## PERSONALIA

## In memory of Andreĭ Vladimirovich Vinogradov

On April 5, 1997, Andreĭ Vladimirovich Vinogradov, a talented scientist and a remarkable person, passed away prematurely. Throughout his short life (he died at the age of 51), Vinogradov selflessly served science.

He graduated from the Faculty of Physics of Moscow State University in 1969 and was awarded an annual prize for the best diploma project. His career as a scientist — from the early steps until the last day — was linked with the Russian Academy of Sciences' Popov Institute of Physics where he set out on his creative path as a postgraduate under L V Keldysh's guidance.

Andreĭ Vladimirovich's works fall naturally into several cycles. The first cycle had to do with the electron mechanism of light absorption by dielectrics in the transmission region and provided a creative basis for his studies into the radiation strength of transparent optical materials. Relying on the modern theory of multiphoton transitions, he investigated the kinetics of light absorption by free charge carriers in dielectrics at high intensities. He was able to get a deep insight into the physical significance of the famous Drude equation, to define its range of applicability, and to demonstrate that the equation could hold under both a single-quantum and a multiquantum change in the energy of an individual electron as a result of collisions. He summed up this cycle in his candidate of science's dissertation. The studies he made in those years threw light on the breakdown mechanism of pure transparent optical materials, now known as electronic avalanche ionization. In this way, he developed a theory of the breakdown of intrinsic transparent dielectrics under the action of short laser pulses where multiphoton ionization becomes as important as its avalanche counterpart. In 1979, these studies won him the Lenin Komsomol Prize, the highest award for young scientists in the Soviet Union.

Vinogradov's second cycle of studies was devoted to Neumark relaxation and giant nonlinearities in solids and contributed significantly to solving a problem which remains topical even today. Among other things, these studies dealt with the interaction of ultrashort (femtosecond) light pulses with semiconductors.

In his last years, Vinogradov worked on the topical problems of quantum optics, laser physics, and the effect of laser radiation on matter. In particular, he contributed quite a lot to theoretical research on nonclassical states, such as the compressed states of light, the compressed states of the vibron motion of nuclei of molecules, and, especially, the superposition states of Schrödinger cat type photons and wave packets.

Andrei Vladimirovich was remarkably thoughtful and profound in tackling the problems that science and life

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Andreĭ Vladimirovich Vinogradov

posed him. This trait of his stands out with special clarity in the last studies he left to us as finished (but not yet published) papers and reports which sum up his findings on quantum optics, based on the pivotal principles of quantum electrodynamics. In particular, he set up the basic equations of macroscopic quantum optics in terms of non-equilibrium Green's functions allowing for the nonlinear interactions of electromagnetic waves in absorbing and dispersive media, and suggests how they can be solved. Thus, a solution is given to the problem of quantum noise at the output of a quantum parametric amplifier, the configuration of traveling waves fully according with the solution given in classical nonlinear optics. Importantly, it is based on a rigorous system of equations of quantum electrodynamics instead of the ordinarily used simplified model for one or several modes. His findings not only supplement the existing views on the physical picture of quantum-optical phenomena, but also provide a basis for the calculation of new effects essential in the production of compressed light with a large compression ratio.

Andreĭ Vladimirovich's works evoked a strong interest both inside and outside this country. From 1979, he regularly attended international conferences and presented invited papers. He visited universities and institutes in many countries, presented papers and delivered lectures in Hungary, Germany, the United States, Great Britain, South Korea, Italy, Finland, Switzerland, and Japan. The results of his work at the scientific institutions of those countries were summed up in pioneering papers written jointly with J Janski (Hungary), T Kobayashi (Japan), and S Stenholm (Finland).

Andreĭ Vladimirovich was also very active as a science organizer. He was a member of the organizing committees of all the international conferences on compressed states and uncertainty relations. At the 5th International Conference held in Budapest late in May this year, his last paper was presented and a special session was held to commemorate him.

Andreĭ Vladimirovich lectured at the Faculty of Physics of Moscow State University. Between 1972 and 1981, he gave lectures on interactions at the Department of Wave Processes, and in 1997 he drew up a syllabus for a course he called "an introduction to quantum optics", and managed to write and give several lectures.

Invariably considerate and composed, Andreĭ Vladimirovich attracted his opponents in scientific debates by his broad knowledge and his desire to share it with them. He was full of creative plans and would have accomplished many of them.

His friends and colleagues will remember Andrei Vladimirovich's selfless service in the name of science, encyclopedic erudition, and broad interests for ever.

N G Basov, L V Keldysh, O N Krokhin, A N Oraevskiĭ, V I Man'ko