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Alexander A. Kaminskii

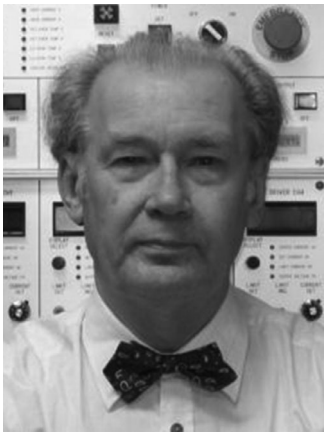
Professor Alexander A. Kaminskii, known for his highly influential publications and books on laser crystals and related materials, passed away on 29 October 2019, shortly after publishing his last papers in the same year.

Alexander A. Kaminskii was born in Moscow, USSR, on 23 October 1934. The family went to Kazan, which is located on the banks of the Volga River, and young Alexander entered Kazan Aviation University. Since he was always striving to engage in scientific activities, he dreamed to study at Lomonosov Moscow State University. When the government politics had changed, he managed to move there. He found his way to become a prominent researcher and professor at internationally prestigious universities and institutes. In addition, he was appointed Corresponding Member of the Russian Academy of Sciences (RAS) and was head of a laboratory in the Shubnikov Institute of Crystallography in Moscow.

Prof. Kaminskii was a pure scientist, who liked to express his research results on physical material quantities, preferably optical wavelengths by precise numbers and units. He was not much interested in organizational tasks. However, he could also be humorous and charming. He established international contacts to France, Germany (East and West), Japan, China, Poland, Spain and the United States of America, amongst others. He was a member of the Russian Delegation to the General Assemblies of International Union of Pure and Applied Physics (IUPAP) and the International Council for Science (ICSU). As a Vice-President at Large of IUPAP from 2008 to 2014 he played a key role in ensuring that Russia was actively involved in the work of the Union and its Commissions. In addition, he was a member of the Optical Society (OSA). We consider his contacts to the science community of democratic countries an important contribution to tearing down the Iron Curtain, symbolized by the Berlin Wall.

Prof. Kaminskii was among the first to recognize the power of empirical application of the Judd-Ofelt theory of crystal-field-induced radiative transition intensities among the energy levels of trivalent rare earth ions (RE^{3+}) doped into dielectric crystals. Along with colleagues, especially Marvin Weber, Francois Auzel, Renata Reisfeld, Alexandra M. Tkachuk, and others at the Lawrence Livermore National Laboratory, he created, and organized in his later books, a comprehensive database of Judd-Ofelt parameters, assisting researchers in the guided search for, and the interpretation of the comparative performances of many interesting rare earth ion-doped laser crystals, such as neodymium-doped laser crystals. Later, this methodology was beneficially applied to the purposeful development of laser glasses doped with neodymium ions in support of inertial confinement fusion research, and to glass fibers doped with erbium ions in support of optical communication.

His cooperation with the later Institute of Optics and Atomic Physics of the Technical University Berlin (TUB) commenced during a workshop in Erice, Italy. Afterwards, he visited



Berlin many times and in turn he invited Prof. H. J. Eichler and colleagues to his laboratory and other main institutes in Moscow, Novosibirsk, and Tbilisi, Georgia. A first joint paper on "Spectroscopic and laser properties of Er^{3+}-doped monoclinic BaY_2F_8 single crystals" appeared in July 1990. In the following decade, articles on lamp and diode pumped solid state lasers were published.

Prof. Kaminskii was always interested in search of efficient multifunctional laser elements. At first, these were crystals for simultaneous laser and second harmonic generation, later for laser generation and stimulated Raman scattering. Around the turn of the century, A. A. Kaminskii and H. J. Eichler started a very fruitful cooperation on stimulated Raman scattering (SRS) in crystals. First SRS experiments were done in the USA but there had always been a long tradition in Raman scattering in Russia where spontaneous scattering was observed first by Landsberg and Mandelstam, called "kombinatsionnoe" scattering. A picosecond Nd:YAG laser to pump more than 100 different crystal types provided by Prof. Kaminskii and international colleagues was employed. Around 3000 SRS emission lines have been discovered and assigned to the underlying nonlinear optical processes in the investigated crystals by intense pump laser pulses in the ultraviolet, visible and infrared spectral regions. The observed SRS lines cover the spectral range from 0.2 μm to 2 μm with less than 2 nm spacing, so that the studies allow building Raman lasers at nearly arbitrary wavelengths which are difficult to access with conventional solid state laser sources. The results support applications in modern laser technology. Frequency chains and ultrashort light pulses can be generated.

More than 150 journal articles were published on SRS experiments which were carried out at TUB mainly with former Ph.D. students Dirk Grebe, Julian Findeisen, Oliver Lux, Hanjo Rhee and Chris Scharfenorth. Prof. Kaminskii initiated most of the articles and was strongly involved in the analysis and publication of the results. The close cooperation was honored by the German Humboldt Foundation which supported him to do research and to teach as a full Professor at the Optical

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Institute for several years. In his scientific career which lasted more than half a century, Prof. Kaminskii (co-)authored nearly 800 journal articles that gathered over 13000 citations, demonstrating his outstanding and pioneering work on laser crystals and nonlinear optics.

In the new millennium, Prof. Kaminskii discovered a new class of laser crystal materials, disordered crystals, which have broad spectra at low temperatures. These materials were accepted by the crystal physics community after hard discussions. Transparent ceramics were investigated in collaboration with the group of Prof. Ken-ichi Ueda in Japan. They developed fully transparent laser ceramics useful for high-power solid state lasers with 100 cm^2 aperture. Prof. Kaminskii transferred his deep and significant knowledge to polycrystalline laser ceramics and opened a new route to large-scale crystalline lasers. He was one of the three initiators for the Laser Ceramics Symposium – an annual international conference on transparent ceramics for lasers and photonics applications, and had actively contributed to promote the international laser ceramics research.

Prof. Kaminskii supervised many students over the years. During his frequent visits to various institutions, students learnt a great deal. Prof. Kaminskii always demonstrated the importance of careful scientific practice. He was a passionate scientist, with a keen eye for precision and attention to detail. He will be missed greatly by all who have had the opportunity to cross paths with him.

Alexander Kaminskii maintained a long-standing collaboration with editorial teams in scientific publishing, such as the *physica status solidi* journals published by Akademie-Verlag Berlin, later Wiley-VCH, as an author of more than 160 articles between 1965 and 2016 and as an active Editorial Advisory Board member since 1987. In 2007 he became one of the Founding Editors of the new Wiley-VCH journal *Laser & Photonics Reviews* and remained committed to the journal as an Editorial Advisory Board member and author. His expertise, advice and commitment as well as the fruitful and enthusiastic conversations about editorial standards and other timely issues during his frequent visits to the Editorial Office were highly appreciated.

We lose a high-level scientific partner and we miss the stimulating, but sometimes controversial discussions with him, not just about the experiments at hand and physics in general, but also on numerous other topics like politics, ethics, culture, and history. He was never short on anecdotes which could be funny or exciting, at times sad, and often included elements that caught us by surprise. Everyone who knew him can readily recall moments that made a deep impression and are retold with great respect to his work, determination and achievements.

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Dr. Oliver Lux, Institute of Atmospheric Physics, German Aerospace Center, Oberpfaffenhofen, Germany
Dr. Hanjo Rhee, Sicoya GmbH, Berlin, Germany
Dr. Julian Findeisen, Robert Bosch GmbH, Stuttgart, Germany
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