

Physics student at Illinois pursuing research in quantum information, learning theory, and optimization.

EDUCATION	<b>University Of Illinois, Urbana-Champaign</b>	Urbana, IL
	<i>B.S. Physics, Specialization in Mathematical Physics</i>	2023 - 2027 (expected)
	<ul style="list-style-type: none"> <li>• <b>Mathematics:</b> (Graduate) Representation-theoretic Quantum Information, (Graduate) Measure Theory, Abstract Linear Algebra, Differential Equations, Stochastic Processes</li> <li>• <b>Computing:</b> Modern Computational Physics, Data Structures &amp; Algorithms</li> <li>• <b>Physics:</b> Quantum Information Processing, Quantum Mechanics I, Electromagnetic Fields I &amp; II, Classical Mechanics I &amp; II, Special Relativity</li> <li>• Minors in Mathematics and Scientific Computing</li> </ul>	
TALKS & POSTERS	<b>Quantum Circuit Volume for Graph Models, Illinois Math Lab Open House</b>	12.2024
	<p>Poster developed with the <i>Illinois Mathematics Lab</i></p> <ul style="list-style-type: none"> <li>• Developed quantum circuits simulating birth-death process graph channels with optimized resource scaling using <math>EQ_k</math>, <math>P_k</math>, and <math>RY</math> gates.</li> <li>• Established <math>O(\sqrt{n}) \leq l(\Phi) \leq O(n)</math> bounds on simulation cost via Lipschitz complexity and Kraus rank methods.</li> <li>• Optimized circuit depth (<math>O(n \log n)</math>) and ancilla space (<math>O(n)</math>) under locality constraints, presenting a general framework for graph channel simulation.</li> </ul>	
RESEARCH	<b>Computation &amp; Neurodynamics Lab</b>   Urbana, IL	01.2025 - Present
	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Applying neural-symbolic regression to extract compact, interpretable equations describing neuron activity as a function of internal parameters and shared time-varying inputs.</li> <li>• PI: Dr. Matthew Singh</li> </ul>	
	<b>Lab for Numerical Parallel Algorithms</b>   Urbana, IL	09.2024 - Present
	<ul style="list-style-type: none"> <li>• Collaborating on the development of a novel Monte Carlo algorithm for contracting general tensor networks, with applications to quantum circuit simulation.</li> <li>• Investigating randomized methods such as TensorSketch for efficient estimation of trace-like quantities in large-scale tensor networks.</li> <li>• PI: Dr. Edgar Solomonik</li> </ul>	
	<b>Polymer Physics Theory Group</b>   Urbana, IL	08.2024 - 01.2025
	<ul style="list-style-type: none"> <li>• Performed computational simulations of free-draining bottle brush polymers with explicit side-chains using a coarse-grain model</li> <li>• Refactored and improved coarse-grain model using stochastic differential equations and brownian motion results. Implemented the model in C.</li> </ul>	
INDUSTRY	<b>Space Dynamics Laboratory</b>   Ionospheric Analyst Intern	05 - 08.2024
	<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 scalars using deep learning architecture (CNNs) and techniques.</li> </ul>	

LEARNING	<b>QSim Summer School – NSF RQS (hosted at IBM, NYC),</b>	08.2025
	Lectures covering theoretical and experimental perspectives on quantum error correction, simulation, and state tomography.	
	<b>Uncertainty Quantification &amp; Machine Learning for Physical Systems – IMSI hosted at the University of Chicago,</b>	05.2025
	Lectures on Bayesian inference, sensitivity analysis, and physics-informed neural networks, with applications to complex physical systems.	
	<b>LPNA Reading Group – University of Illinois,</b>	01.2025 – Present
	Weekly discussions on random matrix theory, graph partitioning, tensor network applications, and quantum error correction.	
OUTREACH	<b>Membership Director SIAM @ University of Illinois,</b>	05.2025 - Present
	SIAM@UIUC executive officer. Responsibilities include managing membership status, involvement, and recruitment.	
PROFESSIONAL AFFILIATIONS	<b>Society of Industrial &amp; Applied Mathematics,</b>	05.2025 - Present
	Member	
SKILLS	<b>Programming:</b> Python, C/C++, Java, Julia, Mathematica	
	<b>Scientific Computing:</b> Numerical simulation, stochastic modeling, time series analysis, statistical signal processing, sliding window statistics, ODE/SDE solvers	
	<b>Libraries &amp; Frameworks:</b> NumPy, SciPy, Pandas, Matplotlib, scikit-learn, SymPy, Jupyter	
	<b>Tools &amp; Environments:</b> Git, $\text{\LaTeX}$ , Conda, Shell, Jupyter	