Session 18: Advanced Microscopy Techniques (Brillouin, CRYOEM, HS-AFM, ...)

Session chairs: Giuliano Scarcelli (University of Maryland, USA) & Silvia Caponi (CNR-IOM, Italy)

O-18.1 Invited speaker

Measuring transient changes in mechanical properties during biological processes

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It is known that changes in mechanical properties (stiffness, viscosity) of organelles, cells & tissue affect their function, and abnormalities thereof are associated with diverse pathologies or their onset. These manifest themselves in morphological and observable translational changes. Underlying all of this are ofcourse microscopic changes that define the material state, and which are associated with much shorter time scales in soft matter than can be directly visualized. Brillouin light scattering (BLS) micro-spectroscopy can give us insight into these via measurements of the hypersonic acoustic speed and attenuation on submicron spatial scales. At BLS probed pico-nano second time scales the properties of soft biological matter are often very different, exhibiting unique dynamics that are of functional relevance for both determining biochemical processes, relaying information on mesoscopic scales, as well as macroscopic dynamics. Here I introduce a couple of BLS based techniques we have developed that can measure changes in these "picosecond-scale micro-mechanics" over the course of micro and sub-miliseconds in biological systems, in particular during electrical/environmental stimulation such as the excitation of an action potential or a sudden perturbation. I will discuss their physiological relevance and potential for identifying pathological anomalies.