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Advancing Precision Ophthalmology Through All-Optical Characterization of Retinal Tissues

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Date: Tuesday, December 2, 2025 16:00-17:00
Venue: Faculty of Engineering Bldg. 2, Room 232

Abstract:
Retinal diseases such as age-related macular degeneration (AMD) increasingly call for diagnostic and therapeutic strategies that account for the biological variability between patients. Achieving this level of precision requires methods capable of assessing the local biochemical composition and biomechanical behavior of retinal tissues using tools that are noninvasive and compatible with clinical deployment. Our research addresses this need by developing all-optical approaches that unify structural, thermal, and biochemical assessment of the retina. In one approach, we use photothermal optical coherence tomography to quantify how retinal layers respond to transient, localized laser excitation and to infer pigment concentration from the resulting deformations. In another approach, we are advancing Raman spectroscopic methods to characterize the biochemical signatures of retinal deposits relevant to AMD progression. Together, these optical spectroscopy pathways, capable of probing both tissue behavior and biochemical composition, form a coherent framework for personalized diagnostics and treatment planning in retinal disease.

Dr. David Veysset

Bio:
David Veysset is an Instructor at the Wellman Center for Photomedicine at Massachusetts General Hospital. His research focuses on advanced optical imaging and laser-tissue interaction, with an emphasis on optical coherence tomography (OCT) and spectroscopy, and their integration for translational applications. Before joining MGH, he trained in Physical Chemistry and Biomedical optics at MIT and Stanford. His recent work combines thermo-mechanical OCT with emerging Raman-based chemical profiling to enable individualized non-damaging retinal diagnostics and treatments. He leads or co-leads several multimodal imaging initiatives within the Bouma Lab and collaborates extensively across MIT and MGH on next-generation ophthalmic imaging and laser-based diagnostic technologies.

主催：
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「グリーントランスフォーメーション(GX)を先導する高度人材育成」プロジェクト（SPRING GX）

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