

Rishi Leburu

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EDUCATION

Emory University

Bachelor of Science in Applied Mathematics (Honors), GPA: 4.0

Atlanta, GA

Aug. 2023 – May 2026 (expected)

EXPERIENCE

Oak Ridge National Laboratory

Research Intern, Mentor: Dr. Guannan Zhang

Oak Ridge, TN

Summer 2025

- Applied stochastic optimal control (SOC) methods to conditional diffusion models for Bayesian inverse problems
- Researched hybrid methods combining diffusion posterior sampling with SOC techniques
- Implemented multiple SOC solvers, including adjoint matching, finite element method, neural ODEs, and neural-FBSDE solvers
- Designed reproducible experiments across dimensions to benchmark solver performance against baselines

Emory University REU - Computational Mathematics for Data Science

Undergraduate Researcher, Advisor: Dr. Deepanshu Verma

Atlanta, GA

Summer 2024

- Investigated methods to enhance variational autoencoders using conditional normalizing flows on the posterior
- Built and trained VAE models using Pyro with PyTorch to better capture complex multimodal distribution objects for the posterior and prior
- Utilized LaTeX, Beamer, Markdown, Git, and VSCode to document and share research results
- Presented a poster at the Joint Mathematics Meetings (JMM) 2025 Undergraduate Poster Session

PUBLICATIONS AND PAPERS IN PROGRESS

1. (submitted) **R. Leburu**, L. Nurbekyan, & L. Ruthotto. *Differentiating through Stochastic Differential Equations: A Primer*. arXiv:2601.08594.
2. (in preparation) **R. Leburu**, L. Nurbekyan, L. Ruthotto, & G. Zhang. *Matching Algorithms for High-Dimensional Stochastic Optimal Control*.
3. (in preparation) J. Solomon, **R. Leburu**, M. Li, & M. Chung. *Variational Sparse Paired Autoencoders for Inverse Problems*.

RESEARCH INTERESTS

generative modeling, AI / machine learning, control theory, variational inference, inverse problems

TECHNICAL SKILLS

Languages: Java, Python, C#, R, HTML/CSS

Scientific Computing & Frameworks: PyTorch, Pyro, FEniCSx, NumPy, SciPy, Matplotlib

Tools: Git, MATLAB, VS Code, LaTeX, job scheduling (SLURM), AI-assisted agentic coding tools

RELEVANT COURSEWORK

Graduate: Topics in Computational Mathematics (Generative Modeling), Matrix Analysis, Numerical Analysis (*in progress*), Real Analysis (*in progress*), Numerical Partial Differential Equations (*in progress*)

Undergraduate: Mathematical Statistics, Nonlinear Optimization, Linear Algebra (*proof-based*), Vector Calculus (*proof-based*), Differential Equations, Partial Differential Equations, Data Structures and Algorithms

AWARDS & HONORS

Chair's Achievement Award, Emory Math Department (2025)

Dean's List, Emory University (2023–2025)