

Yurii Nikolaevich Kul'chin (on his 70th birthday)

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Yurii Nikolaevich Kul'chin was born on February 9, 1953 in the town of Nakhodka, Primorsky Krai. As a capable student in the Physics Department of Far Eastern State University (FESU), he was sent in 1973 for further studies to the Special Department of Physics of the Moscow Engineering Physics Institute (MEPhI) (later the N G Basov Higher School of Physicists MEPhI–FIAN), from which he graduated in 1976. In 1976–1979, he was a trainee researcher, junior researcher at the Institute of Automation and Control Processes (IACP) Far Eastern Scientific Center, USSR Academy of Sciences. In 1979–1982, he was a graduate student at MEPhI. In 1992–2004, he was an associate professor, head of Physics Department of the Far Eastern Polytechnic Institute. In 1982–1991, he was a MEPhI doctoral student, and in 1992–2004, was professor and vice rector for research at Far Eastern State Technical University (FESTU) and director of the Scientific Research Institute Okeanotekhnika at FESTU. Since 1998, he has been head of the Laboratory of IACP FEB RAS. In 2005–2019, he was director of the Institute of Automation and Control Processes of the Far Eastern Branch (FEB) of the Russian Academy of Science (RAS), and since 2019, has been research supervisor of the institute. Since 2004, he has been vice chair of the Far Eastern Branch of RAS (FEB RAS), since 2022, chair of the Far Eastern Branch of RAS, and, since 2022, vice president of the Russian Academy of Sciences.

Academician Yu N Kul'chin is an outstanding physicist and organizer of science. He made a considerable contribution to the development of academic science in the Far East. He is a prominent specialist in laser physics, optical processing of information, physical and nonlinear optics, photonics of nano- and microstructures, biophotonics, and laser technologies.

Under the leadership of Yu N Kul'chin and with his direct participation, a number of priority fundamental scientific results were obtained: photon characteristics of unique sea and natural ground objects were examined for the first time; a series of pioneering studies of laser radiation's interaction with matter was performed, and the principles of organization and technologies of manufacturing functional devices of photonics, nanophotonics, and intellectual measuring systems were developed; and the bases were laid for the creation of a new scientific field focused on the large-scale investigation of the interaction between light radiation and plant genomes and on the elaboration of new technologies for photon control of plant development.

Yu N Kul'chin carried out studies of the physical processes ensuring the collection, transmission, and processing of information in photon and nanophoton devices, as well as determining the limiting capabilities of devices based on nano- and microstructures. His elaboration and study of



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liquid heterophase nanocomposite media, promising as media with low-threshold optical nonlinearity, became widely known.

Yu N Kul'chin performed fundamental studies of the recording and reconstruction of 2D waveguide and 3D-volume dynamic holograms formed due to processes of nonlinear-optical interactions of spatially inhomogeneous light waves in photorefractive and semiconductor crystals that offered wide opportunities for creating high-sensitivity adaptive optical sensors for nanometrology and physical field monitoring.

Yu N Kul'chin was the first to thoroughly investigate optical, nonlinear-optical, and biochemical characteristics of sea organisms with biosilicate skeleton-forming elements and to discover and examine a new type of natural photon crystal—the spicules of silicon sea sponges—and to create biometric analogues of their materials.

Yu N Kul'chin founded the Center for Laser Technologies, the only one in the Far East Federal District, most of whose developments in the field of robotic technologies for laser processing of materials surpass all the known counterparts in terms of novelty of solutions and technical and economic parameters. Among these developments is the

creation of a unique remote-controlled underwater robot for the ship repair industry (laser clearing of ship hulls and hydrotechnical structures from biofouling). The unparalleled technologies of laser processing of wares of magnesium and aluminum alloys, elaborated under Yu N Kul'chin's guidance, have found application in the maintenance and repair of aviation equipment and have made it possible to significantly reduce the cost and shorten the repair time for aviation equipment.

For 14 years, Yu N Kul'chin was head of the Institute of Automation and Control Processes, Far Eastern Branch of the Russian Academy of Sciences. The Center of Collective Use Laser Methods for the Study of Condensed Matter, Biological Objects, and Environment Monitoring was founded at the institute on the initiative and under the guidance of Yu N Kul'chin. Under his leadership, the Department of Optoelectronic Methods for the Study of Gaseous and Condensed Media was formed at IACP FEB RAS, which united the three laboratories previously created on Yu N Kul'chin's initiative: the Laboratory of Precision Optical Measuring Methods, the Laboratory of Physical Methods for Monitoring Natural and Technogenic Objects, and the Laboratory of Laser Methods for Studying Matter. At the same time, new scientific avenues have appeared at the institute, including nanophotonics, nanometrology, near-field optical microscopy, and lidar atmosphere studies. An essentially new area was the photonics of biomineral and biomimetic nanocomposite structures—an area where the unique optical properties of biological materials synthesized by living nature are examined and the technology of obtaining new photon structures is created and upgraded. Another new branch of science in the Far East associated with Yu N Kul'chin's name is agrobiophotonics, investigating the use of light as a factor regulating the growth and development of plants. Intellectual light sources based on the above-mentioned studies are of great importance for the development of the modern 'smart' greenhouse economy.

During the years of his directorship at IAPU FEB RAS, Yu N Kul'chin established long-term fruitful ties with scientific teams from Great Britain, Greece, China, South Korea, the USA, Finland, France, Japan, and other countries.

In 2020, the basic Department Photonics and Digital Laser Technologies, with an MA course, opened at the Far Eastern Federal University on Yu N Kul'chin's initiative, and began to train specialists for the science-intensive industry of the same name, something new to the Far East.

In 2002, the annual international conference, Asia Pacific Conference on Fundamental Problems of Opto- and Microelectronics (APCOM), started on Yu N Kul'chin's initiative. This conference became a significant event in the scientific life in the Asia-Pacific region and, in addition to Russia, is held in Japan, South Korea, China, and Taiwan.

The only leading scientific school in the Russian Far East, Photonics and Laser Physics, headed by Yu N Kul'chin, has carried out its investigations for over 30 years in the field of optical sensors, distributed fiber-optical measuring systems, laser methods of research and diagnostics of media, laser technologies, and bio- and nanophotonics. Its achievements have earned international recognition. In this scientific school, Yu N Kul'chin trained 11 doctors and over 20 candidates of science.

Yu N Kul'chin is the author and co-author of over 800 scientific publications in Russian and foreign journals,

with 15 monographs and 45 inventions and patents in Russia.

Yu N Kul'chin is chair of two doctoral dissertation councils, editor-in-chief of the journal *Vestnik DVO RAN*, and a member of the editorial board of the journals *Kvantovaya Elektronika*, (*Quantum Electronics*) *Avtometriya*, *Prikladnaya Fotonika*, *Nano- i Mikrosistemnaya Tekhnika*, *Pacific Science Review*, and *Laser Biology*.

Yu N Kul'chin is a member of RAS Presidium, a member of the Bureau of the Division of nanotechnologies and information technologies, a member of the RAS expert council, a member of the RAS council, a member of the RAS council for defense research, chair of the RAS committee for the United Nations Environment Program, a member of the Commission of the RAS Presidium for the formation of the list of programs of RAS fundamental research in priority areas assigned by the RAS Presidium, a member of the RSRC Council, a member of the Economic Council under the Governor of Primorsky Krai, a member of the board of the Primorsky Chamber for Commerce and Industry, chair of the Board of Directors of Scientific Organizations of the Far Eastern Region of the Ministry of Education and Science of the Russian Federation, a member of the Russian National Committee of the Pacific Scientific Association, and first vice-president of the international scientific and technical organization, the Laser Association.

Yu N Kul'chin is an honorary member of the international society of optics and photonics, SPIE (USA), a member of the international societies OWLS (Germany) and Laser Biology (China), a member of the executive board of the Association of Academies of Sciences and Scientific Societies in Asia (AASSA), an honorary professor of Dalian University of Technology (China, Dalian, 2009), and an honorary professor of Heilongjiang University (China, Harbin, 2012).

Yu N Kul'chin is an honored scientist of the Russian Federation, awarded with medals of the order For Services to the Fatherland I and II degree. He was awarded the NG Basov Gold Medal of RAS, the medal of the RF Ministry of Higher Education and Science "For the contribution to realization of state politics in education and the development of science and technology," the medal of the Russian society Znanie (Knowledge), and the rank "Honored worker of higher professional education of RF."

In 2000, he won the competition "Engineer of the Year" in the International Union of Scientific and Engineering Societies in the category Scientific Instrumentation. In 2002, at the World Salon of Innovations in Brussels (Belgium), his development Optoelectronic Intellectual Measuring System received the Gold Medal.

Friends and colleagues wish Yurii Nikolaevich Kul'chin good health and further success on his wonderful jubilee!

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