Ryan Anselm

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EDUCATION

Columbia University   2021 - 2024
B.S. in Computer Science (Foundations Track), Magna Cum Laude   **GPA:** *4.05/4.00*
Minor in Applied Math, Minor in Applied Physics

RESEARCH EXPERIENCE

Summer Research Assistant, Flatiron Institute   May 2024 - Aug. 2024
New York, NY

- Conducted research at the Center for Computational Quantum Physics on developing quantum-inspired tensor network methods to compress and manipulate continuous-variable multivariate functions.
- Implemented algorithms in Julia for tensor network construction, optimization, and function approximation.

Columbia Quantum Computing Theory Group   Aug. 2023 - May 2024
New York, NY

- Conducted research in quantum complexity theory and quantum circuit optimization, focusing on lower bounds for hybrid digital-analog quantum computation models and architecture-aware quantum circuit compilation for reconfigurable neutral atom arrays, under the supervision of Henry Yuen.

Summer REU Student, Learning the Earth with AI and Physics   June 2022 - Aug. 2022
New York, NY

- Developed neural network models to emulate cloud microphysics in atmospheric models, achieving comparable accuracy to traditional bulk/bin numerical simulation techniques, as measured by MSE.
- Leveraged Python ecosystem (NumPy, PyTorch, Scikit-learn, SciPy, Xarray) to implement and evaluate models, culminating in a presentation at the 2022 AGU Fall Meeting.

Freshman Research Initiative Fellow, Henkelman Group   Jan. 2021 - Aug. 2021
Austin, TX

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

OTHER EXPERIENCE

Teaching Assistant, Columbia Department of Computer Science   Sept. 2022 - May 2024
New York, NY

Led office hours, graded assignments, and contributed to course content for:
- COMS 4232: Advanced Algorithms (Spring 2024)
- COMS 4281: Intro to Quantum Computing (Fall 2023)
- COMS 3261: Computer Science Theory (Spring 2023)
- CSOR 4231: Analysis of Algorithms I (Fall 2022)

Software Engineer Intern, Salesforce   May 2023 - Aug. 2023
San Francisco, CA

· Developed and deployed Java-based gRPC microservices for integrating Snapchat and other marketing platforms into Salesforce Data Cloud. Utilized Spring Boot, Mockito, SQL, Docker, and AWS.

LEADERSHIP & ACTIVITIES

Seminar Co-Organizer, Columbia Undergraduate Learning Seminar in Theoretical CS

· Led and organized a Spring 2024 undergraduate reading group on quantum complexity theory with 8 weekly talks, covering topics such as hardness results for shallow quantum circuits, stabilizer circuit simulation, and the quantum PCP conjecture.
· Delivered presentations in other semesters on spectral graph theory, randomized complexity classes, and semidefinite programming for MAX-CUT approximation.

Co-President, Columbia University Science Olympiad

· Co-founded and led a team of 12 to organize a day-long Science Olympiad tournament for 400+ high school students, managing a $2000+ budget, coordinating 75 volunteers, and liaising with 29 teams.
· Wrote 12 Science Olympiad tournament tests as an event supervisor for Columbia, MIT, UT Austin, UPenn, and UPitt invitationals, as well as the 2021 national tournament.

AWARDS

1st Place, 2024 MIT iQuHack Quantum Hackathon Quantinuum Challenge	2024
Tau Beta Pi Junior Inductee	2023
Top 500 scorer, William Lowell Putnam Mathematical Competition (Score: 25/120)	2022
USA Physics Olympiad Semifinalist	2020
United States National Chemistry Olympiad High Honors	2019, 2020
USA Computing Olympiad Gold Division	2019

SELECTED COURSEWORK

Computer Science: Quantum Computing, Computational Learning Theory, Advanced Algorithms, Computational Complexity, Unconditional Lower Bounds & Derandomization, Operating Systems, Compilers, Machine Learning, Probabilistic Machine Learning, Unsupervised Learning
Mathematics: Functional Analysis, Real Analysis, PDEs, Probability & Statistics
Physics: Quantum Optics, Quantum Mechanics I & II, Electromagnetism I & II, Thermodynamics & Statistical Mechanics, Classical Mechanics