

# Aleksei Gregory Sorokin

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**Research** Scientific Machine Learning, Gaussian Processes, Quasi-Monte Carlo, Probabilistic Numerics

**Programming** Python (PyTorch, GPyTorch, Pandas, Matplotlib), Julia, C, MATLAB, R, SQL, Wolfram

**Tools** AWS (SageMaker, EC2), GitHub (general, actions, pages),  $\text{\LaTeX}$ , Docker

## Education

2026.01 - 2028.05 **Postdoc.** Department of Statistics, University of Chicago. Advisors *Yuehaw Khoo and Lek-Heng Lim*.

2021.08 - 2025.12 **PhD in Applied Math.** Illinois Institute of Technology (IIT). GPA 3.89/4. Advisor *Fred J Hickernell*.

2017.08 - 2021.05 **Master of Data Science.** IIT. Summa Cum Laude. GPA 3.94/4.

2017.08 - 2021.05 **B.S. in Applied Math, Minor in Computer Science.** IIT. Summa Cum Laude. GPA 3.94/4.

## Experiences

2025.01 - 2025.12 **DOE SCGSR Fellow in Applied Math** at **Sandia National Laboratory** in Livermore, CA. I produced scientific ML models for machine-precision solutions to nonlinear PDEs [2]. I developed scalable multi-fidelity Gaussian processes regression models and open-source software implementations [8, 9].

2024.05 - 2024.08 **Scientific Machine Learning Researcher** at **FM (Factory Mutual Insurance Company)**. I deployed scientific ML models, including PINNs DeepONets, to accelerate CFD fire dynamics simulations [10].

2023.05 - 2023.08 **Graduate Intern** at **Los Alamos National Laboratory**. I modeled multi-fidelity solutions to PDE with random coefficients using efficient and error aware Gaussian processes regression models [11].

2022.05 - 2022.08 **Givens Associate Intern** at **Argonne National Laboratory**. I derived error bounds and a sequential sampling method for efficiently estimating failure probabilities with probabilistic models [14].

2021.05 - 2021.08 **ML Engineer Intern** at **SigOpt, an Intel Company**. In a six-person ML team, I contributed production code for meta-learning model-aware hyperparameter tuning via Bayesian optimization [15].

2022.09 - 2022.11 **Participant** in **Argonne National Laboratory's Course on AI Driven Science on Supercomputers**. Key topics included handling large scale data pipelines and parallel training for neural networks.

2018.05 - 2019.08 **Instructor** for the **STARS Computing Corps' Computer Discover Program**. I taught and developed curriculum for middle school and high school girls to learn programmatic thinking in Python.

2021.08 - 2025.01 **Teaching Assistant** at **IIT**. I led reviews for PhD qualifying exams in analysis and computational math.

## Open-Source Software

**QMCPy Quasi-Monte Carlo Python Software** (qmcsoftware.github.io/QMCSoftware). I led dozens of col-laborators across academia and industry to develop QMC sequence generators, automatic variable transformations, adaptive error estimators, and diverse use cases [1, 6, 7, 16, 17, 18, 19, 4, 5].

**FastGPs Scalable Gaussian Processes in Python** (alegresor.github.io/fastgps). This supports GPU scaling, batched inference, hyperparameter optimization, multi-fidelity GPs, and efficient Bayesian cubature. FastGPs is the first package to implement GPs which require only  $\mathcal{O}(n)$  storage and  $\mathcal{O}(n \log n)$  computations compared to the typical  $\mathcal{O}(n^2)$  storage and  $\mathcal{O}(n^3)$  computations requirements [9, 8].

**QMCGenerators.jl Randomized Quasi-Monte Carlo Sequences in Julia** (alegresor.github.io/QMCGenerators.jl).

**QMCToolsCL Randomized Quasi-Monte Carlo Sequences in C/OpenCL** (qmcsoftware.github.io/QMCToolsCL/).

**TorchOrthoPolys Orthogonal Polynomials in PyTorch** (alegresor.github.io/TorchOrthoPolys/) with GPU support.

## Awards

2025.01 - 2025.12 **DOE SCGSR Fellow in Applied Math**, Sandia National Laboratory, Livermore California.

2025.01 **Karl Menger Student Award for Exceptional Scholarship (Graduate)**, IIT.

2024.01 **College of Computing Excellence in Dissertation Research**, IIT.

2024 **Teaching Assistant Award**, IIT.

2023.08 **Outstanding Math Poster**, Los Alamos National Laboratory.

2017.08 - 2025.05 **Deans List Member**, IIT, every semester.

## References

PhD Advisor **Fred J. Hickernell** (hickernell@iit.edu) Vice Provost for Research and Professor of Applied Math, IIT.

Mentor **Nicolas W. Hengartner** (nickh@lanl.gov) Senior Scientist, Los Alamos National Lab.

Mentor **Michael J. McCourt** (mikemccourt1234@gmail.com) CTO and Co-Founder at Distributional.

Mentor **Pieterjan M. Robbe** (pmrobbe@sandia.gov) Senior Member of Technical Staff, Sandia National Lab.

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- [2] Aras Bacho, Aleksei G. Sorokin, Xianjin Yang, Théo Bourdais, Edoardo Calvella, Matthieu Darcy, Alexander Hsu, Bamdad Hosseini, and Houman Owjadi. “Operator learning at machine precision”. In: (2025). DOI: 10.48550/arXiv.2511.19980.
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- [4] Fred J. Hickernell, Nathan Kirk, and Aleksei G. Sorokin. “Quasi-Monte Carlo methods: what, why, and how?” In: (2025). DOI: 10.48550/arXiv.2502.03644.
- [5] Aadit Jain, Fred J. Hickernell, Art B. Owen, and Aleksei G. Sorokin. “Empirical Bernstein and betting confidence intervals for randomized quasi-Monte Carlo”. In: (2025). DOI: 10.48550/arXiv.2504.18677.
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- [7] Aleksei G. Sorokin. “QMCPy: a Python software for randomized low-discrepancy sequences, quasi-Monte Carlo, and fast kernel methods”. In: (2025). DOI: 10.48550/arXiv.2502.14256.
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- [11] Aleksei G. Sorokin, Aleksandra Pachalieva, Daniel O’Malley, James M. Hyman, Fred J. Hickernell, and Nicolas W. Hengartner. “Computationally efficient and error aware surrogate construction for numerical solutions of subsurface flow through porous media”. In: *Advances in Water Resources* 193 (2024), p. 104836. ISSN: 0309-1708. DOI: 10.1016/j.advwatres.2024.104836.
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