

Ryan Cooley

☎ (+1) 781-400-4183 | ✉ ryancooley20@gmail.com | 📄 Ryan-Cooley | 🌐 ryancooley20 | Portfolio: ryan-cooley.github.io/RCPortfolio

Education

Tufts University

B.S. in Chemical Physics

Minor in Applied Computational Science

Medford, MA

Expected May 2027

- 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++, SQL (basic), Git | **Testing/DevOps:** pytest, GitHub Actions (CI), Docker, Black/Flake8

| **Algorithms & Performance:** vectorization (NumPy broadcasting), Numba JIT, profiling/benchmarking | **Data & Visualization:** Jupyter,

Matplotlib | **Computing:** Linux/macOS CLI; HPC (Slurm: salloc, srun) | **Domain:** OpenMM, VMD | **ML:** PyTorch (planned Fall 2025)

Experience

Entegris

Billerica, MA

Metrology Retention Intern (Data Automation & Simulation)

May 2025 – August 2025

- Implemented and maintained **VBA macros** to automate data transformation, statistical analysis, and report generation
- Achieved **~12×** speedup in end-to-end processing (**38 min** → **<3 min**; **~92%** reduction)
- Designed a **particle-tracking simulation** to model membrane transport and validate experimental retention data
- Performed retention tests using **ICP-MS** and fluorescence spectroscopy (Hitachi F-7000) to ensure data accuracy

Software Projects

Open Source — GitHub (Ryan-Cooley)

Remote

High-Performance Simulation Engine — Monte Carlo Option Pricer (Python / Numba)

June 2025 – Present

- Build a **Numba** Monte Carlo pricer: **10×** vs **NumPy** on **1M+** paths; $RMSE \leq 5 \times 10^{-4}$ (vs Black-Scholes)
- Develop **IV calibration** (Brent/bisection, no-arbitrage) and a **delta-hedging** simulator with costs; map **cost-error** frontiers and log P&L
- Ship a reproducible harness with **CLI**: seeded RNG, profiling, **unit tests**, automated benchmarks (CSV/plots)

Open Source — GitHub (Ryan-Cooley)

Remote

SMA Crossover Backtester (Python)

June 2025 – Present

- Implement a **pandas-based** SMA engine with **dual data sources** (Stooq/yfinance), **rolling metrics**, and full performance analysis
- Design an **interactive dashboard** with real-time parameter tuning and **grid search**; generate visualizations for **returns**, **drawdown**, and **risk**
- Provide a **CLI** and **modular** architecture with **unit tests**, **docs**, and **notebooks** for **reproducible** strategy evaluation across market regimes

Research

Ding Group, Tufts University

Medford, MA

Scientific Computing Researcher

May 2024 – Present

- Create **OpenMM/Python** workflows for **TIP3P** water systems and implement **NumPy** post-processing to validate **force-field** behavior
- Run jobs on **Slurm** (**salloc/srun**), **profile** bottlenecks, and track experiments with **structured logs**
- Maintain experiment **notebooks**, add small **utility tests** where helpful, and **document** methods for **reproducibility**
- Prepare to apply **PyTorch** to **free-energy** workflows, focusing on clean **interfaces** and testable **modules**

Harvard-Smithsonian Center for Astrophysics

Cambridge, MA

Astrophysics Intern

June 2022 – August 2023

- Produced Chandra images using **CIAO/DS9**; practiced scientific writing in LaTeX

Leadership & Activities

Tufts SEDS — CubeSat Team

Medford, MA

Communications & Ground Station Lead

November 2023 – Present

- Assess **uplink/downlink protocols** for **CubeSat** operations, leveraging **FCC Amateur Radio Technician License**
- Perform orbital mechanics analysis; simulate trajectories with **"42"** and model space debris with **MASTER**
- Develop **data-analysis** methods and contribute to team **mission-performance** proposals

Additional Memberships

Tufts University

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

Interests

Chess and poker (competitive strategy games)