazha, I.O. Vakarchuk, I.M. Vyshnevsky, A.M. Dovbnya, V.F. Zelensky, O.M. Egorov, I.M. Karnaukhov, I.M. Mryglod, S.V. Peletminskii, V.V. Slyozov, E.V. Sobotovych, K.M. Stepanov, V.Yu. Storizhko, V.I. Tereshin