# 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. 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*. To appear at NeurIPS 2023. arXiv:2306.17759.
2. 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.
3. **M. Li** and Murat A. Erdogdu, *Riemannian Langevin Algorithm for Solving Semidefinite Programs*. Bernoulli 2023. arXiv:2010.11176.
4. **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.
5. Raphaël Berthier and **M. Li**, *Acceleration of Gossip Algorithms through the Euler–Poisson–Darboux Equation*. IMA Journal of Applied Mathematics 2022. arXiv:2202.10742.
6. 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. Resubmitted to Ann. of Appl. Prob. arXiv:2112.12662.
7. **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. **M. Li** and Mihai Nica, *Differential Equation Scaling Limits of Shaped and Unshaped Neural Networks*. Preprint 2023. 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*. Preprint 2023. arXiv:2309.16620.
3. **M. Li**, and Maxime Gazeau, *Higher Order Generalization Error for First Order Discretization of Langevin Diffusion*. Preprint 2021. arXiv:2102.06229.

**AWARDS**

Doctoral Award, University of Toronto 2023
Ontario Graduate Scholarship 2019–2023
Student Research Presentation Award, Stat. Soc. of Canada 2021

*Equal Contribution.

MITACS Accelerate Fellowship, with Borealis AI 2018–2019

Undergraduate Summer Research Fellowship, University of Toronto 2012

**INVITED TALKS**

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*

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

**CONTRIBUTED TALKS**

Statistical Society of Canada Annual Meeting May 2023
*Neural Covariance SDE: Shaped Infinite Depth-and-Width Networks at Initialization*

Institute of Mathematical Statistics Annual Meeting Jun 2022
*Analysis of Langevin Monte Carlo from Poincaré to Log-Sobolev*

Statistical Society of Canada Annual Meeting May 2022
*Analysis of Langevin Monte Carlo from Poincaré to Log-Sobolev*

Statistical Society of Canada Annual Meeting May 2021
*Riemannian Langevin Algorithm for Solving Semidefinite Programs*

**TEACHING ASSISTANT POSITIONS**

ESC103 Engineering Math and Computation, University of Toronto 2017–2021

STA414 Statistical Learning, University of Toronto 2021–2022

STA286 Probability and Statistics, University of Toronto 2018–2019

STA410 Statistical Computing, University of Toronto 2017

**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**

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)