

Jack D. Carson

ML for Molecular Science · PyTorch/C++/CUDA · HPC & Data Pipelines · GNNs for Drug Discovery | jdcarson@mit.edu

Education

Massachusetts Institute of Technology

B.S. in EECS and Physics

Cambridge, MA

2024 — Present

- **GPA 5.0/5.0. Coursework:** ML for Molecular Engineering, Linear Algebra and Optim. Theory, Mol. Engineering Lab, Modeling with ML, Differential Equations, Probability, Algorithms, Nonlinear Dynamics, Reinforcement Learning (Grad.), ML for Comp. Biology (Grad.)

University of Tulsa

Concurrent Student, Electrical Engineering

Tulsa, OK

2022 — 2024

- **GPA 4.0/4.0.** Only high school student in full EE course sequence.

Booker T. Washington High School

High School Diploma

Tulsa, OK

2020 — 2024

- **GPA 4.0/4.0.** unweighted, 4.78 weighted. Valedictorian.

Research Experience

MIT CSAIL – Barzilay Group

Undergraduate Researcher

2025 — Present

Cambridge, MA

- Only freshman selected for Regina Barzilay Group. Building foundation models for metabolomics with Peter Mikhael and Itamar Chinn. Developing Omicron, a DSL for terabyte-scale biology datasets with graphs/hypergraphs as first-class abstractions.

Memorial Sloan-Kettering Cancer Center

Research Intern, Cheung Family Scholar, Summer 2025

2025 — 2025

New York, NY

- Led design and pretraining of 300M-param epigenetics foundation model in Christina Leslie Lab. Applied sparse dictionary learning to surface novel systems biology mechanisms; lifted downstream applied ML in lab. Pending journal publication.

MIT McGovern Institute for Brain Research

Undergraduate Researcher

2023 — 2025

Cambridge, MA

- Hired as high-school senior after RSI program to design generative models for 3D fMRI denoising and protein biomarker synthesis with Itay Fayer and Kevin Chung. Continued through spring 2025.

MIT Social and Ethical Responsibilities of Computing

Research Fellow

2024 — Present

Cambridge, MA

- Applying statistical physics to language model behavior at long time-scales. Oral presentation at EECS Town Hall. Accepted ICML R2-FM poster.

Professional & Global Engagement

MIT PKG Public Service Center

Priscilla King Gray Fellow

2024 — Present

Cambridge, MA

- Led \$248k fundraising over two years from the McGovern Foundation for rural tech education in Native communities and personally spearheaded first partnership between MIT and the Cherokee Nation.
- Director of MIT TASC native outreach program in collaboration with tribal partners and UTulsa.

Selected Honors

- **Udall Scholar** (2026) Third MIT student ever to win, and the first for tribal public policy.
- **Burchard Scholar** (2026) MIT honor for sophomores and juniors with exceptional promise in the humanities, arts, or social sciences.
- **Elie Wiesel Prize in Ethics, 1st Place** (2025) Widely held as a top international writing contest in continental philosophy.
- **White House Presidential Scholar** (2024) Top national honor for academic and community excellence
- **Research Science Institute (RSI) Scholar** (2023) Selective international STEM research program at MIT for high school students.
- **MIT Brain-Computer Interface Competition**, 3rd Place (2024) Campus-wide EEG neurotech design competition
- **Citadel Quantitative Trading Invitational** (2026) One of 12 university sophomores nationwide selected for high-frequency trading algorithm design competition.

Publications

First Author, Mechanistically Grounded Virtual Metabolism Under Genetic Perturbation

Nature Metabolism, Under Review

First Author, A Statistical Physics of Language Model Reasoning

[ICML 2025 R2FM](#)

Author, Maintaining Electrochemical Performance of Flexible ITO-PET Electrodes under High Strain

[Published in ACS Omega](#)

Skills

- **Programming:** C/C++ (5yrs), Python (6yrs), Rust (3yrs), PyTorch (4yrs), CUDA (1yr), R (2 years) Bash, JavaScript/TypeScript, MATLAB
- **Computational:** Biopython, Scanpy, Anndata, Rdkit, ArchR. Experience with processing single cell omics data (scATAC-seq, scRNA-seq) at terabyte scale. Comfortable with ChIP-seq, ENCODE, Uniprot, and NCBI data sources and processing pipelines in R and Python
- **ML/Math:** Foundation Models, Numerical Opt., Probabilistic Models, ODE/PDEs, Graph ML, Stochastic Processes, Simulation
- **Systems:** HPC, SLURM, GPU Computing, Parallel Programming, Low-Level Debugging, Systems Design, Linux
- **Wet Lab:** Common protein synthesis/purification protocols, Analytical Chem., BL1/BL2 Safety

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- Carnegie Hall choral singer. Track-certified motorcycle racer. Violinist. Studied music theory part-time at IRCAM&UVA. Interests span drug discovery, classical ballet, condensed matter physics, graph neural networks, photography, and T.S. Eliot's poetry. Speaks/reads basic Chinese.