

YUCHEN FANG

Department of Mathematics, University of California, Berkeley
Email: yuchenfang@berkeley.edu | Website: ychenfang.github.io

EDUCATION

University of California, Berkeley

Ph.D. in Applied Mathematics

Advisors: Prof. James Demmel and Prof. Javad Lavaei.

California, US

Aug. 2023 - Jun. 2028 (expected)

The University of Chicago

M.S. in Computational and Applied Mathematics

Thesis: *Fully Stochastic Trust-Region Sequential Quadratic Programming for Equality-Constrained Optimization*

Thesis Advisors: Prof. Mladen Kolar and Prof. Mihai Anitescu.

Illinois, US

Sept. 2021 - Dec. 2022

Xiamen University

B.S. in Statistics

Thesis Advisor: Prof. Yingxing Li.

Fujian, CN

Sept. 2017 - Jun. 2021

OPEN-SOURCED ENVIRONMENT (*-EQUAL CONTRIBUTION)

- [1] Chenyu Li*, Zeyu Sun*, **Yuchen Fang***, Yuhan Cao, and Guangting Yu. AER: An Open Environment & Benchmark For LLM Agents Making Real-World Decisions
Website, technical paper in preparation.

PUBLICATIONS

- [5] Roger Hsiao, **Yuchen Fang**, Xiangru Huang, Ruilong Li, Hesam Rabeti, Zan Gojcic, Javad Lavaei, James Demmel, and Sophia Shao. 3DGS²-TR: A Scalable Second-Order Trust-Region Method for 3D Gaussian Splatting
International Conference on Machine Learning (ICML) 2026, Paper Website
- [4] Jihun Kim, **Yuchen Fang**, and Javad Lavaei. On the Sharp Input-Output Analysis of Nonlinear Systems under Adversarial Attacks
International Conference on Machine Learning (ICML) 2026 Spotlight, Paper
- [3] Santiago Gonzalez, et al. (including **Yuchen Fang**). QEDBench: Quantifying the Alignment Gap in Automated Evaluation of University-Level Mathematical Proofs
International Conference on Machine Learning (ICML) 2026, Paper Website
- [2] **Yuchen Fang**, Javad Lavaei, and Sen Na. High-Probability Complexity Bounds of Trust-Region Stochastic Sequential Quadratic Programming with Heavy-Tailed Noise
Mathematical Programming (2026), DOI: 10.1007/s10107-026-02357-x
- [1] **Yuchen Fang**, Sen Na, Michael W. Mahoney, and Mladen Kolar. Fully Stochastic Trust-Region Sequential Quadratic Programming for Equality-Constrained Optimization Problems
SIAM Journal on Optimization (2024), DOI: 10.1137/22M1537862
Short version accepted by *NeurIPS Workshop on Higher-Order Optimization in Machine Learning (HOOML) 2022*

PREPRINTS

- [7] Junyu Guo, **Yuchen Fang**, Shangding Gu, James Demmel, Javad Lavaei. Remembered but Not Used: Understanding In-Context Update Failures in LLMs
Submitted to *ICLR 2027*, Paper
- [6] **Yuchen Fang**, Sen Na, James Demmel, and Javad Lavaei. Trust-Region Interior-Point Stochastic Sequential Quadratic Programming for Expectation Constrained Optimization with Heavy-Tailed Noise
Submitted to *Mathematical Programming*, Paper
- [5] Haoxuan Wang, **Yuchen Fang**, and Sen Na. TR-SSQP: A Trust-Region Method for Constrained Stochastic Optimization under Heavy-Tailed Noise
Submitted to *SIAM Journal on Optimization*, arXiv
- [4] **Yuchen Fang**, James Demmel, and Javad Lavaei. Why is Normalization Preferred? A Worst-Case Complexity Theory for Stochastically Preconditioned SGD under Heavy-Tailed Noise
Submitted to *Journal of Machine Learning Research*, arXiv
- [3] **Yuchen Fang**, Kinshou Zheng, and Javad Lavaei. TRSVR: An Adaptive Stochastic Trust-Region Method with Variance Reduction
Submitted to *ICLR 2027*, arXiv

- [2] **Yuchen Fang**, Jihun Kim, Sen Na, James Demmel, and Javad Lavaei. A Trust-Region Interior-Point Stochastic Sequential Quadratic Programming Method
Minor revision at *SIAM Journal on Optimization*, arXiv.
- [1] **Yuchen Fang**, Sen Na, Michael W. Mahoney, and Mladen Kolar. Trust-Region Sequential Quadratic Programming for Stochastic Optimization with Random Models
Revision at *Mathematical Programming*, arXiv
Short version accepted by *NeurIPS Workshop on Higher-Order Optimization in Machine Learning (HOOML) 2022*

ONGOING PROJECTS (*-EQUAL CONTRIBUTION)

- [2] **Yuchen Fang***, Roger Hsiao*. FlexLeWorldModel: Enabling Anytime Computing in WorldModel with Flexible-Length Coarse-to-Fine Tokenization
Project in progress.
 - Designed an *anytime-compute predictor* for JEPA-style world models by exploiting a frozen video tokenizer’s nested coarse-to-fine token structure, enabling a single trained model to trade off inference-time compute against planning accuracy (e.g., cheap wide search vs. fine-grained refinement) without retraining.
 - Achieved *Pareto-dominant efficiency* over frozen-encoder world models (e.g., DINO-WM), matching or exceeding planning success at a small fraction of the token budget, while preserving the speed/simplicity of lightweight pixel-based baselines.
 - Showed that freezing a reconstruction-capable tokenizer structurally prevents representation collapse, simplifying the JEPA training objective by reducing or eliminating the need for explicit anti-collapse regularization.
 - Conducted physical probing and Violation-of-Expectation evaluations to empirically characterize the transfer of reconstruction-optimized visual representations to predictive/control objectives, informing a lightweight adapter mechanism for task-relevant readout.
- [1] **Yuchen Fang***, Gechen Qu*, Claire Tomlin, James Demmel, and Javad Lavaei. TRIP-PO: Trust-Region Interior-Point Policy Optimization
In preparation for *RSS 2027*, Paper Draft
 - Proposed a primal trust-region interior-point policy optimization (TRIP-PO) method for safe reinforcement learning with multiple cumulative cost constraints.
 - Avoided explicit Lagrange multiplier computation, reducing instability and hyperparameter tuning compared with dual-ascent and Lagrangian baselines.
 - Designed a step-decomposition update: a normal step to restore constraint feasibility and a tangential step to improve reward within the constraint kernel.
 - Incorporated Fisher information geometry into the constraint metric and developed a PPO-style variant, TRIP-PPO, for stable and scalable policy updates.
 - Evaluated on Safe-HalfCheetah-Velocity in OmniSafe; TRIP-PPO matched TRPO-Lagrangian reward, improved early-stage safety, and reduced early constraint violations relative to PPO-Lagrangian and TRPO-Lagrangian.

PRESENTATIONS

- [6] Nov. 2026, “Trust-Region Interior-Point Stochastic Sequential Quadratic Programming for Expectation Constrained Optimization with Heavy-Tailed Noise”, *INFORMS Annual Meeting*
- [5] Oct. 2025, “High-Probability Complexity Bounds of Trust-Region Stochastic Sequential Quadratic Programming with Heavy-Tailed Noise”, *INFORMS Annual Meeting*
- [4] Dec. 2022, “Trust-Region Sequential Quadratic Programming for Stochastic Optimization with Random Models: First-Order Stationarity”, *NeurIPS Workshop on Higher-Order Optimization in Machine Learning (HOOML) 2022*
- [3] Dec. 2022, “Fully Stochastic Trust-Region Sequential Quadratic Programming for Equality-Constrained Optimization Problems”, *NeurIPS Workshop on Higher-Order Optimization in Machine Learning (HOOML) 2022*
- [2] Nov. 2022, “Fully Stochastic Trust-Region Sequential Quadratic Programming for Equality-Constrained Optimization Problems”, *CAM Student Seminar, The University of Chicago*
- [1] May 2022, “Trust-Region Stochastic Sequential Quadratic Programming for Constrained Optimization”, *ACMNTW Workshop on Optimization and Machine Learning 2022, Northwestern University*

AWARDS

Simons Dissertation Fellowship in Mathematics (40 recipients nationwide annually)	2026
Outstanding Undergraduate, Xiamen University	2021

PROFESSIONAL SERVICE

Journal Reviewer: Mathematical Programming, PNAS	
Conference Reviewer:	
Association for the Advancement of Artificial Intelligence (AAAI)	2027
International Conference on Machine Learning (ICML)	2026
• Golden reviewer 2026	
International Conference on Learning Representations (ICLR)	2024–2027
Conference on Neural Information Processing Systems (NeurIPS)	2023–2026
International Conference on Artificial Intelligence and Statistics (AISTATS)	2023, 2024
Midwest Machine Learning Symposium	2023
Teaching:	
GSI of Math 32 Pre-calculus, University of California, Berkeley	Spring 2025
GSI of Math 1A Calculus, University of California, Berkeley	Fall 2023 - Fall 2024
Grader of STAT 37710 Machine Learning, The University of Chicago	Fall 2022

SKILLS

Programming Languages: R, Python, CUDA, MATLAB, Julia, C, $\text{\LaTeX}$