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

Spring 2025 Seminar Series

Bridging Molecular and Functional Understandings of Cells with Artificial Intelligence

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The mammalian brain exhibits complex functions and behaviors, driven by diverse cell types distributed throughout its tissue. However, understanding the heterogeneity of cell types and neuronal functions across the entire brain remains a significant challenge. In this talk, I will present the development of one of the first spatial cell atlases of the entire mouse brain, providing a comprehensive map of molecularly defined cell types and tissue regions. Specifically, I will discuss the challenges of large-scale cell segmentation in situ and introduce my approach for scalable and accurate cell segmentation. Next, I will explore single-neuron dynamics using in vivo electrophysiology by developing a deep learning model for spike sorting over time, highlighting how this approach enables the decoding of neural population dynamics during motor task learning. Finally, I will outline my roadmap for bridging molecular and functional understandings of cells across modalities and conditions, with the ultimate goal of uncovering fundamental brain mechanisms and informing targeted therapeutics for neurological diseases.

ABOUT the SPEAKER

Yichun He is a PhD candidate from the School of Engineering and Applied Sciences at Harvard University and the Broad Institute of MIT and Harvard. Her research focuses on understanding cell identities and dynamics over space and time, by developing and applying advanced methods in artificial intelligence, single-cell and spatial multi-omics, and brain-computer interfaces. She also bridges large language models with biological knowledge to enhance interpretability and accelerate scientific discovery. Her work has been featured as a cover story in Nature and published in Cell, Nature Communications (including one as Editor's Highlight), and Nature Methods.

Monday, February 3 at Noon
1003 Engineering Centers (Tong Auditorium)