Ryan Anselm

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Education

The University of Texas at Austin Sept. 2025 - Present
Ph.D. in Computer Science
Advised by Scott Aaronson and Nick Hunter-Jones
NSF Graduate Research Fellow

Columbia University Sept. 2021 - May 2024
B.S. in Computer Science, *Magna Cum Laude*
Minors in Applied Math & Applied Physics
GPA: 4.05/4.00

Research Experience

UT Austin Quantum Information Center, *Graduate Research Assistant* Sept. 2025 - Present
Supervised by Scott Aaronson, Nick Hunter-Jones

Flatiron Institute, *Summer Research Assistant* May 2024 - Aug. 2024
Hosted by the Center for Computational Quantum Physics
Supervised by Ryan Levy, Joseph Tindall, Miles Stoudenmire

- Engineered a Julia library that generalizes the Quantized Tensor Train (QTT) format to arbitrary Tree Tensor Networks (TTNs), creating a new framework for compressed, low-rank representations of multivariate functions.
- Leveraged this framework to investigate relationships between function structure and optimal tree layouts and to implement efficient, non-trivial operators (e.g., Discrete Fourier Transform, Koopman) for solving differential equations.

Columbia Quantum Computing Theory Group, *Research Assistant* Aug. 2023 - May 2024
Supervised by Henry Yuen

- Studied complexity-theoretic lower bounds for hybrid digital-analog quantum computation and explored methods for architecture-aware quantum circuit compilation for reconfigurable neutral atom array quantum computers.

Learning the Earth with AI and Physics (LEAP) REU Jun. 2022 - Aug. 2022
Supervised by Kara Lamb, Marcus van Lier-Walqui

- Trained neural network models to emulate cloud microphysics, achieving comparable accuracy to traditional bulk/bin simulation methods. Worked with the ML Python ecosystem (Numpy, Pytorch, Scikit-learn, Scipy, Xarray, etc.) to implement and evaluate models.

UT Austin Computational Materials Freshman Research Initiative Jan. 2021 - Aug. 2021
Supervised by Wenrui Chai

- Developed Python and Fortran algorithms to efficiently locate charge density saddle points for Bader, a computational charge analysis code.

Publications & Presentations

Quantum-inspired Tree Tensor Network Methods for Compression and Transformation of Multivariate Functions. Tensor Networks and Classical Optimization Session, American Physical Society Global Physics Summit, March 2025.

Machine learning optimal prognostic moments for single-category cloud microphysics parameterizations. Processes of (Sub) Cloud Scales: Modeling, Observations, and Parameterizations Session, American Geophysical Union Fall Meeting, December 2022.

P. Chowdhury, R. Dasgupta, P.R. Phelps, C-T.A. Lee, & **R. Anselm**. *Partitioning of chalcophile and highly siderophile elements (HSEs) between sulfide and carbonated melts – Implications for HSE systematics of kimberlites, carbonatites, and melt metasomatized mantle domains.* Geochimica et Cosmochimica Acta 305:130-147. July 2021.

Awards

2025 NSF Graduate Research Fellowship – $159,000
2024 MIT iQuHack Quantum Hackathon, 1st place in track
2024 Tau Beta Pi New York Alpha Chapter, Junior Inductee
2022 Top 350 placement, William Lowell Putnam Mathematical Competition

Work Experience

Salesforce, Inc. Sept. 2024 - Sept. 2025
Associate Member of Technical Staff

- Closed legacy parity gaps, enabled tool calls into core Salesforce apps, and reworked token streaming to support rich UI responses while minimizing latency regressions in the Agentforce Agentic Reasoner (Salesforce's AI agent reasoning engine). Worked with a stack of Python, Java, LlamaIndex, Docker, Git/Github, and CI/CD.

Salesforce, Inc. May 2023 - Aug. 2023
Software Engineering Intern

- Integrated social media platform APIs with Salesforce Data Cloud's activation layer for launching social media marketing campaigns on social platforms. Worked with a stack of Java, SQL, Git/Github, and Docker.

Teaching Experience

Columbia University COMS 4232 Advanced Algorithms, *Teaching Assistant* Spring 2024
Columbia University COMS 4236 Quantum Computing, *Teaching Assistant* Fall 2023
Columbia University COMS 3261 Computer Science Theory, *Teaching Assistant* Spring 2023
Columbia University CSOR 4231 Analysis of Algorithms I, *Teaching Assistant* Fall 2022

Outreach & Community Service

Columbia University Science Olympiad, *Co-President & Co-Founder* 2022 - 2024

- Co-founded an undergraduate student group and led a team of 12 undergraduates to organize an annual Science Olympiad invitational tournament hosted at Columbia University for 500+ high school students.
- Authored 12+ Science Olympiad tests as an volunteer for several tournaments including the 2021 national tournament, Columbia, MIT, UT Austin, UCincinnati, and UPenn invitationals.

Columbia University Undergraduate Learning Seminar in Theoretical Computer Science 2022 - 2024

- Organized a reading group on quantum complexity theory in Spring 2024

Other Experience

Columbia Mathematics Directed Reading Program Jan. 2023 - April 2023

- Conducted a directed reading on percolation theory following *Percolation* by Geoffrey Grimmett.

Selected Coursework

- **Computer Science:** Computational Complexity, Quantum Computing, Advanced Algorithms, Approximation Algorithms, Computational Learning Theory, Unconditional Lower Bounds & Derandomization, Machine Learning, Unsupervised Learning, Operating Systems
- **Mathematics:** Modern Analysis, Applied Functional Analysis, PDE
- **Physics:** Quantum Mechanics I and II, Quantum Optics, Classical Mechanics