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Evgenii Borisovich Aleksandrov (on his seventieth birthday)

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Evgenii Borisovich Aleksandrov, an outstanding physicist and full member of the Russian Academy of Sciences (RAS) had his 70th anniversary on April 13, 2006. He has made important, internationally recognized contributions to progress in atomic spectroscopy, laser physics, quantum electronics, and magnetometry.

Aleksandrov was born in Leningrad into the family of Boris Petrovich Aleksandrov, a scientist on the staff of the Leningrad (now the A F Ioffe) Physico-Technical Institute (FTI), and Nataliya Yemelianovna Kirichinskaya, a mathematics school teacher. In 1954, he enrolled at the Physics and Mechanics Department of the Leningrad Polytechnic Institute. After graduation in 1960, he went to work at the Vavilov State Research Institute for Optics (GOI), where he started as an engineer, then rose to junior then senior research scientist, to head of Laboratory of Atomic Radio-Optics Spectroscopy and the GOI Deputy General Director for fundamental research. In 1999 he became head of a laboratory at the Ioffe Physico-Technical Research Institute, still having his laboratory at the GOI.

Aleksandrov's very first publications on the optical orientation of atoms established him as a brilliant experimenter, master of sophisticated modern techniques, profoundly feeling the physics of the phenomena he worked with. He was the first to observe the effects of the interference of nondegenerate atomic states (quantum beats) and a sequence of coherence resonances (parametric, phase, and nondiagonal resonances) and introduced them into high-resolution spectroscopy. Together with his co-authors, he developed a theory of these phenomena. Using them not only led to deeper understanding of atomic structures but also allowed experimenters to measure atomic constants with an accuracy as high as that of radiospectroscopic methods (lifetimes, Stark splitting, gyromagnetic ratio). Quantum beats and coherence resonances effects marked the emergence of a new field in high-resolution atomic spectroscopy. Many of the results obtained by Aleksandrov himself or under his guidance form the basis of important new venues of research and novel experimental techniques. This work brought him recognition and an excellent reputation in the science community. In the 1970s, Aleksandrov and his team expanded their work in spectroscopic studies of intensity fluctuations in optical fields as a result of the coupling of radiation to atoms and systems of molecules. This led to the creation of laser-based methods for studying particle dynamics in gases and liquid media; these are now used to study uniform linewidths, line broadening, and the structure of states of atoms and molecules. This direction of research was being developed as a natural extension of beat spectroscopy in combination with laser spectroscopy.

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Evgenii Borisovich Aleksandrov

In his work on radiooptical spectroscopy, Aleksandrov provided the explanation of the mechanism by which strongly nonequilibrium distributions of atomic populations over the sublevels of the ground state of atoms are spontaneously generated in gas discharge. The causes of this phenomenon were identified: the radiation-produced population of sublevels of the ground state, which is nonequilibrium under the conditions of trapped resonance radiation.

The study of paramagnetic centers in transparent dielectrics led Aleksandrov to develop a highly sensitive laser polarimetry technique and to discover a nonordered Larmor precession of fluctuating magnetization in equilibrium paramagnets.

Aleksandrov was specifically drawn to working with high-precision and high-sensitivity quantum magnetometry of weak fields for almost his entire life in science. Having begun with the idea of measuring vanishingly weak fields by the method of 'intersecting energy levels,' Aleksandrov then switched to the practically very important task of measuring the earth's magnetic field. This project resulted in designing several types of record-precision and highly sensitive magnet-

ometers for both stationary observatory monitoring and aeromagnetic mapping. These instruments were often used in Russia but even more often abroad. In 1989, he took part in the polar expedition SP-30 for testing pilot models of the magnetometer on a floating ice field in the Arctic; he was able to obtain some unique information on spatial correlations of the variations of the Earth's magnetic field.

After many years of exquisitely subtle and precise experiments, Aleksandrov and his team of colleagues created magnetometers with unique sensitivity, accuracy, speed, and resolving power. The maser-type potassium magnetometer with the resolution 5 fT $Hz^{-1/2}$ possesses high absolute magnetic field measurement accuracy. Using this instrument as a basis, Aleksandrov proposed a concept for the rapid and efficient measurement of magnetic field components.

Aleksandrov developed the theory of multiquantum resonances in nonequidistant systems of magnetic sublevels and suggested and implemented the use of four-quantum resonance in the potassium ground state for further improvement of the metrological potential of quantum magnetometry.

Aleksandrov has also published a number of papers in other fields of fundamental physics, for instance, concerning constraints on the existence of massless axions and holography.

An outstanding physicist with an impressive range of interests, Aleksandrov has spent considerable energy on rejecting the pretensions of all sorts of pseudoscientific ideas that attempt to denounce the authority of genuine science. He has often exposed the fallacies of so-called torsional fields and the accompanying speculations. Even in the dark Soviet times, he dared to raise his voice against a number of initiatives of 'shadow' science, despite active lobbying by the military-industrial establishment; and he continues to adamantly resist pressure from any 'authority' among the false-science clique.

Aleksandrov caused quite a stir in the world press by denouncing certain fashionable discoveries of the phenomena of deceleration and stoppage of light; together with V S Zapassky, he suggested crystal-clear physical mechanisms of the effects announced by the authors of such publications, excluding any mysticism in describing the nature of the distortion of light pulses in nonlinear media.

He has achieved very much in training new generations of scientists. He created a science school in the field of atomic spectroscopy and quantum electronics. This school comprises young scientists in research institutions such as the Vavilov GOI, the Ioffe FTI, and Sankt-Petersburg State University, at which Professor Aleksandrov for many years held a course of lectures on radiofrequency methods of atomic spectroscopy and magnetometry. There can be no doubt that he is a gifted orator and polemicist; his profound and expressive talks, delivered in rich language, always attract listeners. His active participation in various science forums that are powered by young science audiences provides a stimulus for progress in the creativity of young scientists. Aleksandrov's characteristic traits concerning his research and academic activities are simplicity, sincere interest, and undisguised friendliness in communications with his young and not so young colleagues; he combines this with insistence on the highest standards and applies them first and foremost to himself.

Since 1983, Aleksandrov has been Editor-in-Chief of the Academy's journal *Optics and Spectroscopy*; he does everything necessary to maintain the high international rating of this publication achieved by his illustrious predecessors at this post, S E Frish and P P Feofilov. He sits on the editorial boards of the physics journals *Physics Uspekhi, Pisma v ZhETF*, and others. He has published more than two hundred papers and two monographs, *Interference of Atomic States* (with G I Khvostenko and M P Chaika; Moscow: Nauka, 1991; Springer Verlag 1993) and *Laser Magnetic Spectroscopy* (with V S Zapassky; Moscow: Nauka, 1986), and holds author certificates and patents on his inventions.

Aleksandrov was elected a corresponding member of the USSR Academy of Sciences in 1979; in 1992, he became a full member of the Russian Academy of Sciences. His intense science-administration activities involve working on program committees of various international conferences on optics, on qualifications councils, and on academic commissions.

Aleksandrov is an Invited Professor of the Miller Institute of Basic Research in Science with the University of California, Berkeley, USA and an honorary member of the London Institute of Physics. His work was rewarded with the Rozhdestvensky Prize of the USSR Academy of Sciences, the USSR State Prize, the International Hanle Prize, and the Alexander von Humboldt Award. He was also given the orders of Sign of Honor and Friendship Among Peoples.

We extend best wishes to Evgenii Borisovich Aleksandrov from the bottom of our hearts on his milestone jubilee; we wish him good health and success in every field for his untiring effort promoting the good of Russian science.

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A G Zabrodskii, V S Zapasskii, A A Kaplyanskii,
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