

# Anming Gu

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CONTACT INFORMATION	<a href="mailto:gu.anming106@gmail.com">gu.anming106@gmail.com</a> <a href="https://anminggu.github.io">anminggu.github.io</a>
RESEARCH INTERESTS	optimal transport, sampling and optimization, differential privacy, machine learning theory, theoretical computer science, statistics
EDUCATION	<b>Boston University</b> <span style="float: right;">Boston, MA</span> GPA: 3.97 / 4.0 ( <i>summa cum laude</i> ) <span style="float: right;">Sept 2020 – May 2024</span> B.A. in Computer Science, Minor in Mathematics  Honors in Major (Thesis with defense) Thesis: <i>Latent Trajectory Inference with Drift Prior</i> ( <a href="#">slides</a> ) Committee: Edward Chien, Kristjan Greenewald, Mark Bun
HONORS AND AWARDS	BU, CS Convocation Student Speaker ( <a href="#">video</a> ) <span style="float: right;">2024</span> BU, Department of CS College Prize <span style="float: right;">2024</span> Undergraduate Research Opportunity Program (UROP) funding <span style="float: right;">2021</span>
PUBLICATIONS	$(\alpha\beta)$ denotes alphabetical, * denotes equal contribution  [4] $(\alpha\beta)$ M. Bun, E. Chien, K. Greenewald, <b>A. Gu</b> *, S. Kunapuli. <i>Differentially Private Wasserstein Barycenters</i> . In submission to International Conference on Machine Learning 2025. <a href="#">Link to come</a> . [3] <b>A. Gu</b> , E. Chien, K. Greenewald. <i>Partially Observed Trajectory Inference using Optimal Transport and a Dynamics Prior</i> . International Conference on Learning Representations 2025. <a href="#">arXiv: 2406.07475</a> . Preliminary version in OPT Workshop on Optimization for Machine Learning 2024. [2] M. A. Finzi, S. Kapoor, D. Granzio, <b>A. Gu</b> , A.G. Wilson, C. De Sa, J. Z. Kolter. <i>Compute Optimal LLMs Provably Generalize Better with Scale</i> . International Conference on Learning Representations 2025. <a href="#">Link to come</a> . [1] K. Greenewald, <b>A. Gu</b> , M. Yurochkin, J. Solomon, E. Chien. <i>k-Mixup Regularization for Deep Learning via Optimal Transport</i> . Transactions on Machine Learning Research 2023. <a href="#">arXiv: 2106.02933</a> .
RESEARCH EXPERIENCE	<b>Chien Lab, Boston University</b> <span style="float: right;">Boston, MA</span> <i>Research Assistant</i> <span style="float: right;">Sept 2020 – Present</span> <ul style="list-style-type: none"><li>Working on optimal transport for machine learning with Ed Chien, Assistant Professor @ BU and Kristjan Greenewald, Research Scientist @ IBM.</li><li><i>k-mixup regularization</i>: Generalized the mixup regularization technique using optimal transport. Ran experiments on a variety of architectures and datasets. <b>Publication</b> [1].</li><li><i>Latent trajectory inference</i>: Proposed an algorithm to recover a latent path-space distributions from observed marginal distributions. Proved theoretical guarantees of the method using optimal transport, stochastic calculus, and variational calculus. <b>Publication</b> [3].</li><li><i>Differentially private Wasserstein barycenter</i>: Using the Johnson-Lindenstrauss and DP-SGD for private Wasserstein barycenter algorithms. <b>Preprint</b> [4].</li><li><i>Differentially-private trajectory inference</i>: Continuous-time private synthetic data generation via trajectory inference.</li></ul>

	<b>External Research</b>	Remote
	With Marc Finzi, Post-doc @ CMU	Apr 2024 – Jun 2024
	<ul style="list-style-type: none"> <li>Ran experiments to test a novel empirical Freedman-type martingale concentration inequality for LLM generalization bounds. <b>Publication [2]</b>.</li> </ul>	
	With Vishwak Srinivasan, PhD student @ MIT	Aug 2024 – Oct 2024
	<ul style="list-style-type: none"> <li>Analyzed the convergence of the unadjusted Langevin algorithm for sampling on Riemannian manifolds in Rényi divergence. Proved guarantees when the stationary distribution satisfies a log-Sobolev or Poincaré inequality.</li> </ul>	
	With Atsushi Nitanda, Principal Scientist @ A*STAR, Singapore	Oct 2024 – Present
TALKS	<ul style="list-style-type: none"> <li>Analyzing the convergence of the mean-field Langevin dynamics and its discretization under a uniform Poincaré inequality.</li> <li>Verbally offered PhD research internship at A*STAR.</li> </ul>	
	<b>Mean-Field Langevin Dynamics: Convergence under a Poincaré Inequality</b>	
	Boston University Algorithms and Theory Seminar	(scheduled) February 2025
	<b>k-Mixup Regularization for Deep Learning via Optimal Transport</b>	
	Boston University SIAM	March 2023
TEACHING EXPERIENCE	<b>Boston University, Department of Computer Science</b>	Boston, MA
	<ul style="list-style-type: none"> <li>CS565: Algorithmic Data Mining</li> <li>CS330: Analysis of Algorithms</li> <li>CS235: Algebraic Algorithms</li> <li>CS332: Theory of Computation</li> <li>CS320: Concepts of Programming Languages</li> </ul>	Spring 25 Spring 22, Fall 24, Spring 25 Fall 24 Spring 24 Fall 23
EMPLOYMENT	<b>Boston University, Department of Computer Science</b>	Boston, MA
	<i>Post-Bacc Academic Fellow</i>	Sept 2024 – May 2025
	<b>Amazon</b>	Sunnyvale, CA
	<i>Software Development Engineer Intern</i>	Summer 2023
	<b>Capital One</b>	McLean, VA
	<i>Software Engineer Intern</i>	Summer 2022
SERVICE	Reviewer: ICLR 2025, ICML 2025	
MENTORING	Sasidhar Kunapuli (high school)	Oct 2024 – Present
SKILLS	<ul style="list-style-type: none"> <li><b>Languages:</b> Python, C/C++, OCaml, Java, Bash, MATLAB</li> <li><b>Technologies:</b> PyTorch, TensorFlow, Pandas, Jupyter Notebook</li> <li><b>Other:</b> Linux, Git/Github, L<sup>A</sup>T<sub>E</sub>X, Make</li> </ul>	
PHD COURSEWORK	<ul style="list-style-type: none"> <li><b>Theory:</b> Complexity Theory, Mathematical Methods for Theoretical Computer Science</li> <li><b>ML/AI:</b> Machine Learning, Artificial Intelligence, Deep Learning</li> <li><b>Mathematics:</b> Functional Analysis, PDEs, Stochastic PDEs</li> <li><b>Statistics:</b> Stochastic Calculus, Mathematics of Deep Learning</li> <li><b>Other:</b> Functional Compilers, Geometry Processing, Financial Econometrics</li> </ul>	