

Helmholtz-Rayleigh Interdisciplinary Silver Medal in Physical Acoustics and Biomedical Acoustics



Oleg Sapozhnikov 2026

The Silver Medal is presented to individuals, without age limitation, for contributions to the advancement of science, engineering, or human welfare through the application of acoustic principles, or through research accomplishment in acoustics.

PREVIOUS RECIPIENTS

Helmholtz-Rayleigh Interdisciplinary Silver Medal

Gerhard M. Sessler	1997	Timothy J. Leighton	2013
David E. Weston	1998	Mark F. Hamilton	2014
Jens P. Blauert	1999	Henry Cox	2015
Lawrence A. Crum	2000	Armen Sarvazyan	2016
William M. Hartmann	2001	Blake S. Wilson	2017
Arthur B. Baggeroer	2002	Kenneth S. Suslick	2018
David Lubman	2004	Barbara G. Shinn-Cunningham	2019
Gilles A. Daigle	2005	Michael R. Moldover	2021
Mathias Fink	2006	George L. Augspurger	2022
Edwin L. Carstensen	2007	Vera A. Khokhlova	2023
James V. Candy	2008	D. Keith Wilson	2024
Ronald A. Roy	2010	N. Ross Chapman	2025
James E. Barger	2011		

Interdisciplinary Silver Medal

Eugen J. Skudrzyk	1983
Wesley L. Nyborg	1990
W. Dixon Ward	1991
Victor C. Anderson	1992
Steven L. Garrett	1993



ENCOMIUM FOR OLEG A. SAPOZHNIKOV

...for contributions to nonlinear acoustics and its applications to medical ultrasound

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Oleg Anatolievich Sapozhnikov was born in Batyrevo, a village with several thousand people in the Chuvash Republic of the USSR (now Russia), approximately 500 miles east of Moscow. His father was a veterinarian and his mother taught history at a local high school.

After being awarded a Gold Medal when he graduated from the high school in Batyrevo in 1979, Oleg entered the Physics Faculty of Lomonosov Moscow State University (MSU). He studied mathematics and physics at a high level and soon became one of the best students in his class, and the go-to student to answer questions raised by his classmates.

While a student at MSU Oleg joined a research group that specialized in nonlinear acoustics, in 1982. Leading this group were Professors Oleg Rudenko, an accomplished theoretician, and Alexander Karabutov, a talented experimentalist. Nonlinear acoustics became the primary focus of Oleg's scientific activities ever since. The research group was in the department specializing in laser physics and nonlinear optics, and this exposed Oleg to advanced research and education in acoustics, optics, and photoacoustics. Vera Khokhlova started at MSU the same year as Oleg Sapozhnikov, and they joined Oleg Rudenko's group simultaneously. This was the beginning of their lifelong collaboration that included their formation of the Laboratory for Industrial and Medical Ultrasound (LIMU) at MSU in 2014.

Oleg received his MSc degree from MSU in 1985 and defended his PhD thesis in 1988. Since then he has served as a faculty member in the Department of Acoustics within the Physics Faculty of MSU. He defended his Doctor of Science thesis in 2008, which described his research on characterization of ultrasound sources, nonlinear self-action phenomena, and physical mechanisms associated with the use of high-power ultrasound and shock waves in lithotripsy. Shortly thereafter he became a full professor in the Physics Faculty of MSU.

In 1994 Oleg spent a year as a visiting researcher in Lyon, France at the National Institute of Health and Medical Research (INSERM) working with Dominique Cathignol and Jean-Yves Chapelon. Oleg's first trip to the United States was in spring 1996 to visit the University of Texas at Austin, a leading center for nonlinear acoustics. He returned to the U.S. in summer 1996 to begin collaborating with the Center for Industrial and Medical Ultrasound (CIMU) that Larry Crum created in the Applied Physics Laboratory (APL) at the University of Washington (UW) in Seattle, a partnership that continues to this day. Both Oleg and Vera became essential participants in the CIMU group, performing joint experiments, supervising graduate students, and arranging mutual research projects and visits between Moscow and Seattle.

Oleg is a leading and highly cited international expert on physical acoustics, and in particular, on nonlinear acoustics used in biomedical applications. He combined advanced fundamental research performed throughout his academic career as a Professor of Acoustics at MSU with his studies at APL-UW, renowned for its strong translational research in biomedical ultrasound. This combination, together with Oleg's engaging personality and mentorship abilities, led to the transition of his fundamental ideas into patented technologies and ultimately new medical devices.

Oleg is well known for bringing thoughtful analogies from different fields of physics to ultrasound, which often lead to simple explanations of sometimes very complicated phenomena. While he is an exceptional theoretician, he has also conceived and led many experimental projects in physical acoustics, often in nonlinear and biomedical acoustics. His most notable research contributions range from purely theoretical work on group analysis of nonlinear equations in acoustics, to modeling acoustic radiation force, performing experimental studies on acoustical holography, identifying the physical mechanisms of kidney stone breakage in shock-wave and burst-wave lithotripsy, tissue liquefaction in

boiling histotripsy, and interpreting the twinkling artifact in ultrasound Doppler imaging of kidney stones. The acoustical holography method that Oleg developed and introduced in early 2000s to the medical community is now considered to be a critical step in the characterization of ultrasound medical transducers and their fields. The idea of using pulsed shear waves propagating transverse to the push beam that he demonstrated experimentally in 1996 has evolved to become a powerful tool in diagnostic shear wave elasticity imaging, for nondestructive evaluation, and other applications.

Oleg has been an active member of the ASA for many years. He is an ASA Fellow, served as an Associate Editor for *the Journal of the Acoustical Society of America* (JASA), was a member of the ASA Committee on International Research and Education, and has organized special sessions at ASA meetings. Oleg is also a Member of the Governing Board of the International Congress on Ultrasonics (ICU), a Board Member of the Russian Acoustical Society, and a Member of the Scientific Council on Acoustics in the Russian Academy of Sciences, heading the Physical Ultrasound section. In 2004 he was one of the first two recipients of the Early Career Award from the International Commission for Acoustics (ICA), and in spring 2025 he gave a plenary lecture at the joint ICA/ASA meeting in New Orleans.

In conclusion, Oleg Sapozhnikov is an outstanding physicist and acoustician with very broad international recognition. He has contributed significantly to building a foundation for modern physical acoustics and its biomedical diagnostic and therapeutic applications. He is therefore a highly deserving recipient of the Helmholtz-Rayleigh Interdisciplinary Silver Medal in Physical Acoustics and Biomedical Acoustics of the Acoustical Society of America.

MARK F. HAMILTON
MATHIAS FINK
VERA A. KHOKHLOVA
LAWRENCE A. CRUM