GALLOGLY COLLEGE OF ENGINEERING
STEPHENSON SCHOOL OF BIOMEDICAL ENGINEERING
The UNIVERSITY of OKLAHOMA

Leadership Lecture Series 2025-2026

OPTICAL COHERENCE ELASTOGRAPHY AND BRILLOUIN SPECTROSCOPY FOR TISSUE BIOMECHANICS

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Thurman J. White Forum,
Conference Room B

ABSTRACT

Biomechanical properties of tissues play a critical role not only in disease development and progression but also in normal function and development. Several clinical conditions, such as Neural Tube Defects and keratoconus, presbyopia, and glaucoma of the eye, significantly alter these properties, making biomechanical assessment essential for understanding disease mechanisms and guiding clinical management. This talk will present recent advances in Optical Coherence Elastography and Brillouin Spectroscopy for noninvasive biomechanical evaluation of different tissues and cells. I will review progress in noncontact optical coherence elastography (OCE)—including quasi-static, dynamic, and reverberant approaches—and Brillouin microscopy for characterizing tissue stiffness. These methods enable high-resolution, depth-resolved measurements from the cornea and sclera to posterior structures, offering insights into the entire eye globe. I will demonstrate that OCE and Brillouin-based techniques represent a paradigm shift in tissue diagnostics, enabling noninvasive, quantitative evaluation of its biomechanics. Future directions include integration into clinical workflows and longitudinal studies to validate their predictive value.

BIO

Dr. Kirill Larin is the Cullen Endowed Chair and Professor of Biomedical Engineering at the University of Houston. Larin received his first M.S. in Laser Physics and Mathematics from the Saratov State University, Russia, in 1995, his second M.S. in Cellular Physiology and Molecular Biophysics in 2001, and his Ph.D. in Biomedical Engineering in 2002 from the University of Texas Medical Branch. His research contributions are in Biomedical Optics and Biophotonics, and the development and application of various optical methods for noninvasive and nondestructive imaging and diagnostics of tissues and cells. He made significant contributions to the development of Optical Elastography methods. He is the recipient of the prestigious Presidential Award from Russian President Boris Yeltsin. He was inducted as a Fellow of SPIE in 2015, a Fellow of Optica in 2016, and a Fellow of AIMBE in 2020. He is the 2025 recipient of the SPIE Biophotonics Technology Innovator Award.