

OBITUARY

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In memory of Vitalii Sergeevich Zuev

Professor Vitalii Sergeevich Zuev – doctor of Physics and Mathematics, academician of the Russian Academy of Natural Sciences, prominent scientist in the field of laser physics, principal researcher at the P.N. Lebedev Physics Institute and author of numerous scientific papers and two monographs – died suddenly at the age of 80 on 28 March 2014.

Vitalii Sergeevich Zuev was born in Minsk on 11 July 1933. In 1957 he graduated from the Department of Radiophysics at the Moscow Institute of Physics and Technology. Since 1956, when he began his scientific career as a member of the group headed by N.G. Basov, and till the last day of life Vitalii Sergeevich has led active scientific work at the P.N. Lebedev Physics Institute. He defended his Ph.D. thesis in 1964 and his doctoral thesis in 1970.

The research activity of V.S. Zuev is closely associated with the birth of quantum electronics, namely, the creation of first masers and lasers, as well as laser technology, including *Q*-switched lasers, which were used in the first experiments on laser thermonuclear fusion, as well as with the creation of shock-wave-pumped photodissociation lasers and the development of nonlinear optics of active media.

He developed the first maser working on a beam of deuterated ammonium molecules and the first domestic *Q*-switched laser. He discovered the superlight propagation of light pulses in a gain medium. Vitalii Sergeevich was one of the initiators of the design and development of high-power gas lasers pumped by open optical radiation sources, i.e., by intense shock waves and high-current electric discharges initiated directly in the working gas mixture. In 1970, he was directly involved in the creation of explosive photodissociation iodine lasers with a record-high pulse energy of 10^6 J in one beam, which has not been surpassed to this date. These lasers were used in full-scale experiments for detailed investigations of the force action of laser radiation on solid targets. The theoretical foundations of such lasers, developed by V.S. Zuev, were stipulated in his doctoral thesis. In 1973, the group headed by V.S. Zuev developed a nanosecond photodissociation iodine laser pumped by radiation of an open high-current electric discharge. This laser subsequently became the prototype of the most powerful domestic Iskra-5 laser facility launched by the All-Union Research Institute of Experimental Physics within the framework of the laser thermonuclear fusion programme. In subsequent years, a new class of gas lasers (called photochemical lasers) was developed with open optical pump sources, lasing in the spectral range from the near-IR to UV.

Vitalii Sergeevich Zuev made a significant contribution to the development of nonlinear optics of the active media of gas lasers. In the course of fundamental investigations of physical processes occurring in these media, V.S. Zuev and his co-workers discovered a new type of stimulated scattering of light, which they called stimulated enthalpy scattering. Upon such scattering, partial vibrations of a medium are excited not by the energy of the scattered light, but by the energy of light-controlled reactions. These investigations led to an increase by many orders in the radiant intensity of high-power gas lasers whose development was carried out by V.S. Zuev for many years under several large-scale research programmes in close cooperation with other academic and applied-research organisations.

Breadth of scientific interest and enthusiasm for new constantly made him search for new fields of application of his talent. Apart from the development of lasers, with characteristic energy so typical of him, he studied photoassociation spectroscopy, subwavelength localisation of objects in the optical and microwave scanning near-field microscopy, and surface plasmons and polaritons.

Education and scientific organisation have always played an important part in the activities of V.S. Zuev. He founded an efficient and creative collective of scientists – the sector of photochemical processes, which was later transformed into a laboratory. He was a member of the scientific council of the Academy of Sciences of the USSR on the problem of Coherent and Nonlinear Optics, a chairman of the Council of Young Scientists of the Lebedev Physics Institute, and a chairman of the State Examinations Board at the Department of Physics of the Moscow State University. As the head of a research school, he devoted considerable attention to the training of new highly qualified scientific personnel. More than a dozen Ph.D.s have obtained their degrees under his supervision.

Invaluable is the role of V.S. Zuev in the creation, establishment and development of 'Quantum Electronics' journal. For 15 years – the 'golden years of quantum electronics' – he was the deputy editor-in-chief of the journal, and for 15 years, until the end of the XX century, a member of its editorial board.

V.S. Zuev made a significant contribution to the development of quantum electronics. His research and organisational activity have earned him the order of the 'Badge of Honour', the USSR State Award, and the Mandelshtam prize. He was awarded the title 'Honoured Worker of Science of the Russian Federation'.

Both in science and in everyday life Vitalii Sergeevich was remarkably a decent and honest man, a trusted friend, ready to come to help at any moment.

His death is an irreparable loss for his friends and colleagues.

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