Department of Biomedical Engineering
UNIVERSITY OF WISCONSIN–MADISON
Celebrating 25 Years

Fall 2024 Seminar Series

Autonomous Multiscale Imaging for Studying Rare Biological Phenomena

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Investigating rare biological events, such as metastatic colonization, requires imaging systems capable of capturing these phenomena within large, multicellular contexts. To achieve this, the Dean lab is developing autonomous, multiscale light-sheet microscopes optimized for imaging chemically cleared and expanded tissues. At the heart of these systems is navigate, an open-source, Python-based control software tailored for intelligent light-sheet microscopy. Navigate offers a reconfigurable hardware interface and intuitive GUI, enabling complex imaging routines without requiring advanced programming skills. It supports multiple light-sheet modalities, integrates seamlessly with external analysis tools, and allows for real-time, decision-based imaging workflows. This platform's robust and versatile design enhances the efficiency and reproducibility of biological imaging, providing a powerful tool for studying rare but significant biological processes in situ.

ABOUT the SPEAKER

Dr. Kevin Dean is an interdisciplinary scientist whose research is focused on developing and applying advanced technologies to elucidate how tissue function emerges from the organization and activity of proteins at subcellular scales. He received his BA in Chemistry from Willamette University in 2007 and earned his PhD in Biochemistry from the University of Colorado, Boulder, in 2013 under the mentorship of Dr. Amy Palmer. Dr. Dean's expertise spans thermodynamics, optical probes and biosensors, non-linear spectroscopy, microfluidics, advanced microscopy, cell biology, and computer vision. His work is central to two multisite Center Grants: the NCI Cellular Cancer Biology Imaging Research Center, where he is pioneering an autonomous multiscale microscope for identifying and isolating single metastatic cells in whole cleared tissues, and the NIGMS Biomedical Technology Development and Dissemination Center, where he is developing and disseminating cutting-edge light-sheet microscopy techniques. These include ASLM, Field Synthesis, and Oblique Plane Microscopy, which are optimized for live cell imaging and provide novel insights into cellular signal transduction using multiplexed biosensors and advanced time-series analysis.

Monday, October 28 at Noon
1003 Engineering Centers (Tong Auditorium)