

Jason Ludmir

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Education

Ph.D., Computer Science

In-Progress

Rice University

Focus: Quantum Computing and High Performance Computing, **Advisor:** Dr. Tirthak Patel

M.Sc., Computer Science

May 2021

Brown University

Focus: Database Systems and Optimization, **Advisor:** Dr. Stanley Zdonik

B.S., Finance

May 2015

Wake Forest University

Focus: International Business, **Minor:** Japanese Language

Awards and Recognition

Ken Kennedy – HPE Cray Graduate Fellowship

2025

Selected for prestigious fellowship recognizing research excellence in high-performance computing.

Best Lightning Talk at HPC Energy Conference

2025

Awarded Best Lightning Talk by audience vote during the conference's lightning talk session.

1st Place: ACM Student Research Competition at SC 2024 Conference

2024

Won after being selected to present at the prestigious ACM Student Research Competition.

Inaugural HPC Student Cohort (HPCSC)

2024

Selected at Supercomputing (SC) 2024 and IPDPS 2025 as part of a prestigious cohort promoting extended engagement with the HPC community.

DAC Young Fellow

2024

Selected as a Young Fellow of the 61st Design Automation Conference (DAC).

DAC Creative Research Dissemination Award

2024

Recognized for presenting a research publication summary with exceptional creativity.

ICCAD Quantum Computing for Drug Discovery Challenge

Honorable Mention and Innovation Award Nomination

2023

Awarded for innovative contributions in applying quantum computing to a drug discovery challenge.

Conference Travel Awards

Multiple

Awarded travel awards to attend SC24, DAC24, SIGMETRICS25.

Ipreo International Hack-A-Thon: 1st Place

2016

Led team to victory in a global competition focusing on innovative financial technology solutions.

Bank of America Leadership Scholarship

2014

Recognized for outstanding leadership potential and academic excellence.

Global Citizens Scholarship

2014

Awarded for commitment to global awareness and cross-cultural understanding.

Wake Forest University Study Abroad Scholarship

2013

Selected for academic merit to support international study experience in Japan.

Wake Forest University Dean's List

2012-2015

Consistently recognized for academic excellence throughout undergraduate studies.

Research Experience

Rice University

August 2023 - Present

Doctoral Researcher

- Advancing high-performance quantum computing through the development of optimized compilation techniques for Rydberg atom quantum computers, with a focus on hardware utilization.
- Developing innovative hybrid algorithms that combine machine learning and quantum computing techniques to tackle complex problems such as anomaly detection.

Brown University

May 2020 - June 2021

Research Assistant

- Researched optimizations to the dynamic time warping (DTW) algorithm in time series databases.
- Implemented optimizations to DTW in the Rust programming language.

Peer-Reviewed Publications

1. **(SIGMETRICS 2026, 21% acceptance rate)** Yuqian Huo, Daniel Leeds, Jason Ludmir, Nicholas S. DiBrita, and Tirthak Patel. "Anchor: Reducing Temporal and Spatial Output Performance Variability on Quantum Computers." *In Proceedings of the ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS)*, 2026.
2. **(DAC 2025, 23% acceptance rate)** Jason Ludmir, Sophia Rebello, Jacob Ruiz, Tirthak Patel. "Quorum: Zero-Training Unsupervised Anomaly Detection using Quantum Autoencoders." *In Proceedings of the Design Automation Conference (DAC)*, 2025.
3. **(SIGMETRICS 2025, 18% acceptance rate)** Jason Ludmir, Nicholas S. DiBrita, Yuqian Huo, Tirthak Patel. "Modeling and Simulating Rydberg Atom Quantum Computers for Hardware-Software Co-design with PachinQo." *In Proceedings of the ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS)*, 2025.
4. **(SC 2024, 24% acceptance rate)** Jason Ludmir, Nicholas S. DiBrita, Yuqian Huo, Tirthak Patel. "PARALLAX: A Compiler for Neutral Atom Quantum Computers under Hardware Constraints." *In Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC)*, 2024.
5. **(ICCAD 2024, 24% acceptance rate)** Nicholas S. DiBrita, Daniel Leeds, Yuqian Huo, Jason Ludmir, Tirthak Patel. "ReCon: Reconfiguring Analog Rydberg Atom Quantum Computers for Quantum Generative Adversarial Networks." *In Proceedings of the International Conference on Computer-Aided Design (ICCAD)*, 2024.

Preprints

1. Jason Ludmir, Ian Martin, Nicholas S. DiBrita, Daniel Leeds, and Tirthak Patel. "QMill: Representative Quantum Data Generation for Quantum Machine Learning Utility."
2. Jason Han, Nicolas S. DiBrita, Daniel Leeds, Jianqiang Li, Jason Ludmir, and Tirthak Patel. "Layerwise Federated Learning for Heterogeneous Quantum Clients using Quorus."

Technical Reports

1. Jason Ludmir and Tirthak Patel. “CutSure: Reducing the Overhead of Reloading Rydberg Atom Arrays on Neutral Atom Quantum Computers.” ACM Report: <https://src.acm.org/binaries/content/assets/src/2025/jason-ludmir.pdf>

Open-Sourced Artifacts

1. **QMill: Representative Quantum Data Generation for Quantum Machine Learning Utility:** <https://github.com/positivetechnologylab/QMill>.
2. **Layerwise Federated Learning for Heterogeneous Quantum Clients using Quorus:** <https://github.com/positivetechnologylab/Quorus>.
3. **Anchor: Reducing Temporal and Spatial Output Performance Variability on Quantum Computers:** <https://github.com/positivetechnologylab/Anchor>.
4. **Quorum: Zero-Training Unsupervised Anomaly Detection using Quantum Autoencoders:** <https://github.com/positivetechnologylab/Quorum>.
5. **CutSure: Increasing the Efficiency of Neutral Atoms by Reducing Qubit Waste from Measurement-related Ejections:** <https://github.com/positivetechnologylab/CutSure>.
6. **Modeling and Simulating Rydberg Atom Quantum Computers for Hardware-Software Co-design with PachinQo:** <https://github.com/positivetechnologylab/PachinQo>.
7. **PARALLAX: A Compiler for Neutral Atom Quantum Computers under Hardware Constraints:** <https://github.com/positivetechnologylab/Parallax>.
[†]*Received Artifact Available, Functional, and Reproducible Badges at SC 2024.*
8. **ReCon: Reconfiguring Analog Rydberg Atom Quantum Computers for Quantum Generative Adversarial Networks:** <https://github.com/positivetechnologylab/ReCon>.

Speaking Events

- Presented “Quorum: Zero-Training Unsupervised Anomaly Detection using Quantum Autoencoders”,
DAC 2025 *June 2025*
- Presented “Modeling and Simulating Rydberg Atom Quantum Computers for Hardware-Software
Co-design with PachinQo”, SIGMETRICS 2025 *June 2025*
- Poster Presentation, “Unsupervised Quantum Anomaly Detection”,
Quantum Information Processing Systems *April 2025*
- Lightning Talk, “Unsupervised Quantum Anomaly Detection”,
Energy HPC Conference *February 2025*
- Poster Presentation, “Unsupervised Quantum Anomaly Detection”,
Energy HPC Conference *February 2025*
- Poster Presentation, “Unsupervised Quantum Anomaly Detection”,
DefenseTech Connect Conference *December 2024*
- Poster Presentation, “CutSure: Increasing the Efficiency of Neutral Atoms”,
ACM Student Research Competition at SC *November 2024*

Poster Presentation, “PARALLAX: Compiling for Neutral Atom Quantum Computers”,
Design Automation Conference (DAC) *June 2024*
Presented “Neutral Atom Compilation”, Rice University CS Graduate Seminar *February 2024*

Academic Service

Manuscript Reviewer, *Quantum Information Processing* (Quantum Computing) *July 2025*
Manuscript Reviewer, *Cluster Computing* (Quantum Computing) *June 2025*
Manuscript Reviewer, *Quantum Machine Intelligence* (Quantum Computing) *May 2025*
Judge, Shapiro Showcase
Shapiro Undergraduate Research Competition *April 2025*
Poster Judge, Engineering and Computing Undergraduate Engineering and Computing
Engineering and Computing Undergraduate Research Poster Symposium *February 2025*
Student Volunteer, Program Committee Meeting, High Performance Computing (HiPC)
Conference, HPC Systems Software Track *August 2024*
External Reviewer for quantum computing research, International Symposium
on Computer Architecture (ISCA) *January 2024*

Mentorship Experience

Jacob Ruiz, Stanford University *July 2024 - November 2024*
Guided implementation of quantum circuits for enhancing classical machine learning models with applications to anomaly detection in datasets. Co-author for Quorum (DAC 2025).

Sofia Rebello, Rice University *January 2024 - January 2025*
Mentored an undergraduate student in quantum computing applications in finance, demonstrating how quantum algorithms can optimize portfolio allocation and risk. Her poster on this work won first place at the ACM Student Research Competition (SRC) at the 2025 Code Generation and Optimization (CGO) conference. Co-author for Quorum (DAC 2025).

Teaching Experience

Rice University *Fall 2024*
Teaching Assistant - Database Management Systems

- Provided timely and thorough grading of assignments, delivering detailed, actionable feedback that reinforced students’ understanding of core database concepts.

Rice University *Fall 2023*
Teaching Assistant - Distributed Programming

- Assisted in managing a highly collaborative class in which seniors prepared a capstone project.

Brown University *Fall 2020*
Head Teaching Assistant - Database Management Systems

- Led the remote redesign of one of the most popular courses at Brown, including creating assignments, exams, review materials and lectures.
- Managed a team of TAs across the world in handling a student body of over 100 students.

Brown University *Fall 2019*
Teaching Assistant - Computer Systems

- Prepared assignments/labs using C and assembly for over 300 students enrolled.
- Held weekly office hour sessions to assist students with debugging and conceptual questions.

Technical Skills

Programming Languages: Python, C, C++, Rust, Java, Assembly, LaTeX, SQL

Frameworks & Libraries: Matplotlib, NumPy, Pandas, Qiskit, SciPy

Development Tools: GDB, Git, Docker, VS Code, Jupyter Notebooks

Parallel Computing: CUDA, MPI, OpenMP

Graduate Coursework

Rice University

- Advanced Operating Systems
- Computer Systems Architecture
- Parallel Computing
- Probabilistic Algorithms
- Internet of Things (IoT)

Brown University

- Software Security and Exploitation
- Deep Learning
- Computer Systems
- Database Management Systems
- Time Series Databases

Additional Work Experience

IHS Markit

May - August 2021

Data Science Intern

- Optimized and debugged a machine learning model used to predict investor activity.

Ipreo

May 2015 - August 2016

Market Intelligence Consultant

- Provided clients with intelligence about institutional investors and drivers in equity markets.