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PERSONALIA

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In memory of Valentin Sergeevich Starunov

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Valentin Sergeevich Starunov, a talented experimenter and theoretician, chief research scientist, DSc in physics and mathematics, who devoted forty years of his life to research at the P N Lebedev Physics Institute of the Russian Academy of Sciences (FIAN), died on May 9, 2000 at the age of 66.

V S Starunov was born on March 25, 1935 in Kazatin of the Vinnitsa region, in a family of an army officer. His father was killed in World War II in 1943, so he was adopted and brought up by his uncle.

In 1953, having graduated from school, Valentin Sergeevich entered the Moscow Physico-Technical Institute, from which he graduated in 1960, majoring in optics.

The same year he started work at the P N Lebedev Physics Institute of the USSR Academy of Sciences, in the G S Landsberg Optics Laboratory, where he joined the team working on molecular scattering of light and molecular acoustics; the work was led by I L Fabelinskiĭ.

Starunov's first research work was devoted to studying the spectrum of light scattered by fluctuations of anisotropy; this is a continuous spectrum with a maximum at the non-shifted frequency and falling off on both sides following a relatively complicated law. This spectrum is known as the Rayleigh wing. At that time, the nature of this phenomenon was not understood and potential explanations offered in various laboratories of the world differed greatly.

Starunov's task was to carry out an experimental investigation of the Rayleigh wing, to attempt to clarify the nature of the phenomenon and at least obtain reliable experimental data.

Despite considerable experimental difficulties, Starunov created a nearly perfect set-up, prepared a suitable object of study and achieved reliable results. He carried out adequate processing of his experimental data that proved to be theoretically describable. He was the first to apply the Einstein – Fokker equation to analyze the effect of rotational motion of anisotropic molecules to scattered light spectrum. He also analyzed quantitatively the effect of librations of the molecules, which is responsible for the far side of the Rayleigh wing at the microscopical level. Starunov's experimental and theoretical work made it possible for the first time to give a physical interpretation of the two anisotropy relaxation times that characterize the Rayleigh wing at the microscopical level. Starunov's work was one of the best, perhaps the best effort that created order in this field; the author manifested a mature mastery of experimental and theoretical techniques.

In 1963 V S Starunov published his first paper "An interpretation of the spectral composition of light scattered by anisotropy fluctuations in liquids". Further progress in experimental work required excitation by narrow-spectrum high-intensity light. It was at this moment that D I Mash at the P N Lebedev Physics Institute reproduced the first He – Ne laser, which was an ideal light source for scattering excitation. It was this laser that was used to study the scattering spectrum; V S Starunov actively participated in this research. This was the pioneering work in which the Mandelstam – Brillouin spectrum was obtained; from the linewidth of this spectrum, the damping of hypersound in liquids at frequencies on the order of 10^{10} Hz was found and the hypersound velocity was measured more precisely then in earlier experiments. In this work the Mandelstam – Leontovich relaxation theory was firstly examined.

Valentin Sergeevich Starunov
(25.03.1935 – 09.05.2000)

V S Starunov's most important contribution was in studying the Rayleigh wing. He was one of the experimenters who discovered the fine structure of the Rayleigh wing. This was an unanticipated phenomenon, which was given a correct initial interpretation and which stimulated numerous publications from many laboratories around the world.

V S Starunov was very active in studying the discovered fine structure of the Rayleigh wing at low viscosity and the spectrum kinetics over a broad range of viscosity variation (from centipoise to 10^9 poise). The

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work yielded fundamental results that have significance for physics as a whole.

Together with his colleagues, V S Starunov carried out more research on molecular scattering of light and molecular acoustics. Among other things, they have measured the width and lineshape of depolarized lines of Raman scattering of light in liquids.

As solid-state lasers with ruby rods for the lasing medium began to emerge at our laboratories, unheard-of possibilities were created for studies in nonlinear optics, including those that begin with thermal kinds of light scattering.

After the accidental discovery of stimulated Raman scattering in 1962, the members of the team in which V S Starunov worked realized that all other types of scattering must produce induced nonlinear phenomena. The task that arose was to create a high-power pulse laser using low-quality ruby rods rejected by other teams. V S Starunov was one of the most active participants in tackling this problem. To their own surprise, they succeeded in building a solid-state laser that generated 300 MW in a 10-ns pulse. By that time (1964), however, American and Canadian physicists had already detected the stimulated Mandelstam – Brillouin scattering (SMBS).

Further work in which V S Starunov actively participated discovered such nonlinear phenomena as stimulated scattering of the Rayleigh wing and stimulated entropic scattering. V S Starunov developed the theory of these fundamental phenomena; the results are now in monographs and textbooks.

V S Starunov defended his PhD thesis in 1966 and his DSc thesis in 1998. He could have completed the latter much earlier but did not want the effort to slow down successful research.

V S Starunov actively contributed to almost all research efforts in nonlinear optics; for instance, he was in the team which obtained SMBS in compressed gases. This result overturned the reigning belief that components of the stimulated Mandelstam – Brillouin scattering cannot exist in gases.

Of special interest was the experimental and theoretical work on nonlinear optical phenomena in resonators, in particular the study of picosecond pulses caused by the synchronization of SMBS components.

V S Starunov continued his experimental and theoretical research till the end of his life. Alas, he never saw his last paper in print.

V S Starunov devoted considerable time to training students and postgraduates from various regions of this country. He was one of the organizers of a successfully operating laboratory at the Alisher Navoi Samarkand State University.

The achievements of Valentin Sergeevich Starunov will live in science; his name will not be forgotten.

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O N Krokhin, V V Morozov, P P Pashinin,
L P Presnyakov, L M Sabirov, I I Sobel'man,
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