Physics – Uspekhi **48** (11) 1199 – 1201 (2005)

PERSONALIA PACS number: **01.60.+q**

Ibragimkhan Kamilovich Kamilov (on his seventieth birthday)

DOI: 10.1070/PU2005v048n11ABEH005883

November 20, 2005 marks the 70th birthday of Ibragimkhan Kamilovich Kamilov, well-known physicist, Corresponding Member of the Russian Academy of Sciences (RAS), Chairman of the Presidium of the Daghestan Scientific Center of the RAS, Director of the Physics Institute of the Daghestan Scientific Center of the RAS, Honoured Scientist of the Russian Federation.

Kamilov was born on November 20, 1935 in the village of Kudali of the Gunib district of the Daghestan autonomous republic of the USSR (now the Republic of Daghestan). In 1952, he enrolled in the Physics and Mathematics Department of Daghestan State University (DGU). On graduating from the university in 1956, he was assigned to the Daghestan Branch of the USSR Academy of Sciences (now the Daghestan Scientific Center of the RAS). In 1961, Kamilov graduated from the postgraduate course of Moscow State University (MGU), where he was supervised by Professor V G Mikryukov. Then, he returned to DGU and rose there from lecturer to professor, Head of the Chair of Solid State Physics and Vice-Rector for Research Affairs.

As DGU Vice-Rector for Research Affairs, Kamilov contributed importantly to the expansion of higher education and science in the republic. He took the part of one of the organizers and then became the science supervisor of the Daghestan Interuniversity Experimental and Industrial Complex of the RSFSR Ministry of Higher Education. The scientific topics he personally supervised, including defense-oriented ones, were included into the long-term plans of fundamental research of the USSR AS, the RSFSR Ministry of Higher Education, and the USSR State Science and Technology Committee. Research programs and training of research workers received new impetus in the years when Kamilov was DGU Vice-Rector for Research Affairs. For this effort, he was awarded the Certificate of Gratitude, the Diploma of Merit, and the badge "For exemplary work in higher education in the USSR" by the RSFSR Ministry of Higher Education. In 1973, Kamilov enrolled in the DSc program of the MGU Physics Department. In 1975, he successfully defended his doctoral dissertation at MGU.

In 1988, Kamilov became Director of the academic Physics Institute, the largest in Daghestan and the only one in southern Russia. He carried out the large-scale task of drastic updating — he expanded experimental and theoretical research in the physics of phase transitions and critical phenomena in condensed media, nonequilibrium phase transitions, nonlinear dynamics, and synergetic processes in semiconductor systems. The scientific school in the physics of phase transitions that he created is well known in this country and abroad. The school gained the official status of the leading scientific school of the Russian Federation. Kamilov has authored or co-authored more than 500 publications, among them monographs, textbooks, review papers, invention certificates, and patents.

Ibragimkhan Kamilovich Kamilov

More than 30 doctorate and candidate degrees have been awarded to students under Kamilov's scientific leadership.

Kamilov has shown broad academic interests in studying a number of fundamental problems in solid state physics, magnetism, thermodynamics, and thermal physics.

Kamilov's pioneering work in the physics of magnetic phase transitions built the foundation for a new field of research — the physics of the magnetic critical state. His detailed studies of magnetic phase transitions, magnetic phase diagrams in the vicinity of the Curie point and the compensation point, as well as of static, dynamic and crossover phenomena in weak magnetic fields became widely known. Using the Landau – Ginzburg – Vonsovsky – Belov theory as the base, Kamilov conducted an analysis of the methods for determining spontaneous magnetization, magnetostriction, magnetic susceptibility and the Curie point from M-H-T data in the critical region. A principally new technique (the 'kink') of their determination was developed based on a phenomenon that Kamilov was the first to detect in the lower vicinity of the Curie point, namely, the constancy

Uspekhi Fizicheskikh Nauk **175** (11) 1255 – 1256 (2005)
Translated by V I Kisin

of magnetic susceptibility, magnetization, magnetostriction, and the magnetooptical Faraday effect in a wide range of temperatures in weak magnetic fields. This work laid the foundation of a new field of research — the physics of magnetically ordered crystals in weak magnetic fields.

Kamilov and his students used a detailed study of the static and dynamic properties of ferro- and ferrimagnets in the magnetic critical region to advance a unified approach to taking into account the interactions that perturb the ordering spin – spin interactions and to establish experimentally the universality classes of static and dynamic critical behavior of real magnetically ordered crystals. It was also shown that the external magnetic field in real ferro- and ferrimagnets can play the role of ordering, disordering and random fields. This approach made it possible to establish the main features of the effect of a magnetic field on the second-order phase transitions and to identify a number of multicritical points, including the Lifshitz multicritical point, as well as a range of crossover phenomena.

Another research field that grew out of Kamilov's work was the study of problems in magnetoelasticity and, especially, phase transitions and critical phenomena in compressible magnets. For this purpose, magnetoelasticity in the critical region was studied experimentally, and a static theory of similarity was created for the description of magnetoelasticity in the critical region, while new specific features were established in the critical behavior of the dynamic magnetoelasticity and in the effect of a magnetic field on them. Also, a magnetic analog of the Landau – Khalatnikov mechanism in a magnetic field above the Curie point was found and scaling equations of state for sound absorption in gadolinium were obtained for the first time.

Using all this information, the most comprehensive testing of universal similarity laws was carried out for the first time, the validity of the framework of the modern theory of critical phenomena was corroborated (scaling, renorm-grouping, and ε-expansion), and a number of scaling magnetic equations of state were constructed.

These and other results obtained by Kamilov jointly with his students were generalized and presented in a unique monograph *Statical Critical Phenomena in Magnetically Ordered Crystals* written together with Kh K Aliev, and in the fundamental publication *Phase Transitions and Critical Phenomena in Condensed Media*. Kamilov also wrote a number of authoritative review papers for *Physics – Uspekhi*. His personal contribution to progress in the modern physics of phase transitions and critical phenomena propelled the scientific school in Russia that grew in this field of physics to one of the leading positions in world science.

Kamilov conducted his research using unique experimental equipment, including facilities without analogs in other countries. His work covers practically every avenue in the physics of phase transitions in condensed media: in magnets, high-temperature superconductors, manganites, ferroelectrics, electronic semiconductors, as well as liquids and their mixtures. Structural and electronic Mott – Anderson phase transitions were studied in binary and multicomponent semiconductors at hydrostatic pressures of up to 90 kbar.

The laboratory of nonlinear dynamics and chaos that he created has in recent years carried out studies of synergetic processes in semiconductor plasmas in a strongly nonlinear nonequilibrium state at high over-critical parameters. Nonequilibrium and noise-induced phase transitions were studied in semiconducting systems with nonlinear characteristics.

Original and widely known and recognized results were obtained in all these lines of work. Kamilov's scientific, science managing, research and methodical efforts allowed him not only to create a leading scientific school in phase transitions physics in the Russian Federation, but also to transform the Physics Institute of the Daghestan Scientific Center of the RAS into one of the larger world centers for the study of phase transitions and critical phenomena in condensed media.

One of Kamilov's distinctive features is his openness to anything new and promising. The current stage of research conducted by him and his colleagues and students is characterized by the large-scale application of powerful and flexible techniques of computational physics for studying critical phenomena in models of complex spin systems. Kamilov published a series of well-known papers on thermal physics and semiconductor physics. He and his team defined a new class of semiconductors — quasi-zero-gap semiconductors in which the zero-gap state is induced by impurity centers. He developed and implemented an utterly novel principle for creating semiconductor diodes that are now known as thermostimulated diodes.

Kamilov's research work has been supported and highly praised by RAS Full Members A S Borovik-Romanov and S V Vonsovsky, Corresponding Member G A Smolensky, MGU Professor K P Belov, and other prominent physicists.

Kamilov's talent as an organizer has also been invaluable. It was on his initiative that the Chair of Solid State Physics opened at the DGU; he headed it for many years. He supervised the creation of and headed the laboratory that was part of both the Physics Institute and DGU, and the creation of the Center for High Technologies. In 2001, he created at the DGU Physics Department the base chair for the Physics Institute — the Chair of Magnetism and Phase Transitions Physics. The entire staff of the chair, headed by Kamilov, were his former pupils. He created the Division of Mathematics and Computer Sciences at the Daghestan Scientific Center of the RAS, and also the Collective Use Analytical Center. In addition, the Physics Institute set up the Physical and Technical Lyceum in the city of Makhachkala.

In his capacity as Chair of the Daghestan Scientific Center, Kamilov carried out a huge amount of work on solving important scientific managerial and technical problems of the Republic of Daghestan and the region in which it is incorporated, on the resuscitation and expansion of the Daghestan Scientific Center, on solving profound organizational problems at the Center, and on strengthening its reputation not only on the Russian scene but on the international level as well. His science and management activities on the scale of the RAS are also significant.

Kamilov has delivered a number of reports to numerous international conferences abroad and lectured at German and Yugoslavian universities.

He has been an organizer and the irreplaceable chairperson of traditional international conferences and seminars on magnetism and phase transitions that are regularly convened in Makhachkala, based at the Daghestan Scientific Center, the Physics Institute, and Daghestan State University. He sits at the same time on the organizing committees of many other international conferences. Kamilov is a member of science councils and divisions of the RAS, the American Physical Society, and the Royal Society of London, and is among the leaders of the Russian Physical Society. Kamilov is the Editor-in-Chief of the journal *The Bulletin of the Daghestan*

Scientific Center of the RAS, and has been the editor of monographs and other science publications. For many a year, he sat on the Commission of the Komsomol Central Committee conferring Lenin Komsomol Prizes for Physics.

The State has marked Kamilov's achievements with distinguished awards: the Orders of Badge of Merit and Friendship of Nations, and a number of medals. He was awarded a stipend by the President of the Russian Federation as an outstanding Russian scientist. He also received Diplomas of Merit from the Presidium of the USSR Academy of Sciences, the Ministry of Higher Education of the Russian Federation, and a number of organizations in Daghestan.

Friends and colleagues wish Ibragimkhan Kamilovich Kamilov many happy returns of the day and also wish him good health, vivacity, and further success in enriching Russian science.

K S Aleksandrov, Zh I Alferov,
A F Andreev, A A Boyarchuk, V L Ginzburg,
Yu V Gulyaev, V A Zayats, Yu A Izyumov,
G A Mesyats, A K Murtazaev, Yu A Ossipyan