



THE UNIVERSITY OF
CHICAGO

THE COMMITTEE ON
COMPUTATIONAL AND
APPLIED MATHEMATICS

COLLOQUIUM

YULONG LU

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University of Minnesota Twin Cities

Diffusion Models: Theory and Applications (in PDEs)

THURSDAY, April 18th, at 4:00 PM
Jones 303, 5747 S. Ellis Ave. Chicago, IL 60637

ABSTRACT

Diffusion models, particularly score-based generative models (SGMs), have emerged as powerful tools in diverse machine learning applications, spanning from computer vision to modern language processing. In the first part of this talk, we delve into the generalization theory of SGMs, exploring their capacity for learning high-dimensional distributions. Our analysis shows that SGMs achieve a dimension-free generation error bound when applied to a class of sub-Gaussian distributions characterized by certain low-complexity structures. In the second part of the talk, we consider the application of diffusion models in solving partial differential equations (PDEs). Specifically, we present the development of a physics-guided diffusion model designed for reconstructing high-fidelity solutions from their low-fidelity counterparts. This application showcases the adaptability of diffusion models and their potential to scientific computation.

Organizers:

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