transitions of metals from the superconducting to the normal state under the action of magnetic fields. He produced a theory of first-order quantum transitions at low temperatures, when quantum tunneling processes rather than the usual thermal-activation mechanism assume the principal role in the nucleation of the new phase.

His interest in the theory of phase transitions naturally led Lifshitz to phase transitions in polymers—long molecules consisting of macroscopic numbers of links. As usual, Lifshitz's attention to the new field was accompanied by development of a fundamentally new approach based on the physically profound idea of treating the polymer chain as a partly equilibrated statistical system with volume interaction and linear memory. His series of papers on this subject, which are oriented to the physics of biopolymers, is at the center of attention of specialists in polymer physics and molecular biology. Molecular biologists are drawn to Lifshitz's work not only by the specific content of his most recent papers, but also by his deep general understanding of the physical problems underlying the functioning of cells, biological evolution, etc.

In 1967, Lifshitz was honored with the Lenin Prize for his work on the electronic theory of metals, as well as the international Simon Prize, which is awarded by the British Physical Society. The Presidium of the USSR Academy of Sciences awarded Lifshitz the Mandel'shtam Prize for his work on crystal lattice vibrations.

Lifshitz has always regarded himself as a member of the Landau School, to which he is linked by many years of scientific and personal friendship. Lifshitz has many students. His students and their students in turn are continually aware of their bond to Lifshitz, who never declines to take an interest in their work and give useful adivce. Lifshitz spent ten years of creative and teaching activity at Khar'kov. It is therefore natural that most of his students, whose scientific activity has not abated since his transfer to Moscow, should be concentrated at Khar'kov. It is Lifshitz's students who are responsible for the high level of solid-state theory at Khar'kov and who make Khar'kov one of the centers for theoretical physics.

Lifshitz is a full member of the Ukrainian Academy of Sciences. His removal to Moscow has not broken his bonds to the Ukrainian Academy or to its scientific institutes. He is essentially the chief Khar'kov solid-state theoretician.

Since 1969, Lifshitz has headed the theoretical division of the USSR Academy of Sciences Institute of Semiconductor Physics and taught in the Moscow State University Physics Department, where he organized the Solid State Theory specialty and has now guided it to maturity. Lifshitz carries a heavy scientific-organizational workload. He is chairman of the Scientific Council on the "Solid State Theory" problem in the Presidium of the USSR Academy of Sciences.

Many are familiar with the latitude, benevolence, kindliness, and availability of Il'ya Mikhaĭlovich and at the same time know him as a stern critic. His profound understanding of physics and his subtle intuition make conversations with him helpful even when they concern problems that would appear to be remote from theoretical physics. He has the ability to find the "theoretical-physics kernel" in a problem and to formulate problems rigorously in fields in which only intuitive, often not quite correct conceptions had existed before he turned his attention to them. Thus one may encounter metallurgical engineers, biologists, and, of course, theoretical physicists in his office in the Institute of Physical Problems, the entrance to which is never blocked by bureaucratic obstacles.

His colleagues, friends, and students extend their love, admiration, and respect to Il'ya Mikhaĭlovich on his birthday, wish him good health and happiness, and await new examples of his brilliance.

Translated by R. W. Bowers

Anatoliĭ Alekseevich Logunov (on his fiftieth birthday)

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December 30, 1976 was the fiftieth birthday of the prominent Soviet physicist and Academician Anatoliĭ Alekseevich Logunov. Logunov's scientific career has been organically interwoven with the origin and development of a promising new field of science—the physics of elementary particles.

Logunov's first scientific papers were devoted to the mechanisms of diffusion and acceleration of cosmic particles in the magnetized intergalactic medium. The analytic equations derived in these studies are widely used in investigating the propagation of cosmic particles.

During the 1950's, the dispersion-relation (d. r.) method was developed and substantiated for meson–nucleon scattering processes, making it possible to establish relationships between the differential and total cross sections of this process. These studies marked the beginning of a new approach to description of strong elementary-particle interactions based solely on the general principles of quantum field theory—microcausality, spectrality, and relativistic invariance.

Logunov made a fundamental contribution to the development of the d. r. method for various physical processes. For example, he was the first to establish and demonstrate the d. r. for photoproduction, virtual processes, and multiple production. This required the creation of special methods for analytic continuation of functions of many complex variables, methods consistent with the basic premises of quantum field theory. Demonstration of the d. r. for nucleon–nucleon scattering and various other important processes became possible as a result of Logunov's development of majoration technique, which made it possible to show that the analytic properties of all Feynman diagrams are determined by small numbers of lower-order graphs.

On the basis of d. r. in combination with the unitarity condition, he derived the system of equations that formed the basis for the theory of strong interactions for photoproduction processes in the medium-energy range.

Logunov showed that the general principles of quantum field theory can be used to obtain asymptotic relations for the complete and differential cross sections, as well as the polarizations in direct and crossing channels. He generalized the Pomeranchuk theorem of equality of the nucleon–nucleon and nucleon–antinucleon scattering cross sections for the physically observable case in which the total cross sections and the effective interaction radius increase with energy. The proof and establishment of the asymptotic relations are of fundamental importance, since their experimental verification may answer the question as to whether contemporary elementary-particle theory is valid at small distances. It is this that has given impetus to the intensive experimental research being done to verify the asymptotic relations in all of the world's major laboratories.

Logunov discovered dynamic equations for description of the two-body system in quantum field theory, which have since become known in the literature as the quasipotential Logunov–Tavkhelidze equations. The quasipotential concept is introduced to describe the interaction on the basis of these equations. Generally speaking, the quasipotential depends on energy, its imaginary part describing the inelastic virtual processes that are characteristic for quantum field theory. In the case of electromagnetic interactions, a regular method is given for construction of the quasipotential, making it possible to develop effective procedures for calculation of higher-order corrections for bound states in quantum electrodynamics. For the case in which the expansion in the coupling constant is inapplicable, Logunov studied the analytic properties of the quasipotential with respect to the energy and transferred momentum. This served as a basis for development of various phenomenological models describing strong interactions at high energies and both small and large scattering angles.

The genesis of the analytic properties and the asymptotic behavior of the scattering amplitude led Logunov to the discovery of gobal duality—finite sum rules that establish an integral relation between the resonances in one channel of the reaction and the resonances in the cross channel. This made it possible to predict the behavior of the scattering amplitude at high energies from experimental data obtained in the low-energy range. The finite sum rules were the point of departure for introduction of the local-duality notion, which serves as a basis for dual-resonance models in strong-interaction theory.

Logunov's pioneering work in the introduction and study of a special class of multiple processes—the inclusive reactions—opened up a new trend in study of the dynamics of strong interactions. In essence, this marked a new approach in theoretical and experimental study of multiple processes at high energies. Working from the general principles of quantum field theory, he established several important new properties and characteristics of the behavior of these processes at high energies. It was in the course of experimental study of inclusive processes at high energies that the fundamental similarity laws of the microscopic universe—scale invariance of strong interactions—were discovered. Theoretical and experimental studies of inclusive processes are being pursued intensively in all of the world's major scientific centers.

In addition to his productive scientific career, Logunov does a great deal of scientific-organizational and community work.

For many years, he has been a Professor at Moscow State University, where he gives much of his strength and energy to the training of youth. He has instructed a whole pleiad of talented physicists and founded a well-known scientific school.

Logunov was one of the founders of the Theoretical Physics Laboratory of the Joint Institutes of Nuclear Research, a leading theoretical center in the physics of the microscopic universe.

He has made an enormous contribution to the development of experimental facilties and the upgrading of particle-physics research in our country to a qualitatively new level. Logunov directed the creation of one of our largest scientific centers—the Institute of High Energy Physics (IHEP) at Serpukhov. The startup of the powerful IHEP accelerator in 1967, the elaboration of a scientific program with provision for extensive international collaboration, and its successful implementation have led us to new frontiers in high-energy physics.

Logunov's contributions to the development of Soviet science have been recognized by high governmental honors, the Lenin and State Prizes.

Logunov is a Vice President of the USSR Academy of Sciences and a Deputy to the Supreme Soviet of the RSFSR.

We wish him health and success in his work.

Translated by R. W. Bowers