ENVIRONMENTAL RESEARCH BY THE QUANTUM ELECTRONICS TECHNIQUE

EDITOR–IN–CHIEF FOREWORD

This thematic issue of the Journal is dedicated to the memory of prominent Soviet scientist Professor, Doctor in Physical and Mathematical Sciences Uno Khermanovich Kopvillem, who would be 70 years old on October 4, 1993.

Scientific interests of Uno Khermanovich were highly diversified. His works in the field of nonlinear coherent optics, quantum acoustics, radio–frequency spectroscopy, gravitation, and oceanography are widely known.

Meanwhile, the way of U.Kh. Kopvillem to science was not as smooth as ways of many of his colleagues. On graduating from the Kirov College of Education in 1951, he had been a schoolmaster for four years when he became a post–graduate of the Kazan' State University, which he successfully graduated from and defended Candidate's Dissertation on the problems of magnetic resonance in solids. Uno Khermanovich was at the peak of his scientific and educational activity in 1958–1973 when he was the Chief of the Department on Quantum Acoustics of the Kazan' Physicotechnical Institute and a lot of talented young scientists grouped round him. He defended Doctoral Thesis in 1966.

Photon echo predicted by U.Kh. Kopvillem and his scholar V.P. Nagibarov in 1962 was a turning point in coherent optics. In two years this phenomenon was experimentally detected and independently theoretically explained by American scientists N.K. Kurnett, I.D. Abella, and S.R. Hartmann. By now this discovery gave rise to two interesting leads for nonlinear optics, namely, optical spectroscopy and resonant informatics. For this reason two papers devoted to echo–holography are published in this thematic issue along with the papers devoted to the coherent phenomena in gases and liquids.

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Since 1975 till the end of his life U.Kh. Kopvillem had been working at the Pacific Institute of Oceanography of the Far–Eastern Scientific Center of the Academy of Sciences of the USSR. In Kopvillem's opinion, application of quantum electronics and quantum acoustics techniques to oceanology was to result in molecular approach to the study of the ocean. New parameters such as the proton relaxation times of water molecules, the parameter of acoustic nonlinearity, the coefficients of the spin Hamiltonian for the paramagnetic ions in sea water, the characteristics of an electric field of the atmosphere and its permittivity, as well as the characteristics of microseisms initiated by the waves of various origin were determined for the ocean.

Uno Khermanovich spent a lot of his creative power and energy to develop a unique device, namely, a laser deformograph capable of recording seismic waves of different intensities in a wide frequency range. Creative development of his ideas in this field is embodied in the papers of the present issue. U.Kh. Kopvillem had been the Chief of the Department and Laboratory engaged in physical phenomena occurring in the ocean and techniques for their study for about 15 years. He wrote two monographs which became widely known among scientific establishment.

The works that develop the ideas of Prof. U.Kh. Kopvillem in the field of coherent optics, acoustics, quantum radiophysics, radio–frequency spectroscopy of the atmosphere, ocean, and tectonite, and echo–holography as well as the methods of neutrino and fast charged particle detection in deep water, principles of marine geophysics, and methods for solving the problems arising at the interface of the above–enumerated fields of science have been included in this thematic issue.

A number of other papers written by the scientists who were the scholars of Prof. U.Kh. Kopvillem at different times were included in the thematic issue of the Journal *Izvestiya Vysshikh Uchebnykh Zavedenii, Fizika* **36**, No. 7, 1993 entitled *Interaction of Coherent Radiation with Matter*, which was also dedicated to the 70th birthday of this scientist.

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