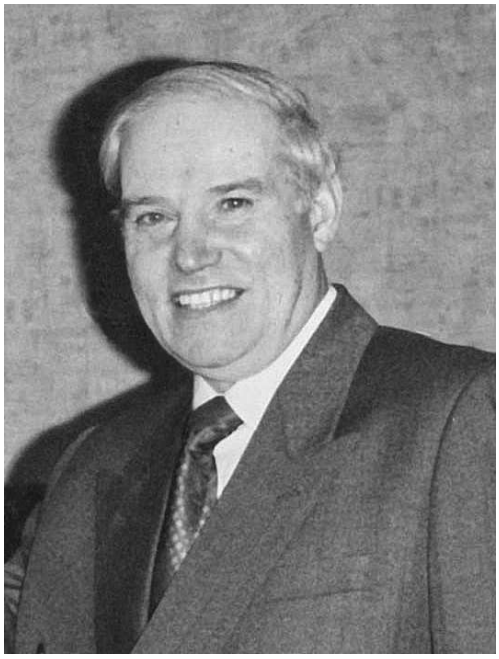
ERNST ANATOLIIOVYCH PASHITSKII
(to the 70th Anniversary of his Birthday)



On December 16, 2006, Ernst Anatoliiovych Pashitskii — the principal scientific researcher of the Department of Physics of Magnetic Phenomena at the Institute of Physics of the National Academy of Sciences of Ukraine, Doctor of Science in physics and mathematics, Professor — was 70 years old.

E.A. Pashitskii is a physicist with an extremely broad scope of scientific interests. After having graduated from the Faculty of Physics at the Taras Shevchenko Kyiv State University in 1959, he started his scientific activity as a theorist of the laboratory of plasma physics of the Institute of Physics of the AS UkrSSR. Later, at the post-graduate course at the I.V. Kurchatov Institute of Atomic Energy (Moscow), E.A. Pashitskii passed through the school of not only his direct scientific supervisor A.B. Mikhailovskii, but also of Academician M.O. Leontovich — Head of the Plasma Physics Sector at the IAE. In 1965, after finishing the postgraduate study, he returned back to the IP in the Department of Gaseous Electronics. Here, in 1966, E.A. Pashitskii defended his PhD thesis entitled "Issues of the Stability Theory of Nonequilibrium Plasma". In this work, a lot of instabilities in the nonequilibrium and spatially inhomogeneous plasma with charged particle beams in an external magnetic field was analyzed and classified, and a number of important methodological results were obtained. In particular, it was formulated firstly electrodynamic boundary conditions describing precisely collective beam-plasma interaction.

Soon after having defended the thesis, E.A. Pashitskii, continuing to work in plasma physics, turned his attention to the physics of superconductivity (SC). In 1968, he proposed a new, plasmon (non-phonon) mechanism of Cooper pairing between electrons in degenerate semiconductors (semimetals). Later on, he considered the opportunity of its implication as the basis of high-temperature superconductivity (HTSC) in various systems, including layered mesoscopic structures metal–insulator. In 1974, E.A. Pashitskii defended his doctoral thesis "Collective Effects and Superconductivity in Systems with Coulomb Interaction", where this problem has been studied regularly and consistently.

In the following years, he together with his disciples carried on the theoretical researches of various problems of solid state physics and surface science. Among new directions of his activity, the problems of Coulomb correlations and magnetic ordering in metal and semiconductor systems, the screening of Coulomb interactions in low-dimensional systems, the problem of excitonic insulator, and charge density waves should be noted. In the branch of surface science, he studied the phenomena of adsorption on a metal surface, image forces in three-layer systems taking the spatial dispersion of dielectric permittivity into account, the interaction of adsorbed atoms through a substrate for various shapes of the Fermi surface of the latter. In 1987, E.A. Pashitskii was awarded the State Prize of the UkrSSR in the domain of science and engineering for his works, where the formation of experimentally found long-period chain structures in submonolayer films composed of atoms adsorbed on the transition metal surfaces was explained as a consequence of the emergence of static charge density waves (the so-called Friedel oscillations) in metals with small flat "pockets" on the multiply connected Fermi surface.

Nevertheless, various aspects of the SC theory always took a distinguished place in the versatile scientific activity of E.A. Pashitskii. In particular, he studied the influence of the spectral function shape

of bosons that participate in pairing on the critical temperature, a competition between superconducting and dielectric order parameters, some issues of the two-band SC problem. After the real HTSC having been experimentally discovered in layered cuprate oxides in 1986, E.A. Pashitskii and his colleagues from the Laboratory of Imperfect Crystal Theory (headed by him) turned to the theoretical researches of various anomalous properties of those compounds, regarding the latter as objects where the Coulomb (plasmon) mechanism of SC could be realized. The features in the one-particle electron spectrum of cuprates (the so-called extended saddle-point singularities) were demonstrated to give rise to the appearance of acoustic plasmons in the collective electron spectra of those compounds; the acoustic plasmons, in their turn, favor the electron pairing through the d-wave channel. Such Coulomb mechanism should make an important contribution to high values of the critical temperature of these compounds.

Along with the microscopic theory of HTSC, E.A. Pashitskii is also engaged in a more applied problem of achieving high critical currents in epitaxial YBaCuO films. He assisted in the development of the idea of two competing mechanisms that restrict the critical current in such films: owing, firstly, to the collective pinning of the vortex lattice on the edge dislocation grid and, secondly, to the confined transparency of low-angle boundaries for the superconducting current. For the last mechanism he elaborated the theory of a current between non-superconducting cores of dislocations, taking the proximity effects into account in the framework of the Ginzburg–Landau theory. E.A. Pashitskii also studied the problem of HTSC in fullerenes (the Jahn-Teller mechanism) and proposed a model of anomalous conductivity and SC in semiconductor mesoscopic structures — layered superlattices and "sandwiches" made up of metal monochalcogenides.

The scope of E.A. Pashitskii's scientific interests also includes the theory of superfluid Bose liquids. While considering the concept of many-particle correlations in liquid helium, he demonstrated that a sharp growth of the repulsion between molecules at their approach to one another can lead to a sign-variable interaction in the momentum space, which is an analog of Friedel oscillations in the usual coordinate space. Recently, E.A. Pashitskii has fulfilled a cycle of researches concerning the quantum states in two-dimensional (2D) electron systems, which are embedded into a quantizing magnetic field, when either the integer or fractional quantum Hall effect is realized. In those works, he succeeded in explaining a number of features in the behavior of Hall resistance as a consequence of the formation of local electron pairs at a partially occupied Landau level owing to the interaction between 2D-electrons and surface phonons at the semiconductor heterostructure interfaces.

Among the scientific hobbies of E.A. Pashitskii, a special place is occupied by the problems of classical hydrodynamics. In the framework of the Navier–Stokes equations, he managed to obtain a solution which simulates such natural phenomena as a tornado and a tropical hurricane. He attempts to apply a similar approach to studying the Earth's mantle in order to forecast catastrophic earthquakes and eruptions.

Now, E.A. Pashitskii is keen on explaining the results of experiments which revealed the electric activity in superfluid helium, when the second sound waves were excited therein. In so doing, he proceeds from the idea of the latent entropy which arises in a mixed state of almost degenerate many-particle condensates.

It should be noted that a substantial part of almost 200 papers published by E.A. Pashitskii in leading physical journals was written together with various co-authors. In most cases, E.A. Pashitskii was the "generator of ideas" and the initiator of fruitful cooperation. He is the most active participant of scientific seminars; he is always ready to apprehend a new interesting result of another lecturer and to share his encyclopaedic knowledge in the diverse domains of fundamental physics with the audience. His erudition has revealed itself in full measure when he worked as the assistant to the editor-in-chief of the Encyclopaedic Dictionary "Solid State Physics" (in two volumes), published in 1996–1998. For this fundamental work, he was awarded the S.I. Pekar Prize of the Presidium of the NASU in 2005.

Since 1976, E.A. Pashitskii has been actively engaged in pedagogical activity. He lectures the courses on the superconductivity and superfluidity theory and the theory of low-dimensional mesoscopic quantum systems at the Faculties of Radiophysics and Physics of the Taras Shevchenko Kyiv National University. In 1991, E.A. Pashitskii was conferred the rank of Professor.

We wish Ernst Anatoliiovych Pashitskii a sound health, personal happiness, and a plenty of years for the fruitful work in favor of the Ukrainian science and education.

Friends and colleagues