Sifan Liu

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Academic position

Department of Statistical Science, Duke University — **Durham, NC**
Assistant Professor — *July 2025 -*

Center for Computational Mathematics, Flatiron Institute — **New York, NY**
Associate Research Scientist — *July 2024 - June 2025*

Education

Stanford University — **Stanford, CA**
Ph.D. in Statistics — *Sept 2019 - June 2024*

Tsinghua University — **Beijing, China**
Bachelor of Mathematics — *Sept 2015 - July 2019*
Minor in Computer Science

Research interests

- Monte Carlo methods, Markov chain Monte Carlo, quasi-Monte Carlo
- Selective inference, post-selection inference
- Risk estimation, uncertainty quantification

Publications

Journal Publications

- **Liu, S.** (2025). Transport Quasi-Monte Carlo. *SIAM Journal on Scientific Computing*, forthcoming.
- **Liu, S.**, Panigraphi, S. (2025). Selective Inference with Distributed Data. *Journal of Machine Learning Research*, 26(12), 1-44.
- **Liu, S**. (2024). Conditional Quasi-Monte Carlo with Constrained Active Subspaces. *SIAM Journal On Scientific Computing*, 46(5), A2999-A3021.
- **Liu, S.**, Owen, A. B. (2023). Preintegration via Active Subspace. *SIAM Journal on Numerical Analysis*, 61(2), 495-514.
- Cappello, L., Kim, J., **Liu, S.**, and Palacios, J. A. (2022). Statistical Challenges in Tracking the Evolution of SARS-CoV-2. *Statistical Science*, 37(2), 162-182.
- Chen, S., **Liu, S.**, Ma, Z. (2022). Global and Individualized Community Detection in Inhomogeneous Multilayer Networks. *Annals of Statistics*, 50(5), 2664-2693.
- **Liu, S.**, Owen, A. B. (2021). Quasi-Monte Carlo Quasi-Newton for Variational Bayes. *Journal of Machine Learning Research*, 22(1), 11043-11065.
- Yang, F., **Liu, S.**, Dobriban, E., Woodruff, D. P. (2021). How to Reduce Dimension with PCA and Random Projections? *IEEE Transactions on Information Theory*, 67(12), 8154-8189.

Conference Publications

- **Liu, S.** (2023). Langevin Quasi-Monte Carlo. *NeurIPS 2023*. arXiv:2309.12664

- Lacotte, J., **Liu, S.***, Dobriban, E., Pilanci, M. (2020). Limiting Spectrum of Randomized Hadamard Transform and Optimal Iterative Sketching Methods. *NeurIPS 2020*. arXiv:2002.00864
- **Liu, S.**, Dobriban, E. (2020). Ridge Regression: Structure, Cross-Validation, and Sketching. *ICLR 2020*, **Spotlight presentation**. arXiv:1910.02373
- Dobriban, E., **Liu, S.** (2019). Asymptotics for Sketching in Least Squares Regression. *NeurIPS 2019*. arXiv:1810.06089

Preprints

- Grazzi, S., **Liu, S.**, Roberts, G.O., Yang, J. Sub-Cauchy Sampling: Escaping the Dark Side of the Moon. arXiv:2601.11066
- Chen, Y., **Liu, S.** (2025). Rotated Mean-Field Variational Inference and Iterative Gaussianization. arXiv:2510.07732
- Bou-Rabee, N., Carpenter, B., Kleppe, T. S., & **Liu, S.** (2025). The Within-Orbit Adaptive Leapfrog No-U-Turn Sampler. arXiv:2506.18746
- Jing, J., **Liu, S.**, Song, B., Yuan, W., Shen, L., & Wang, G. (2025). Antithetic Noise in Diffusion Models. arXiv:2506.06185
- **Liu, S.**, & Panigrahi, S. (2025). Flexible Selective Inference with Flow-based Transport Maps. arXiv:2506.01150
- Bou-Rabee, N., Carpenter, B., **Liu, S.**, Oberdörster, S. (2025). The No-Underrun Sampler: A Locally-Adaptive, Gradient-Free MCMC Method. arXiv:2501.18548
- **Liu, S.**, Panigrahi, S., Soloff, J. (2024). Cross-Validation with Antithetic Gaussian Randomization. arXiv:2412.14423
- **Liu, S.** (2023). An Exact Sampler for Inference after Polyhedral Model Selection. arXiv:2308.10346. Python package: `https://github.com/liusf15/selinf_sampler/`
- **Liu, S.**, Markovic, J., Taylor, J. (2022). Black-box Selective Inference via Bootstrapping. arXiv:2203.14504

(* equal contributions)

Awards

- Jerome H. Friedman Applied Statistics Dissertation Award, Stanford University, 2024
- NeurIPS 2023 Scholar Award, 2023
- Foundation of Computational Mathematics (FoCM) travel award, 2023
- Stanford Data Science Scholars, 2021-2023
- Tsinghua Scholarship for comprehensive distinction, 2018
- Tsinghua scholarship for outstanding academic performance, 2017
- First Prize of National Mathematical Olympiad (top 0.01%), 2014

Invited talks

- International Conference on Statistics and Data Science (ICSDS), December 2025, Seville, Spain
- Seminar at the USC Marshall School of Business, October 2025, Los Angeles, CA
- The Fast and Curious 2: MCMC in Action, September 2025, University of Toronto, Canada
- Seminar in the Department of Statistics at Rutgers University, March 2025, New Brunswick, NJ
- International Seminar on Selective Inference, February 2025, virtual
- University of Florida Winter workshop, January 2025, Gainesville, FL
- Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing (MCQMC), August 2024, Waterloo, Canada
- International Conference on Monte Carlo Methods and Applications (MCM), June 2023, Paris
- Foundations of Computational Mathematics (FoCM) poster presentation, June 2023, Paris
- ICSA Applied Statistics Symposium, June 2023, Ann Arbor, Michigan
- International Seminar on Selective Inference, April 2023, virtual
- Ninth Workshop on High-Dimensional Approximation (HDA), February 2023, Australian National University,

Australia
- Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing (MCQMC), July 2022, Linz, Austria
- 2021 Joint Statistical Meetings, August 2021, virtual
- International Conference on Monte Carlo Methods and Applications (MCM), August 2021, virtual

Reviewing

Journals: IEEE Journal on Selected Areas in Information Theory, IEEE Transactions on Information Theory, Journal of Machine Learning Research (2), SIAM Journal on Mathematics of Data Science (2), Journal of the American Statistical Association, Information and Inference: A Journal of the IMA, Journal of Computational and Graphical Statistics (3), SIAM Journal on Scientific Computing, SIAM Journal on Uncertainty Quantification, Annals of Applied Probability, Annals of Statistics (2), Statistical Science, TMLR

Conferences: NeurIPS (2020), ICML (2021, 2022), ICLR (2021, 2022, 2023), MCQMC (2020, 2024)

Teaching experience

- Inclusive mentorship in data science (mentor)
- STATS 60/160 Introduction to Statistical Methods (TA)
- STATS 100 Mathematics of Sports (TA)
- STATS 101 Data Science 101 (TA)
- STATS 110 Statistical Methods in Engineering and the Physical Sciences (TA)
- STATS 141 Biostatistics (TA)
- STATS 202 Data mining and analysis (TA)
- STATS 206 Applied multivariate analysis (TA)
- STATS 214/CS 229M Machine Learning Theory (TA)
- STATS 223/323 Sequential analysis (TA)
- STATS 320/NBIO 220/CS 339N Machine Learning Methods for Neural Data Analysis (TA)
- STATS 334/MATH 231 Mathematics and Statistics of Gambling (TA)
- DATASCI 112 Principles of Data Science (TA)