NSF NANOSCALE SCIENCE AND ENGINEERING GRANTEES CONFERENCE:
NANO AND AI CONVERGENCE
DECEMBER 9-10, 2024

"Goal-oriented active learning for nanoengineering: Advancing discovery and process control"

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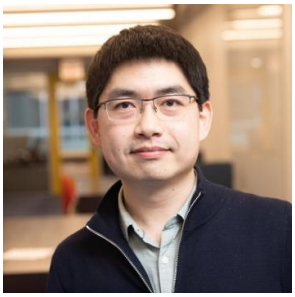

Bio: Yuxin Chen is an Assistant Professor of Computer Science at the University of Chicago. He is also a member of the Committee on Computational and Applied Mathematics and an affiliated faculty at the Data Science Institute. Before joining the University of Chicago, he was a postdoctoral scholar in the Department of Computing and Mathematical Sciences at the California Institute of Technology; prior to that, he received his Ph.D. in computer science from ETH Zurich. Chen's research interest lies broadly in probabilistic reasoning and machine learning. More specifically, his research centers around the fundamentals of resource-efficient learning for real-world adaptive experimental design, with the goal of bridging the gap between theory and practice in active learning. He was a recipient of the Google European Doctoral Fellowship in Interactive Machine Learning, the Swiss SNSF Early Postdoc Mobility Fellowship, and the PIMCO Postdoctoral Fellowship in Data Science.

Abstract: Active learning (AL) is transforming experimental design for nanosystems by enabling efficient data acquisition and optimization in large, complex search spaces where experiments are costly, and feedback is sparse. This talk highlights scalable AL approaches for goal-oriented experimental design in nanoengineering, focusing on multi-fidelity optimization, structured exploration, and surrogate modeling. Applications in nanophotonic structure design and biochemical engineering illustrate how these techniques accelerate discovery while balancing exploration with exploitation and maintaining reliability. By addressing fundamental challenges such as cost-sensitive data acquisition and the integration of domain knowledge, AL serves as a critical enabler for AI-driven advances in nanoscale science, bridging theoretical insights and real-world experimental workflows.