

Eesh Gupta

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Education

Stanford University. *Palo Alto, California.* 2023-Present

PhD Candidate. Applied Physics.

Advisor: David Schuster

Rutgers University. *New Brunswick, New Jersey.* 2023

B.S. Physics (Highest Honors). *Summa Cum Laude.*

Advisors: Srivatsan Chakram and Stephen Schnetzer

Thesis: *A Tale of Two Oscillators: Crosstalk Resilient Control of Multimode Cavities for Quantum Computation*

Publications

A. Galda, **E. Gupta** *, J. Fallas, X. Liu, D. Lykov, Y. Alexeev, I. Safro. Similarity-Based Parameter Transferability in Quantum Approximate Optimization Algorithm (QAOA). *Frontiers in Quantum Science and Technology* (2023). [* Joint First Author]

Talks and Posters

Fast Control of Multimode Cavities with Conditional Displacements.
American Physical Society March Meeting, Las Vegas, NV, 2023.

Quantum Information Processing with Multimode Circuit Quantum Electrodynamics.
Rutgers Condensed Matter Conference (poster), Piscataway, NJ, 2022.

Predicting Transferability of Optimal Parameters of QAOA.
American Physical Society March Meeting, Chicago, IL, 2022.
Learning off the Lawn (Student Symposium), Argonne National Laboratory, IL, July 2021.

Error Mitigating Quantum Computation of Molecular Ground States.
Aresty Virtual Summer Science Poster Session, Piscataway, NJ, July 2020.

Research Experiences

Experimental Control of Superconducting Quantum Systems

2022 - Present

Department of Physics and Astronomy, Rutgers University

Advisor: Srivatsan Chakram

- Developing control schemes based on conditional displacements for 3D Multimode microwave cavities coupled to ancillary transmon qubits in presence of decoherence errors.
- Performing calibration, control, and readout of superconducting qubits and 3D microwave cavities

Transferability of QAOA Parameters

June - Nov 2021

Computational Science Division, Argonne National Laboratory

Advisors: Yuri Alexeev, Ilya Safro, Alexey Galda

- Developed metrics for predicting when optimal parameters of Quantum Approximate Optimization Algorithm (QAOA) MaxCut problem for a small random graph (5-10 nodes) also optimize a large random graph (100-200 nodes).
- Performed simulations on QTensor tensor network quantum simulator

Quantum Error Mitigation

Sep 2019 – May 2021

Department of Physics and Astronomy, Rutgers University

Advisor: Stephen Schnetzer

- Developed error mitigation techniques based on zero noise extrapolation which resulted in 4x improvement in ground state energy of the hydrogen molecule computed using Variational Quantum Eigensolver (VQE) algorithm Performed Python noise simulations on noise models using IBM Qiskit

Outreach

Rutgers Quarknet Summer School

2022- 2023

- Taught quantum mechanics and quantum algorithms to a cohort of 24 high school students over a 2 week summer program in both 2022 and 2023.
- Led interactive discussions, designed problem sets, organized lab tours

Hacking Workshops

2020-2022

- Delivered 5+ talks and led interactive coding sessions on quantum computing topics-Quantum Teleportation, Variational Quantum Eigensolver, Superconducting Qubits.
- Talks delivered at Governor's School of New Jersey, New Jersey Section of the American Association of Physics Teachers and Society of Physics Students.

Agpocalypse 2050	2018
University of Nebraska-Lincoln	
- Developed minigames to inform urban middle school students about strategies to mitigate the harmful impacts of potential fuel shortages on our food and water resources - Investigated criteria for effective video games which balance education and entertainment.	

Selected Academic Honors

National Science Foundation Graduate Research Fellowship	2023
Richard T. Weidner Physics Prize, Rutgers	2023
Henry Rutgers and Paul Robeson Scholar, Rutgers	2023
Barry Goldwater Scholarship	2022
Qiskit Advocate, IBM	2021
Aresty Summer Science Research Fellowship, Rutgers	2020