

# Jason Ludmir

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## Education

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### **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

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### **1st Place: ACM Student Research Competition at Supercomputing Conference** 2024

Won after being selected to present at the prestigious ACM Student Research Competition at SC24.

### **Inaugural HPC Student Cohort (HPCSC)**

2024

Selected to attend 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.

### **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.

Consistently recognized for academic excellence throughout undergraduate studies.

## Research Experience

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### 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

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1. **(SIGMETRICS 2025)** 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 SIGMETRICS International Conference on Measurement and Modeling of Computer Systems*, 2025.
2. **(SC 2024)** 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.
3. **(ICCAD 2024)** 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.

## Under-Review Manuscripts

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1. **(Lead Author)** A framework for quantum data generation to advance entanglement-rich datasets in quantum machine learning.
2. **(Lead Author)** An unsupervised, zero-training quantum anomaly detection framework leveraging quantum autoencoders.
3. **(Lead Author)** A technique that significantly reduces the rate of qubit ejections in neutral atom systems during measurement, improving the performance of neutral atom computers.
4. **(Co-Author)** A novel technique designed to minimize the variability in the output fidelity of quantum circuits, addressing both temporal and spatial variability in quantum cloud computing environments.

## Open-Sourced Artifacts

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1. **PARALLAX: A Compiler for Neutral Atom Quantum Computers under Hardware Constraints:** <https://github.com/positivetechnologylab/Parallax>.

<sup>†</sup>Received Artifact Available, Functional, and Reproducible Badges at SC 2024.

2. **ReCon: Reconfiguring Analog Rydberg Atom Quantum Computers for Quantum Generative Adversarial Networks:** <https://github.com/positivetechologylab/ReCon>.

### *Speaking Events*

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- 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*

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- 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*

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- Jacob Ruiz, Stanford University** *July 2024 - Present*  
Guided implementation of quantum circuits for enhancing classical machine learning models with  
applications to anomaly detection in datasets.
- Sofia Rebello, Rice University** *January 2024 - Present*  
Mentored an undergraduate student in quantum computing applications in finance, demonstrating  
how quantum algorithms can optimize portfolio allocation and risk.

### *Teaching Experience*

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- 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*

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**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

**Operating Systems:** Linux, Windows, macOS

**Parallel Computing:** CUDA, MPI, OpenMP

### *Graduate Coursework*

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#### **Rice University**

- Advanced Operating Systems
- Computer Systems Architecture
- Parallel Computing

#### **Brown University**

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

### *Additional Work Experience*

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#### **IHS Markit**

*Data Science Intern*

*May - August 2021*

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

#### **Ipreo**

*Market Intelligence Consultant*

*May 2015 - August 2016*

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