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Department of Biomedical Engineering

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Date Friday, January 24, 2024
Time 12:00 to 1:00 PM
Location SEC 201

Title: *Brillouin microscopy for applications in mechanobiology and biomedicine*

Abstract: Brillouin microscopy is fast developing new field of research on the intersection of biological physics, optics, acoustics and mechanobiology. The technology is based on the physical phenomenon of inelastic Brillouin light scattering, where light changes its frequency after interaction with GHz pressure waves in the material. The change in the frequency of light, so-called Brillouin frequency shift, is linked to the mechanical properties of the material under test and hence can be used to infer the distribution of mechanical properties across the sample with microscopic resolution, no physical contact, and damage-free. These characteristics make Brillouin microscopy a desirable technique for studying the mechanobiology of cells and tissues and mapping micromechanical properties in situ. In this talk, I will focus mostly on biological and biomedical applications of Brillouin microscopy, from tissue engineering to understanding the mechanical manifestation of diseases such as cancer and respiratory diseases. I will also share my lab's recent advances in developing fibre-integrated Brillouin probes that can extend the technology towards endoscopic applications.

Bio: Dr Irina Kabakova is an Associate Professor in Optical Physics and an Associate Head of School (Education & Students) with the School of Mathematical and Physical Sciences, UTS. She specialises in developing novel microscopy techniques based on Brillouin light scattering that can be directly applied to map local compressibility and viscoelasticity of cells and tissues at the microscale. She also has interests in photonic integration and miniaturisation of imaging setups that will enable translation of laboratory techniques towards clinical use. As a dedicated educator, Irina has contributed to developing several teaching programs for UTS's Bachelor of Science in Physics degree (Optics, Medical Devices and Diagnostics, Medical Imaging Technology). She is a core member of the Institute of Biomedical Materials and Devices (IBMD@UTS). To date, she helped to attract a combined total of over $70m in research funding – a major achievement in a relatively short scientific career. She is a Chief Investigator in the Australian Research Council Centres of Excellence in Quantum Biotechnology (QUBIC) and Optical Microcombs for Breakthrough Science (COMBS).