Aleksei G. Sorokin

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alegresor.github.io/

Education

2021 - 2025 **Ph.D. in Applied Mathematics.** Illinois Institute of Technology (IIT).

2017 - 2021 **Master of Data Science.** IIT. Summa cum laude.

2017 - 2021 **B.S. in Applied Mathematics, Minor in Computer Science.** IIT. Summa cum laude.

Experiences

Summer 2023 **Graduate Intern** at **Los Alamos National Laboratory.** I modeled the solution processes of PDEs with random coefficients using efficient and error aware Gaussian processes resulting in [2].

Summer 2022 **Givens Associate** at **Argonne National Laboratory**. I researched methods to efficiently estimate failure probability using Monte Carlo with non-parametric importance sampling resulting in [1].

Summer 2021 **Machine Learning Engineer** at **SigOpt, an Intel Company**. I developed novel meta-learning techniques for model-aware hyperparameter optimization resulting in [5].

2018 - Present **Lead Developer** of **QMCPy: A Quasi-Monte Carlo Python Library.** This package provides researchers and practitioners with high quality sequence generators, automatic variable transformations, adaptive stopping criteria algorithms, and diverse use cases. See [3, 6, 7] or visit *qmcpy.org*.

Fall 2021 - Present **Teaching assistant** at **IIT**. Includes leading review sessions for Ph.D. qualifying exams.

Fall 2022 **Participant** in an elective course on **AI Driven Science on Supercomputers** through **Argonne National Laboratory**. Coursework at *github.com/alegresor/ai-science-training-series*.

2018 - 2021 **Lead Developer** of **DNNB: The Deep Neural Network Builder in Python.** This research package implements deep learning models from scratch in Python. See *github.com/alegresor/DNNB*.

2018 - Present **Administrative Assistant** for **The Center for Interdisciplinary Scientific Computation at IIT**. I scheduled lecture series and maintained information on the CISC website at *cos.iit.edu/cisc/*.

2018 - 2019 **Instructor** for the **STARS Computing Corp's Computer Discover Program.** I developed a curriculum for middle school and high school girls to learn programmatic thinking with Python.

Publications

[1] Aleksei G Sorokin and Vishwas Rao. "Adaptive Probabiliy of Failure Estimation with Gaussian Processes". In preparation for the SIAM/ASA Journal of Uncertainty Quantification.

[2] Aleksei G Sorokin et al. "Computationally Efficient and Error Aware Surrogate Construction for Numerical Solutions of Subsurface Flow Through Porus Media". In preparation for Advances in Water Resources Journal.

[3] Aleksei G. Sorokin and Rathinavel Jagadeeswaran. "Monte Carlo for Vector Functions of Integrals". In preparation for the 2022 Monte Carlo and Quasi-Monte Carlo Methods Conference Proceedings.

[4] Eda Gjergo et al. *GalCEM. I. An Open-source Detailed Isotopic Chemical Evolution Code*. Feb. 2023. DOI: 10.3847/1538-4365/aca7c7. URL: https://dx.doi.org/10.3847/1538-4365/aca7c7.

[5] Aleksei Sorokin et al. "SigOpt Mulch: An intelligent system for AutoML of gradient boosted trees". In: *Knowledge-Based Systems* (2023), p. 110604. ISSN: 0950-7051. DOI: https://doi.org/10.1016/j.knosys.2023.110604. URL: https://www.sciencedirect.com/science/article/pii/S0950705123003544.

[6] Sou-Cheng T. Choi et al. "Quasi-Monte Carlo Software". In: *Monte Carlo and Quasi-Monte Carlo Methods*. Ed. by Alexander Keller. Cham: Springer International Publishing, 2022, pp. 23–47. ISBN: 978-3-030-98319-2.

[7] Aleksei G. Sorokin et al. "(Quasi-)Monte Carlo Importance Sampling with QMCPy". In: *IIT Undergraduate Research Journal* (2021), pp. 49–54. URL: https://tinyurl.com/52yr7myu.

Talks

2023 *Probabilistic Models for PDEs with Random Coefficients*. Los Alamos National Laboratory Student Lightening Talks.

2023 *Unified Framework for Quasi-Monte Carlo Software*. *Monte Carlo Methods and Applications*.

2023 *Monte Carlo with QMCPy for Vector Functions of Integrals*. *PyData Chicago*.

2023 *Adaptive Probability of Failure Estimation with Gaussian Processes*. *SIAM CSE*.

2022 *QMCPy Client for UM-Bridge*. *UM-Bridge Workshop*.

2022 *Quasi-Monte Carlo for Functions of Multi-Dimensional Integrals*. *Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing Conferene*.

2022 *Quasi-Monte Carlo for Functions of Multi-Dimensional Integrals*. *Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing Conferene*.

2022 *Quasi-Monte Carlo for Functions of Multi-Dimensional Integrals*. *CORS/INFORMS International Conference*.

2021 *QMCPy, A Quasi-Monte Carlo Framework*. *Midwest Numerical Analysis Day*.

2021 *Building QMCPy's Quasi-Monte Carlo Framework*. *International Conference on Monte Carlo Methods and Applications*.

2021 *QMCPy Quasi-Monte Carlo Software*. *SIAM Great Lakes Section Meeting*.

2021 *(Quasi)-Monte Carlo Importance Sampling with QMCPy.* Computational Mathematics Seminar, Department of Applied Mathematics, Illinois Institute of Technology.

2020 *QMCPy: A Quasi-Monte Carlo Software in Python 3*. *Chicago Area SIAM Student Conference*.

2020 *QMCPy: A Quasi-Monte Carlo Software in Python 3*. *PyData Chicago*.

Posters

2023 *Probabilistic Models for PDEs with Random Coefficients*. 2023 Los Alamos National Laboratory Student Symposium.

2022 *Adaptive Failure Probability Estimation with Gaussian Processes*. 2022 IIT Welcome Week Student Research Poster Day.

2022 *Robust Approximation of Sensitivity Indices in QMCPy Poster*. *2022 Conference on Sensitivity Analysis of Model Output (SAMO)*.

2021 *QMCPy: Quasi-Monte Carlo Software in Python.* 2021 Chicago Area Undergraduate Research Symposium.

2021 *QMCPy: A Quasi-Monte Carlo Software in Python 3*. *2021 SIAM Conference on Computational Science and Engineering*.

2019 *Multi-threaded/-processed Requests to Cloud Services for Intelligent Address Standardization*. *2019 SIAM Conference on Computational Science and Engineering*.

Coursework

Mathematics — Applied Analysis I/II, Computational Mathematics, Probability, Statistics, Applied Statistics, Bayesian Computational Statistics, Statistical Learning, Monte Carlo Methods in Finance, Mathematical Methods for Algorithmic Trading, Numerical Methods for PDEs, Reliable Mathematical Software, Linear Optimization, Computational Algebraic Geometry

Computer Science — Big Data Technologies, Data Preparation and Analysis, Database Organization, Big Data Visualization, Systems Programming, Computer Organization and Assembly, Data Structures and Algorithms, Object Oriented Programming I/II.

Awards

2017 - Present **Deans List Member**, IIT.

2023 **Outstanding Mathematics Poster**, Los Alamos National Laboratory.

2021 **Travel Award**, SIAM CSE.

2021 **Best Manuscript**, IIT Undergraduate Research Journal.

2020 **College of Science Summer Stipend**, IIT.

2020 **Karl Menger Student Award for Exceptional Scholarship**, IIT.

References

hickernell@iit.edu **Fred J. Hickernell, Ph.D.** Vice Provost for Research and Professor of Applied Mathematics, IIT.

nickh@lanl.gov **Nicolas W. Hengartner, Ph.D.** Senior Scientist, Los Alamos National Laboratory.

mccourt@sigopt.com **Michael J. McCourt, Ph.D.** Research Engineer, SigOpt, an Intel Company.

vhebbur@anl.gov **Vishwas Rao, Ph.D.** Assistant Computational Mathematician, Argonne National Laboratory.

schoi32@iit.edu **Sou-Cheng T. Choi, Ph.D.** Chief Data Scientist, Kamakura Corporation.