Paul Bruzzi

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SUMMARY

Undergraduate researcher in computer science and physics with experience in quantum algorithm design, hybrid quantum-classical methods, and numerical analysis. Interested in about developing algorithms optimized for near-term quantum hardware and exploring speedups achievable on quantum devices.

EDUCATION

2022 - Present   B.S. in Computer Science and Physics, **Rensselaer Polytechnic Institute**
Expected 2026 (GPA: 3.56/4.0)
Relevant Coursework: Computing & Quantum Computing, Intro to Algorithms, Data Structures, Linear Algebra, Intro to Quantum Mechanics

WORK EXPERIENCE

Quantum Algorithm Research Assistant   Jun 2024 - Present
– Investigating molecular and lattice quantum systems for ground state energy estimation.
– Designed and benchmarked Hadamard Test and Quantum Phase Estimation algorithms on IBM hardware.
– Implemented hybrid quantum-classical methods coupling quantum circuits with classical optimizers, such as VQPE, QCELS, ODMD.
– Supervised by Dr. Fabian Faulstich.

Quantum Algorithm Research Intern   May 2025 - Jul 2025
– Conducted quantum algorithm research at Lawrence Berkeley National Laboratory.
– Implemented algorithms for quantum state estimation under the supervision of Dr. Roel Van Beeumen.
– Analyzed algorithmic convergence and noise resilience in simulation environments.

PROJECTS

Quantum Phase Estimation Comparison   [GitHub]
Developed a comprehensive repository comparing multiple quantum phase estimation algorithms. Evaluated performance across query complexity and time evolution on simulated quantum systems. Used Qiskit and Python for algorithm implementation and numerical benchmarking.

A Practical guide to Quantum Linear Algebra   [GitHub]
Authored an open-source educational repository explaining quantum computing fundamentals. Implemented and demonstrated core quantum linear algebra algorithms in Qiskit. Designed Jupyter notebooks for reproducible and beginner-accessible quantum examples.

BeeKeepr   [GitHub]
Collaborated with a 4-member team to design and develop an app for tracking hive health and providing education content for beginner beekeepers. Managed documentation, proposal writing, and user feedback integration throughout the project cycle. Developed using Flutter and Firebase.

Vacansee   [GitHub]
Led a 8-person development team to build an interactive campus map in Vue and Python. Managed version control with GitHub and conducted code reviews and task assignments.

Current Papers

Bruzzi, Paul et al. (2026). "Quantum Phase Estimation Algorithm Comparision". Working title, manuscript in preperation

Pre-Print

Alex Weiss and **Bruzzi, Paul** (May 2025). "A Practical Guide to Quantum Linear Algebra". In: *HAL Open Science.* **Authors contributed equally**. URL: https://hal.science/hal-05090131

Conferences

Duke Math Connections Fall 2024	Gave an academic talk introducing quantum computing principles to mathematics undergraduates, highlighting recent research in quantum energy estimation on current IBM hardware.

Skills

Programming	Python, Jupyter Notebook, Qiskit, C++, C, React,
Tools	NumPy, Pandas, IBM Quantum Cloud, Git/Github
Research	Quantum algorithm design, data analysis, numerical simulation, LaTeX
Soft Skills	Technical writing, collaboration, presentation, project leadership

Awards and Honors

Dean's List (Semesters 1, 6); Honors Dean's List (Semesters 2-5, 7)