



THE UNIVERSITY OF  
CHICAGO

DEPARTMENT OF STATISTICS

## Joint colloquium with the Committee on Computational and Applied Mathematics (CCAM)

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### “Enhancing PDE Computations and Score-Based Generative Models through Optimization”

**THURSDAY, January 25, 2024, at 4:00PM**

Jones 303, 5747 S. Ellis Avenue

#### Abstract

This presentation explores optimization strategies for improving both partial differential equation (PDE) computations and score-based generative models (SGM). In the realm of numerical computations, we introduce a saddle point framework that capitalizes on the inherent structure of PDEs. Integrated seamlessly with existing discretization schemes, this framework eliminates the necessity for nonlinear inversions, paving the way for efficient parallelization. Shifting our focus to SGM, we delve into the mathematical foundations of the Wasserstein proximal operator (WPO). Specifically, we express it as the Wasserstein proximal operator of cross-entropy. By leveraging the PDE formulation of WPO, we propose a WPO-informed score model that demonstrates accelerated training and reduced data requirements.