

Nikolai Vasil'evich Karlov (on his 80th birthday)

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Nikolai Vasil'evich Karlov, Corresponding Member of the Russian Academy of Sciences, outstanding physicist and science manager, well-known representative of the Russian school of radiophysics and quantum electronics, celebrates his 80th birthday on October 15, 2009. N V Karlov's fundamental work expanded the ideas of this school to the new avenues of laser physics, nonlinear optics, the physics of gas lasers, and laser isotope separation.

N V Karlov was born on October 15, 1929 in Leningrad. His father, Vasilii Nikolaevich Karlov, was an aircraft designer with the Polikarpov Design Bureau, and his mother, Mariya Petrovna Makotinskaya, was a building construction engineer. In the pre-war years, the family moved to Moscow, following the move of the design bureau. In 1943, amid the hardships of the war years, N V Karlov began his working life as electrician at an aircraft production plant. Attraction to physics led him to the newly established Physics and Engineering Department of Moscow State University, which was later transformed into the Moscow Institute of Physics and Technology (MFTI in *Russ. abbr.*), from which he graduated in 1952. After a postgraduate course under S E Khaikin's supervision, in 1955 N V Karlov became junior researcher at the P N Lebedev Physical Institute (FIAN) and continued to work and progress there, later becoming senior researcher, sector leader, and head of department.

Since 1983, his name has been tied to the formation and maturation of the A M Prokhorov Institute of General Physics (IOFAN) that branched off from FIAN. In 1987, N V Karlov resigned from the position of IOFAN department head, as he was elected Chancellor of MFTI. There he worked on physics education and was re-elected to a second term in 1994. At the same time, N V Karlov was actively engaged in social activities and was elected to the first Soviet Parliament (1989–1991). Between 1995 and 1999, N V Karlov chaired the State Higher Attestation Committee of the Russian Federation.

N V Karlov's style in research, characterized by a profound theoretical approach closely combined with experiments and prospective applications, was largely formed at the phase of entering the world of research. He owes his high level of theoretical and general physics training to a large extent to the followers of L I Mandel'shtam's 'oscillatory' school, who worked then at the FIAN laboratory: M A Leontovich, S M Rytov, and A M Prokhorov. N V Karlov made an important contribution to the advancement of the Russian school of quantum electronics: he conducted a search for the most efficient materials (paramagnetic crystals) for quantum amplifiers in the



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microwave range, developed the theory of sensitivity of radio receiving systems, and determined the optimal conditions for reception of regular signals and noise. In 1976, N V Karlov was awarded the USSR State Prize for his work in quantum electronics.

In the mid-1960s, N V Karlov's research interests shifted to laser physics as his priority field. The first series of his publications in this field dealt with building high-power CO₂ lasers. These classic studies, conducted in collaboration with A M Prokhorov and colleagues at the department of oscillations, were carried out in the framework of a special program.

In the mid-1970s, Nikolai Vasil'evich Karlov broadened his scope of interests and turned, with the full support of Academicians A M Prokhorov and I K Kikoin, to laser isotope separation—a topic that was new both to himself and to the Institute. Integrated experimental studies were organized under his guidance in the three most promising areas of laser-assisted isotope separation: laser selective multistep atomic ionization, multiphoton resonance dissociation of polyatomic molecules in a strong infrared laser field, and laser-stimulated selective sorption/desorption of molecules on the surface.

The most original and significant results were obtained under N V Karlov's guidance in the study of multiphoton dissociation of molecules, when sharp resonances were discovered in the spectrum of multiphoton excitation of molecules; these peaks made it possible to achieve high isotopic selectivity of the separation process even for very heavy molecules (UF_6). Specially for this research project, the first-in-the-world high-power high-pressure tunable CO_2 laser was designed and built at the Institute of High-Current Electronics (located in Tomsk), headed at the time by Gennadii Andreevich Mesyats; the laser worked successfully in this study. The election of N V Karlov as Corresponding Member to the USSR Academy of Sciences in 1984 was an obvious recognition of his contributions to science.

Nikolai Vasil'evich Karlov began devoting more and more time to teaching even while he was still largely a researcher. In 1983, his famous *Lectures on Quantum Electronics* were published — a textbook which remains a desktop must, not only for undergraduate students but also for physicists beginning to work in quantum electronics. N V Karlov's efforts in teaching reached its peak after his election as Chancellor of MFTI. During his tenure as Chancellor, N V Karlov was able to implement several significant innovations at MFTI, such as adding to the curriculum an extended course on quantum electronics for MFTI undergraduates and courses of humanities for students in physics. He later published *A Book on the Moscow FizTekh* in which he described the creation and development of MFTI and the 'fiztekhn system' itself.

In 1994, N V Karlov was awarded the Order of Friendship for his scientific, pedagogical, and social activities.

N V Karlov has authored more than 300 research papers and 11 monographs; he is one of the most cited Russian physicists. The students and followers of the scientific school he created carry on their efficient research in many laboratories in Russia and abroad. Some of them have grown in stature to become self-sufficient leaders of research organizations and innovative bodies.

Sending our best wishes to Nikolai Vasil'evich on this jubilee, we feel certain of his forthcoming creative achievements, and wish him excellent health for many years to come.

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