Physics – Uspekhi **64** (8) 852 – 853 (2021)

PERSONALIA

PACS number: **01.60. + q**

In memory of Vladislav Ivanovich Pustovoit

DOI: https://doi.org/10.3367/UFNe.2021.07.039012

One of the most prominent scientists in the country, a leading specialist in the field of acoustoelectronics, acousto-optics, semiconductor physics, optoelectronics, and the theory of weak signal recording, a member of the Bureau of the Division of Nanotechnology and Information Technology of the Russian Academy of Sciences (RAS), a laureate of 5 (!) USSR and Russian Federation State Prizes, an academician of RAS, and a doctor of physical and mathematical sciences, Vladislav Ivanovich Pustovoit, passed away on July 5, 2021 at the age of 85.

V I Pustovoit was born on November 15, 1936 in Berdyansk (Dnepropetrovsk region, Ukrainian SSR, now Zaporizhzhya region, Ukraine). In 1959, he graduated from Dnepropetrovsk State University, and in 1963 from the postgraduate course of Lebedev Physical Institute of the USSR Academy of Sciences (FIAN) (Theoretical Department). In that same year, V I Pustovoit defended his candidate thesis, titled ''The Theory of Low-Frequency Wave Amplification in Semiconductors and Dense Plasma in the Presence of Drift.'' The thesis had been prepared under the guidance of Academician Vitaly Lazarevich Ginzburg (later the laureate of the 2003 Nobel Prize in physics).

In 1972, Vladislav Ivanovich defended his doctoral thesis, ''A Theory of Acoustic Wave Propagation, Amplification, and Generation in Semiconductors.'' In 1973, he was conferred the rank of professor, in 1990 he was elected a corresponding member of the USSR Academy of Sciences, and in 2006 became a full member of RAS in the Division of Informational Technologies and Computational Systems with the specialty 'scientific instrument engineering.'

In acoustoelectronics, V I Pustovoit, together with Yu V Gulyaev, suggested, for the first time in the world, the ideas of acoustic wave amplification. They laid the basis for a powerful direction of science and technology, which all over the world is currently referred to as acoustoelectronics. Now, it is the field of solid state physics and the technological basis of the new generation of functional devices of ultrafast energy-dependent information processing.

In acousto-optics, he solved problems regarding light diffraction by inhomogeneous acoustic waves and waves with sharp phase modulation in crystals. These physical models fostered the creation of new, more precise methods of spectral measurements using acousto-optic spectrometers. His ideas concerning collinear light diffraction by sound waves in crystals led to the creation of production of a whole family of quickly tunable optical filters and spectrometers in the UV, visible, and IR ranges, now called acousto-optic spectrometers.

After finishing the postgraduate course at FIAN, V I Pustovoit began working at the All-Russian Scientific Research Institute for Physical-Engineering and Radio-technical Metrology (VNIIFTRI). This gave birth to the scientific potential, which then led to considerable scientific and productive achievements. An original technology for producing acousto-optical elements was developed and applied in industry under the guidance of V I Pustovoit and with his direct participation; acousto-optic (AO) onboard (space, air, and marine) optical radiation spectrometers in the visible and IR ranges with record characteristics in spectral resolution, light-generating power, and operating speed were created on the basis of this technology for the first time in the world; AO systems of plasma-chemical process control in the production of giant-size integral systems were created and implemented; specialized acousto-optical laser systems for the simultaneous transmission of large information arrays through optical communication links were designed.

Vladislav Ivanovich Pustovoit
(15.11.1936 – 05.07.2021)

Investigated with the participation of V I Pustovoit and under his guidance was diffraction of light and X-ray radiation by acoustic waves in crystals with allowance for optical and acoustic anisotropy and the electron band structure. This made it possible to propose and create AO processors in the frequency range of $10^7 - 10^{10}$ Hz for a fast Fourier expansion of radio signals in real time and for

Uspekhi Fizicheskikh Nauk **191** (8) 899 – 900 (2021)
Translated by M V Tsaplina

Academician Vladislav Pustovoit (right) hands over the English versions of his papers (one written in co-authorship with M E Gertsenshtein in 1962 and a new one based on a talk on March 2, 2016, "On the First Direct Detection of Gravitational Waves," delivered at the Scientific session of the Physical Sciences Division (PSD) of RAS and published in a special issue of *Uspekhi Fizicheskikh Nauk* (*UFN*) (*Physics – Uspekhi*) journal devoted to the centenary of Vitaly Ginzburg (see *Usp. Fiz. Nauk* **186** 1133 (2016); *Phys. Usp.* **59** 1034 (2016))) to Professor David Reitze, executive director of the LIGO scientific collaboration, which was the first to detect gravitational waves in 2015. (The photograph was taken after the Scientific session of PSD RAS, Detection of Gravitational Waves as the Starting Point of Gravitational Wave Astronomy, on November 2, 2016 at the conference hall of the Lebedev Physical Institute (FIAN).)

obtaining controlled microwave signal delay and correlation functions of pulsed signals. Original methods for measuring ultrashort light pulses and methods for designing panoramic analyzers of the broadband signal spectrum with up to 10^3 positions were proposed.

In recording weak signals, Pustovoit, along with M E Gertsenshtein (see M E Gertsenshtein, V I Pustovoit *Zh. Eksp. Teor. Fiz.* **43** 605 (1962); Pustovoit V I, Gertsenshtein M E *Sov. Phys. JETP* **15** 116 (1962)), was the first in the world to suggest in 1962 the idea of using a Michelson laser interferometer to search for gravitational waves (space-time metric waves) and to formulate a theory describing variations of interferential light patterns in the gravitational wave field. This idea underlay the large underground LIGO interferometer constructed in the USA at the California Institute of Technology; gravitational waves from space objects were first detected on it in 2015.

V I Pustovoit suggested for the first time the original idea of a parametric mechanism of gravitational wave detection, which, in the future, as laser radiation sources are found in space, may underlie new methods of gravitational wave detection. This pioneering work deserved worldwide recognition and is widely cited in scientific publications of the last decade.

In recent years, V I Pustovoit was actively engaged in other physical problems, namely, a new theory of thunderstorm phenomena in the atmosphere, biomedical radio electronics, and the application of magnetometers and gravimeters for determining coordinates of objects on Earth's surface.

V I Pustovoit was the author of over 400 scientific works, inventions, and patents. He was a thesis advisor for more than 40 candidates and doctors of sciences.

In 1989, V I Pustovoit was appointed Vice Chairman of Gosstandart (State Standards) of the USSR, where he was in charge of metrology in the country. For almost 20 years (from 1995 to 2015), Vladislav Ivanovich successfully headed the Scientific Technological Center of Unique Instrument Engineering of RAS specializing in the design and production of optical spectrometric devices intended for both scientific research and implementing spectroscopic information technology in industry, the ecology, and medicine.

V I Pustovoit was editor-in-chief of the journal *Fizicheskie osnovy priborostroeniya* (Physical Bases of Instrumentation), associate editor of the journal *Radiotekhnika i Elektronika* (Radio Engineering and Electronics) (*Journal of Communications Technology and Electronics* in English translation), a member of editorial boards of the journals *Uspekhi Sovremennoi Radioelektroniki* (Advances in Modern Radio Electronics) (*Telecommunications and Radio Engineering* in English translation) and *Elektromagnitnye Volny i Elektronnye Sistemy* (Electromagnetic Waves and Electron Systems), a member of the advisory council of the higher classification board (VAK) of the Russian Federation, a member of the Academic Council of RAS on Acoustics, a member of the Academic Council of RAS on Quantum Technologies, a member of the Academic Council on the "development of the instrument base of scientific organizations and educational institutions" of the Federal Science and Innovation Agency, a member of the Academic Council on the program "Study of the nature of the world's oceans," and a member of the bureau of the Academic Council of RAS for Scientific Instrument Engineering.

Interaction with Vladislav Ivanovich was a great pleasure. His great erudition in many areas of science, new ideas, exceptional moral rectitude, and sincerity attracted many people. Along with scientific work, he liked to putter. At his dacha (country house), he had various work benches for wood and metal working. This was how he got away from everyday problems, which he had plenty of in his life.

A clear image of the outstanding man and prominent physicist of our time,Vladislav Ivanovich Pustovoit, will live forever in the hearts of his colleagues, disciples, and all those who value his contribution to world science and technology.

A L Aseev, A S Bugaev, E P Velikhov,
Yu V Gulyaev, G Ya Krasnikov, A V Latyshev,
V Ya Panchenko, O V Rudenko, A N Saurov,
A S Sigov, Yu A Chaplygin, V A Cherepenin