Anya Katsevich

NSF Postdoctoral Fellow

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Education

Courant Institute, New York University, Ph.D. in Mathematics, May 2022.
Advisors: Afonso Bandeira and Jonathan Weare

University of North Carolina at Chapel Hill, B.S. in Mathematics with Highest Honors, May 2017.
Thesis Advisor: Jeremy Marzuola.

Research Interests

High-dimensional statistics, asymptotic analysis, math of data science, applied probability.

Experiences

- *Guest researcher*, Weierstrass Institute for Applied Analysis and Stochastics, July 2024.
  Collaborated with Vladimir Spokoiny on Laplace approximation accuracy for Bayesian inverse problems.
- *Summer practicum*, Los Alamos National Laboratory, 2019.
  Studied DC-power grid reliability under uncertainty.

Journal Refereeing

Reviewer for: Annals of Statistics, Bayesian Analysis, Bernoulli, SIAM Journal on Mathematics of Data Science, Journal of Machine Learning Research, Communications in Mathematical Sciences

Teaching

At NYU

- Preliminary Exams Workshop, Winter '21-'22 – Graduate Level.
  Led a workshop helping the first-year mathematics PhD students prepare for their preliminary exam in advanced calculus.

At MIT

- 18.650: Fundamentals of Statistics, Fall '23, Spring '24, Fall '24, Spring '25 – Undergraduate Level.
  Teaching assistant in the falls, and course instructor in the springs.

Papers

Submitted

[1] **A. Katsevich**. The Laplace asymptotic expansion in high dimensions. Available on arXiv.

Under review

[2] **A. Katsevich.** The Laplace approximation accuracy in high dimensions: a refined analysis and new skew adjustment. **Major revision** in *Annals of Statistics.* Available on arXiv.

Accepted

[1] **A. Katsevich.** Improved dimension dependence in the Bernstein von Mises Theorem via a new Laplace approximation bound". **Accepted** in *Information and Inference: A Journal of the IMA.* Available on arXiv.

Published

[4] **A. Katsevich**, P. Rigollet. On the approximation accuracy of Gaussian variational inference. *Annals of Statistics.* 52 (4): pp. 1384-1409 (2024). Available on arXiv.

[5] **A. Katsevich.** From local equilibrium to numerical PDE: Metropolis crystal surface dynamics in the rough scaling limit. *SIAM Multiscale Modeling and Simulation.* 21 (1): pp. 309–348 (2023). Available on arXiv.

[6] **A. Katsevich.** The local equilibrium state of a crystal surface jump process in the rough scaling regime. *SIAM Multiscale Modeling and Simulation* 20 (4): pp. 1315-1360 (2022). Available on arXiv.

[7] **A. Katsevich**, A. Bandeira. Likelihood maximization and moment matching in low SNR Gaussian mixture models. *Communications on Pure and Applied Mathematics* 76 (4): pp. 788-842 (2022). Available on arXiv.

[8] Y. Gao, **A. Katsevich**, J. Liu, J. Lu, J. Marzuola Analysis of a fourth order exponential PDE arising from a crystal surface jump process with Metropolis-type transition rates. *Pure and Applied Analysis* 3 (4): pp. 595-612 (2021). Available on arXiv.

[9] **A. Katsevich**, P. Mikusiński. On De Graaf spaces of pseudoquotients. *Rocky Mountain J. Math* 45 (5): pp. 1445-1455 (2015). Available on Project Euclid.

[10] **A. Katsevich**, P. Mikusiński. Order in spaces of pseudoquotients. *Topology Proceedings* 44: pp. 21-31 (2014). Available from journal.

Presentations

Invited talks

- *The connection between EM and the method of moments in low SNR Gaussian mixtures.*
  National Meeting of the Sociedade Portuguesa de Matemática (ENSPM), July 2021, held virtually.
- *Hydrodynamic limits under rough local equilibrium.*
  Southeastern Probability Conference at UNC Chapel Hill. August 2022.

- *The approximation accuracy of Gaussian variational inference.*
  Optimization and Statistical Learning workshop, Les Houches Physics School. January 2023
- *The Laplace approximation and Bernstein von Mises theorem for high-dimensional Bayesian inference.*
  Harvard University, Probabilitas Seminar. April 2023
  Georgia Institute of Technology, Stochastics Seminar. August 2023
  Columbia University, Applied Probability Seminar. November 2023
  Institute for Mathematical Sciences, National University of Singapore, The Mathematics of Data workshop. January 2024.
  University of Wisconsin-Madison, Probability Seminar. May 2024.
- *Asymptotic expansions of Laplace-type integrals.*
  Oberwolfach Workshop on Statistics and Learning Theory in the Era of Artificial Intelligence. June 2024.
  Weierstrass Institute for Applied Analysis and Stochastics, Research Seminar on Mathematical Statistics. July 2024.

Contributed talks

- *Statistical Inference for High Variance Gaussian Mixture Models.*
  DOE Computational Sciences Graduate Fellowship (CSGF) Program Review, July 2021, held virtually.

Poster Presentations

- *Microgrid Reliability under Uncertainty: Static and Dynamic Analysis*
  DOE CSGF Annual Program Review, July 2019, in Arlington, VA

Awards

- NSF Postdoctoral Research Fellowship, 2022-2025
- Paul Garabedian Fellowship, “awarded each year to an outstanding PhD student" by the Courant Institute, 2021
- Department of Energy Computational Sciences Graduate Fellowship (DOE CSGF), 2017-2021
- NSF Graduate Research Fellowship (declined for DOE CSGF)
- Barry Goldwater Scholarship, 2015-2017
- Archibald Henderson Medal, awarded by UNC math dept. for “high degree of mathematical ability and the greatest promise of originality in the field”, 2015