

**FALL 2023**

# **RENSSELAER POLYTECHNIC INSTITUTE**

**DEPARTMENT OF MATHEMATICAL SCIENCES COLLOQUIUM**

**Miaolan Xie (Cornell University)**

**November 27, 2023 - 4pm**

**TROY 2012**

## **Reliable and Adaptive Stochastic Optimization in the Face of Messy Data**

Solving real-world stochastic optimization problems presents two key challenges: the messiness of real-world data, which can be noisy, biased, or corrupted due to factors like outliers, distribution shifts, and even adversarial attacks; and the laborious, time-intensive requirement of manually tuning step sizes in many existing algorithms.

I will introduce a simple adaptive optimization framework that avoids the need for manual step size tuning by adaptively adjusting the step size in each iteration based on the progress of the algorithm. To address the issue of messy data, the algorithm only assumes access to function-related information through probabilistic oracles, which may be biased and corrupted.

This framework is very general, encompassing a wide range of algorithms for both unconstrained and constrained optimization. It is applicable to multiple problem settings, such as expected loss minimization in machine learning, simulation optimization, and derivative-free optimization. Under reasonable conditions on the oracles, we provide a meta-theorem to bound the sample complexity for any algorithm in the framework.

*Refreshments served at 3:30pm 4<sup>th</sup> floor Lounge – Amos Eaton*

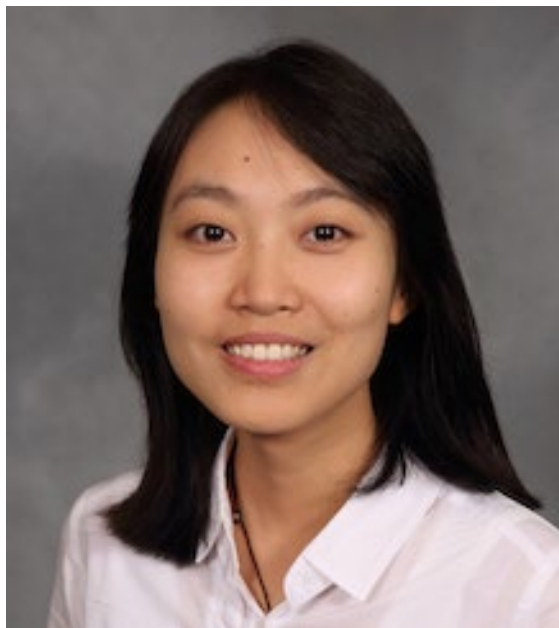
## Biographical Sketch

Miaolan Xie is a fifth-year Ph.D. Candidate in Operations Research and Information Engineering at Cornell University, under the guidance of Professor Katya Scheinberg. She earned her Bachelor of Mathematics with majors in Pure Mathematics and Combinatorics and Optimization from the University of Waterloo. Xie Master's degree in Combinatorics and Optimization was completed under the supervision of Levent Tunçel at the University of Waterloo.

Her research is situated at the intersection of data science, machine learning, and stochastic optimization, leveraging tools from statistics and stochastic processes. Specifically, Xie designs and investigates reliable and adaptive optimization algorithms capable of handling messy data in real-world applications while providing robust performance guarantees.

Xie has received notable recognition for her research, including Second Place in the 2023 Student Paper Prize awarded by the INFORMS Optimization Society and Second Place in the Flash Talk Competition at the YinzOR Student Conference. Additionally, she was awarded NSF Research Internship Funding in 2022.

Before starting her Ph.D., Miaolan Xie worked as a data scientist at Alibaba on the retail supply chain platform team. Before that, she held positions at Baidu and PwC Consulting. She also completed an internship at Scotia-bank in Toronto in 2016. During the summer of 2022, Xie served as a Givens Associate in the Mathematics and Computer Science Division at Argonne National Laboratory, collaborating with Stefan Wild and Matt Menickelly.



Miaolan Xie

<https://miaolan.github.io/>

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