Mufan (Bill) Li

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RESEARCH POSITIONS

Postdoctoral Research Associate, Princeton University 2023–Present
Department of Operations Research and Financial Engineering
Supervised by Boris Hanin

DEGREES

Ph.D. Statistics, University of Toronto 2017–2023
Thesis: *Analysis of Learning Algorithms via Diffusion Limits*
Supervised by Daniel M. Roy and Murat A. Erdogdu

M.Sc. Statistics, University of Toronto 2015–2016

B.A.Sc. Engineering Science, University of Toronto 2010–2015

PUBLISHED ARTICLES

See also my Google Scholar or Semantic Scholar pages.

1. **M. Li** and Mihai Nica, *Differential Equation Scaling Limits of Shaped and Unshaped Neural Networks*. TMLR 2024. arXiv:2310.12079.
2. Blake Bordelon, Lorenzo Noci, **M. Li**, Boris Hanin, and Cengiz Pehlevan, *Depthwise Hyperparameter Transfer in Residual Networks: Dynamics and Scaling Limit*. ICLR 2024. M3L Workshop Oral Presentation. arXiv:2309.16620.
3. Lorenzo Noci*, Chuning Li*, **M. Li***, Bobby He, Thomas Hofmann, Chris Maddison, and Daniel M. Roy, *The Shaped Transformer: Attention Models in the Infinite Depth-and-Width Limit*. NeurIPS 2023. arXiv:2306.17759.
4. Matthew Zhang, Sinho Chewi, **M. Li**, Krishnakumar Balasubramanian, and Murat A. Erdogdu, *Improved Discretization Analysis for Underdamped Langevin Monte Carlo*. COLT 2023. arXiv:2302.08049.
5. **M. Li** and Murat A. Erdogdu, *Riemannian Langevin Algorithm for Solving Semidefinite Programs*. Bernoulli 2023. arXiv:2010.11176.
6. **M. Li**, Mihai Nica, and Daniel M. Roy, *The Neural Covariance SDE: Shaped Infinite Depth-and-Width Networks at Initialization*. NeurIPS 2022 (Selected for Oral, Nominated for Outstanding Paper Award). arXiv:2206.02768.
7. Raphaël Berthier and **M. Li**, *Acceleration of Gossip Algorithms through the Euler–Poisson–Darboux Equation*. IMA Journal of Applied Mathematics 2022. arXiv:2202.10742.
8. Sinho Chewi, Murat A. Erdogdu, **M. Li**, Ruoqi Shen, and Matthew Zhang, *Analysis of Langevin Monte Carlo from Poincaré to Log-Sobolev*. COLT 2022 Extended Abstract. arXiv:2112.12662.
9. **M. Li**, Mihai Nica, and Daniel M. Roy, *The Future is Log-Gaussian: ResNets and Their Infinite-Depth-and-Width Limit at Initialization*. NeurIPS 2021. arXiv:2106.04013.

PREPRINTS

1. Yunbum Kook, Matthew S. Zhang, Sinho Chewi, Murat A. Erdogdu, and **M. Li**, *Sampling from the Mean-Field Stationary Distribution*. Preprint 2024. arXiv:2402.07355.
2. **M. Li**, and Maxime Gazeau, *Higher Order Generalization Error for First Order Discretization of Langevin Diffusion*. Preprint 2021. arXiv:2102.06229.

*Equal Contribution.

AWARDS

Princeton DataX Postdoctoral Fellowship	2024-2025
NSERC Postdoctoral Fellowship (Declined)	2024
Doctoral Award, University of Toronto	2023
Ontario Graduate Scholarship	2019–2023
Student Research Presentation Award, Stat. Soc. of Canada	2021
MITACS Accelerate Fellowship, with Borealis AI	2018–2019
Undergraduate Summer Research Fellowship, University of Toronto	2012

INVITED TALKS

Princeton Alg-ML Seminar — April 2024
Neural Covariance SDE and Its Limiting Spectrum

One World Mathematics of ML Seminar (Video) — April 2024
Infinite-Depth Neural Networks as Depthwise Stochastic Processes

LCDS Seminar, Brown University — November 2023
Geometric Dyson Brownian Motion and the Free Log-Normal for Minor of Products of Random Matrices

Google DeepMind — August 2023
The Shaped Transformer: Attention Models in the Infinite Depth-and-Width Limit

DeepProb, University of Oxford — Feb 2023
Neural Covariance SDE: Shaped Infinite Depth-and-Width Networks at Initialization

OPTML++, MIT (Video) — Feb 2023
Neural Covariance SDE: Shaped Infinite Depth-and-Width Networks at Initialization

Layer 6 AI — November 2022
Neural Covariance SDE: Shaped Infinite Depth-and-Width Networks at Initialization

Deep Learning Foundations, University of Maryland (Video) — Sept 2022
Neural Covariance SDE: Shaped Infinite Depth-and-Width Networks at Initialization

WORK EXPERIENCE

Research Intern, Borealis AI	Aug 2018–Apr 2019
Investment Analyst, Ontario Teachers' Pension Plan	Jul 2016–Jul 2017
Electronic Trading Intern, RBC Capital Markets	May 2013–Aug 2014

PEER REVIEW

Foundations of Computational Mathematics (FoCM)
Journal of Machine Learning Research (JMLR)
Transactions on Machine Learning Research (TMLR) Expert Reviewer
SIAM Journal on Mathematics of Data Science (SIMODS)
Journal of Computational and Graphical Statistics (JCGS)
Neural Information Processing Systems (NeurIPS)
International Conference on Learning Representations (ICLR)
International Conference on Machine Learning (ICML)