Ryan **Cooley**

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Education

Tufts University
Medford, MA

B.S. in Chemical Physics
Expected Graduation May 2027

Minor in Applied Computational Science

- GPA: 3.89/4.00, Dean's List (All Semesters), Sigma Pi Sigma (Physics & Astronomy Honor Society)

  Mathematics: Calculus I–III; Linear Algebra; Mathematical Modeling | **Physics:** Physics 11–12; Modern Physics; Quantum Theory I | **Chemistry:** General; Organic Chemistry; Physical Chemistry | **Computer Science:** Introduction to Computer Science

Skills

Programming: Python (NumPy, pandas, Numba), C++, Git | **Testing/DevOps:** pytest, GitHub Actions (CI), Docker, Black/Flake8 | **Numerical Methods:** Monte Carlo simulation (GBM), Black–Scholes pricing, benchmarking/profiling | **Data & Vizualization:** Jupyter, Matplotlib | **Molecular Simulation:** OpenMM, VMD (MD setup, trajectories/analysis) | **HPC:** Linux/macOS command line, Slurm job scheduling (salloc, srun) | **Astronomy:** CIAO, DS9 | **Web & Documentation:** HTML/CSS/JavaScript, LaTeX

Professional Experience

Entegris
Billerica, MA

Metrology Retention Intern
May 2025 - August 2025

- Implemented and maintained VBA macros for automated data transformation, statistical analysis, and formatted report generation
- Reduced end-to-end processing time by over **1200%** (from 38 min to under 3 min) through workflow automation
- Designed a particle-tracking simulation to model transport through a membrane barrier, validating experimental retention data
- Conducted retention tests using ICP-MS, dynamic light scattering, and fluorescence spectroscopy on a Hitachi F-7000

Chestnut Hill Realty
West Roxbury, MA

Administrative Assistant
May 2024 - August 2024

- Managed administrative tasks, tenant communications, property tours, and maintenance coordination, boosting efficiency and satisfaction

Research Experience

Independent Quantitative Research
Remote

Self-directed
June 2025 – Present

- **Monte Carlo Option Pricer:** Build a Python GBM Monte Carlo engine (Numba-accelerated); run hedged P&L; calibrate implied vol and generate a mini-surface; validate against Black–Scholes; maintain tests/CI/Docker with benchmarks at 10^5–10^6 paths
- **SMA Crossover Backtester:** Construct a pandas-based backtester for SMA(20/50) on SPY; visualize signals and performance metrics in ipywidgets; accelerate runtime by 80% using Numba on minute-level data

Ding Group at Tufts University
Medford, MA

Undergraduate Research Assistant
May 2024 – Present

- Simulate TIP3P and bundled water models in OpenMM/Python and process trajectories with NumPy to validate force-field parameters
- Integrate new coarse-grained force-field parameters into test simulations, collaborating on model development
- Analyze simulation outputs with Matplotlib to assess energy convergence and structural metrics.
- Initiate free-energy calculation research using alchemical methods to probe solvation energetics

Harvard-Smithsonian Center for Astrophysics
Cambridge, MA

Astrophysics Intern
June 2022 - August 2023

- Created astronomical images from Chandra data using CIAO and DS9 under the mentorship of Dr. Felipe Andrade-Santos
- Learned to use LaTeX for scientific paper creation and publication

Extracurricular Activity

Students for the Exploration and Development of Space (SEDS)
Tufts University

CubeSat Communications & Ground Station Lead
November 2023 - Present

- Apply FCC Amateur Radio Technician License knowledge to research ground-station hardware and uplink/downlink protocols for CubeSat operations
- Support orbital mechanics analysis in MATLAB, using "42" for trajectory simulations and MASTER for space-debris analysis
- Develop data-analysis methodologies and contribute to team proposals on CubeSat mission performance

Additional Memberships
Tufts University

American Chemical Society; Society of Physics Students; Club Squash; Club Rock Climbing