



Daifeng Wang, Ph.D.

Associate Professor

Biostatistics and Medical Informatics
University of Wisconsin–Madison

<https://daifengwanglab.org/>



Friday, September 18, 2026

12:00-1:00 pm

Morgridge Hall Seminar Room 7560

Zoom Meeting: 966 3372 9112

<https://uwmadison.zoom.us/j/96633729112?pwd=tHFc9i1dAAqmXe05uWtw8wXBIQZxGB.1>

Passcode: 621125

AI-Driven Single-Cell Analysis: From Disease Mechanisms to Therapeutic Discovery

Abstract: Emerging single-cell genomics provides an unprecedented view of cellular and molecular heterogeneity across diseases and clinical phenotypes, yet translating these complex data into mechanistic and therapeutic insight remains challenging. This talk presents an AI-driven computational framework for single-cell analysis that integrates multimodal, graph-based, and physics-informed learning to connect genes, cell functions and dynamics, disease phenotypes, and repurposed drugs. First, cooperative multi-view integration and interpretable model explanation prioritize molecular features and higher-order interactions across single-cell and spatial modalities for Alzheimer's disease (AD). Next, graph learning approaches refine and associate cell subtypes with AD phenotypes, including cognitive resilience, neuropsychiatric symptoms, and pathological progression, reveal personalized molecular diversity, and identify network-based repurposed drugs for neuropsychiatric disorders. Finally, physics-informed AI models infer continuous dynamics of gene expression, cell populations, and perturbation responses. Multi-agent reinforcement learning further reveals virtual cell environments that represent cellular dynamics and interactions. Together, these methods advance interpretable, mechanistic single-cell analyses for disease modeling, patient stratification, and drug discovery.

Bio: Dr. Daifeng Wang is an Associate Professor and H. I. Romnes Faculty Fellow in the Department of Biostatistics and Medical Informatics at the University of Wisconsin–Madison. He is also an Investigator and Director of the Data Science Core at the Waisman Center. Dr. Wang received his Ph.D. in Electrical and Computer Engineering from The University of Texas at Austin and completed postdoctoral training in bioinformatics at Yale University. His research focuses on developing AI and machine learning methods and bioinformatics tools to understand functional genomics and gene regulation in brain development and brain disorders.



**School of Medicine
and Public Health**

UNIVERSITY OF WISCONSIN–MADISON