

# ANIKET DESHPANDE

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My interests lie in mathematical and statistical methods for quantum information, namely tensor network methods, random matrix theory, and representation theory. I also enjoy learning about mathematical finance and theoretical neuroscience.

**EDUCATION**      **University Of Illinois, Urbana-Champaign**      Urbana, IL  
*B.S. Physics, Specialization in Mathematical Physics*      2023 - 2027 (*expected*)

- *Relevant Coursework:*

**Undergraduate:** Quantum Mechanics I, Electromagnetic Fields I, Classical Mechanics I & II, Special Relativity & Mathematical Methods, Stochastic Processes, Real Analysis, Differential Equations, Abstract Linear Algebra

**Graduate-level:** Differentiable Manifolds I, Real Analysis, Representation Theory for Quantum Information, Quantum Information Processing

- Minors in Mathematics and Scientific Computing

**TALKS & POSTERS**      **Quantum Circuit Volume for Graph Models, Illinois Math Lab Open House**      12.2024  
 Poster developed through the *Illinois Mathematics Lab*; available on website.

**RESEARCH**      **Computation & Neurodynamics Lab | Urbana, IL**      01.2025 - Present

- Simulating heterogeneous networks of FitzHugh-Nagumo neurons under noisy time-varying inputs; analyzing sliding window covariances between intrinsic timescales and membrane potential dynamics to uncover interpretable neuron-level models.
- Applying neural-symbolic regression to extract compact, interpretable equations describing neuron activity as a function of internal parameters and shared time-varying inputs.
- PI: Dr. Matthew Singh

**Lab for Numerical Parallel Algorithms | Urbana, IL**      09.2024 - Present

- Collaborating on the development of a novel Monte Carlo algorithm for contracting general tensor networks, with applications to quantum circuit simulation.
- Investigating randomized methods such as TensorSketch for efficient estimation of trace-like quantities in large-scale tensor networks.
- PI: Dr. Edgar Solomonik

**Polymer Physics Theory Group | Urbana, IL**      08.2024 - 01.2025

- Performed computational simulations of free-draining bottle brush polymers with explicit side-chains using a coarse-grain model
- Refactored and improved coarse-grain model using stochastic differential equations and brownian motion results. Implemented the model in C.

**LEARNING**      **LPNA Reading Group, University of Illinois**      01.2025 – Present  
 Weekly discussions on various literature in random matrix theory, graph partitioning, tensor network applications, and quantum error correction.

**QSim Summer School, NSF RQS (hosted at IBM, NYC)**      08.2025

Attending lectures covering theoretical and experimental perspectives on quantum error correction, simulation, and state tomography.

INDUSTRY	<b>Space Dynamics Laboratory</b>   Ionospheric Analyst Intern <span style="float: right;">05 - 08.2024</span> <ul style="list-style-type: none"> <li>• Developed a Python scraper to expedite the data collection of NICT ionograms to 600+ ionograms downloaded per hour.</li> <li>• Researched numerical analysis methods to improve the noise reduction of ionograms using various filtering methods. Implemented filters in Python and Julia and ran statistical analysis (PSNR, MSE, SSIM) to compare efficiencies.</li> <li>• Researched methods to improve automatic ionogram scalers using deep learning architecture (CNNs) and techniques.</li> </ul>
SKILLS	<p><b>Programming:</b> Python, C/C++, Java, Julia, Mathematica</p> <p><b>Libraries:</b> Matplotlib, SciPy, NumPy, Pandas</p> <p><b>Utilities:</b> Anaconda, Git, Jupyter, Shell, L<sup>A</sup>T<sub>E</sub>X</p>