Aniket Deshpande

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Areas of Research

Tensor Algorithms; Machine Learning; Theoretical Neuroscience

Education

2023–2027 University of Illinois, Urbana-Champaign,
B.S. in Physics, *Specialization in Physics & Computation*

Research

06.2026 **Lawrence Berkeley National Lab** *Berkeley, CA*
Student Researcher
Mentor: Prof. Roel Van Beeumen
Incoming summer 2026 — scalable solvers group.

02.2026— **Supervised Program for Alignment Research**
Research Fellow
Mentor: Dmitry Manning-Coe
Addressing issues with sparse autoencoders with a novel tensor network-based architecture for crosscoders.

02.2026— **Vector Institute for Artificial Intelligence** *Toronto, Ontario*
Research Intern
PI: Prof. Alán Aspuru-Guzik
Developing machine learning models trained on fermionic quantum spectroscopy data for predicting quantum properties of molecular systems. Deriving theoretical guarantees for sample complexity.

08.2025— **Engelken Lab** *Urbana, IL*
Undergraduate Researcher
PI: Prof. Rainer Engelken
Calculating covariant Lyapunov vectors and stable manifold angles on Sompolinsky-Crisanti-Sommers rate network models.

09.2024— **Lab for Parallel Numerical Algorithms** *Urbana, IL*
Undergraduate Researcher
PI: Prof. Edgar Solomonik
Collaborating on the development of a novel Monte Carlo algorithm for contracting general tensor networks, with applications to quantum circuit simulation. Developing Bayesian models for tensor CP decomposition, showing how likelihood maximization under structured covariance priors connects to alternating Mahalanobis distance minimization.

Industry

05—08.2024 **Space Dynamics Laboratory** *Albuquerque, NM*
Ionospheric Analyst Intern
Developed a Python scraper to expedite the data collection of NICT ionograms to 600+ ionograms downloaded per hour. Researched numerical analysis methods to improve noise reduction of ionograms using various filtering methods; implemented filters in Python and Julia and ran statistical analysis (PSNR, MSE, SSIM) to compare efficiencies. Researched methods to improve automatic ionogram scalers using deep learning architectures (CNNs).

Talks & Posters

08.2025 [P] "Approximating Tensor Contractions with Annealed Importance Sampling," QSim 2025, NYC, NY.
12.2024 [P] "Quantum Circuit Volume for Graph Models," Illinois Mathematics Lab Open House.

Selected Training

08—12.2025 Independent Study – Information Geometry, with Prof. Matthew Singh
08.2025 QSim Summer School – NSF RQS (hosted at IBM, NYC)

Service & Affiliations

05.2025— Membership Director, SIAM @ University of Illinois, Urbana-Champaign
05.2025— Member, Society of Industrial & Applied Mathematics

Coursework

Physics: Statistical Mechanics, Quantum Information Theory[G], Electromagnetism I, Classical Mechanics I & II, Special Relativity

Mathematics: Real Analysis, High-Dimensional Statistics[AG], Optimal Control Theory[AG], Representation Theory[AG], Stochastic Processes, Partial Differential Equations[G]

Computing: Deep Learning Theory[G], Theoretical Neuroscience[G], Biologically-Plausible AI[G], Machine Learning, Deep Generative Models, Data Structures & Algorithms

[G] graduate coursework [A] audited coursework

Skills

Programming: Python, C/C++, Java, Julia, Mathematica
Libraries & Frameworks: NumPy, SciPy, Pandas, Matplotlib, PyTorch, SymPy, Jupyter
Tools & Environments: Git, LaTeX, Conda, Shell, Jupyter

Last updated: February 18, 2026