Donald J. **Liveoak**

Physics student

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Education

Doctor of Philosophy, Physics — *Ann Arbor, MI*

University of Michigan, GPA N/A — *Sept 2025 - May 2030 (expected)*

Bachelor of Science, Physics — *Cambridge, MA*

Massachusetts Institute of Technology, GPA 5.00/5.00 — *Sept 2022 - May 2025*

Relevant coursework: Relativistic QFT I-II (G), Classical Mechanics III (G), Electromagnetism II, Experimental Physics I, Statistical Physics I, Quantum Physics I-III, (Abstract) Algebra I, Fundamentals of Programming

Non-degree Dual Enrollment Student — *Dearborn, MI*

University of Michigan-Dearborn, GPA 4.00/4.00 — *Sept 2019 - Apr 2022*

59 credit hours completed in mathematics, physics, and computer science

Research Experience

AV (formerly AeroVironment) — *Cambridge, MA*

Optical Simulations Intern — *May 2025 - present*

MIT Kavli Insitute — *Cambridge, MA*

Undergraduate Researcher — *June 2023 - present*

- Developed N-body simulations to model the formation of close-in Neptunes
- Implemented dynamical tides in N-body regime (`REBOUNDx`) using C
- Used secular integration to probe dynamical history of recently discovered exoplanet

University of Michigan-Dearborn, Department of Mathematics — *Dearborn, MI (remote)*

Research Assistant I — *Aug 2024 - Feb 2024*

- Proved theoretical recovery guarantees for 2D phase retrieval algorithms

Apex Microdevices — *Dayton, OH (Remote)*

Intern Research Scientist I — *Aug 2024 - Feb 2024*

- Implemented machine learning models for applications in metalens design

BlueHalo (formerly UES, Inc.) — *Dayton, OH (Remote)*

Student Researcher — *Dec 2022 - Apr 2023*

- Developed a data pipeline to process and analyze molecular beam epitaxy data

MIT Computer Science and Artificial Intelligence Laboratory — *Cambridge, MA*

Undergraduate Researcher — *Dec 2022 - Apr 2023*

- Derived and implemented algorithms for computing geodesic distance using anisotropic Laplacians

Air Force Research Laboratory — *Dayton, OH*

Research Assistant — *June 2022 - Aug 2023*

- Used image processing to characterize quality of fabricated crystalline structures
- Designed solution for collecting and organizing molecular beam epitaxy and characterization data

Research Science Institute — *Cambridge, MA (remote)*

Research Scholar — *June 2021 - Aug 2021*

- One of the 81 internationally selected students to participate in an intensive research program at MIT
- Selected as Top 5 Oral Presentation Award recipient

University of Michigan-Dearborn, Department of Mathematics — *Dearborn, MI*

Research Assistant I — *Feb 2021 - May 2022*

- Derived, implemented, and analyzed algorithm for fast recovery of signals from phaseless measurements
- Extended algorithm from one-dimensional signals to two-dimensional signals

Presentations

D. Liveoak, S. C. Millholland (Jan 2025). *Formation of Close-in Neptunes around Low-Mass Stars Through Breaking Resonant Chains.* Oral presentation at 245th AAS Meeting, Extrasolar Planets: Formation and Protoplanetary Disks

D. Liveoak, S. C. Millholland, M. Vick (Jan 2025). *Forming Hot Jupiters with Chaotic Tides.* Poster presentation at 245th AAS Meeting, Extrasolar Planets: Formation and Protoplanetary Disks

D. Liveoak, S. C. Millholland, M. Vick (Jan 2025). *Forming Hot Jupiters with Chaotic Tides.* Poster presentation at 245th AAS Meeting, Chambliss Student Poster Competition Finalist Round

D. Liveoak, S. C. Millholland (Aug 2024). *Formation of Close-in Neptunes around Low-Mass Stars Through Breaking Resonant Chains*. Oral presentation given at the Summer MKI Undergraduate Research Forum

B. Hutchinson, M. Hamka, **D. Liveoak** (Jan 2023). *Fast and Accurate Phase Retrieval from Incomplete, Windowed Fourier Measurements.* Poster presentation given at the 2023 Joint Mathematics Meetings Pi Mu Epsilon Contributed Session on Research by Undergraduates, VIII

D. Liveoak, J. Solomon (May 2022). *Schrödinger Bridges on Discrete Domains.* Poster presentation given at the Regeneron International Science and Engineering Fair 2022

D. Liveoak, J. Wang (April 2022). *Interpolation Algorithms using Superposition of Quantum States*. Poster presentation given at the UM-Dearborn Natural Sciences Poster Session

D. Liveoak, J. Solomon (Aug 2021). *Discrete Schrödinger Bridges*. Oral presentation given at Research Science Institute Symposium

Publications

D. Liveoak, S. C Millholland, M. Vick, D. Tamayo. (2025). *Self-consitent Dynamical Tides in the `REBOUNDx` framework.* The Astrophysical Journal, 989(1), 35

D. Liveoak & S. C Millholland. (2024). *Formation of Close-in Neptunes around Low-mass Stars through Breaking Resonant Chains.* The Astrophysical Journal, 974(2), 207.

J. Hume, D. McDonald, A. Newman, **D. Liveoak**, Y. Hristova and A. Viswanathan. (2024). *Edge-Informed Estimation of Gaussian Point Spread Functions in Convolutional Blurring Models.* 2024 IEEE Conference on Computational Imaging Using Synthetic Apertures (CISA)

D. Liveoak & S. C Millholland. (2024). *Forming Hot Jupiters via Chaotic Tidal Migration.* MIT Undergraduate Research Journal, Vol. 48

M. Hamka, B. Hutchinson, **D. Liveoak**, Y. Hristova, and A. Viswanathan. (2025). *Fast and Accurate 2D Phase Retrieval from Incomplete, Windowed Fourier Measurements.* (in preparation)

D. Liveoak, S. C Millholland, M. Vick. (2025). *Warm Jupiter Formation via Chaotic Tidal Migration* (in preparation)

Selected Media Coverage

Close-in Neptune Formation (Liveoak & Millholland 2024) featured in AAS Nova Highlights.

Employment & Leadership Experience

Research Science Institute
Cambridge, MA

Assistant Director — *April 2024 - current*

- Led team of over 25 staff to oversee smooth operation for research program of 100 students
- Coordinated with MIT admin and staff to organize/oversee 40+ events and programs

FIRST Robotics Competition Team 7196
Detroit, MI

Electronics/Programming Mentor — *Jan 2023 - Present*

- Mentored Detroit Public School students in engineering principles and fundamentals

MIT Physics Department
Cambridge, MA

Lead Mentor, Grader, Notetaker — *Nov 2023 - present*

- Peer mentor for Classical Mechanics, Quantum Physics I, and Statistical Physics I
- Graded MIT Classical Mechanics I-II, Quantum Physics II and Electromagnetic Theory I (G)
- Notetaker for Relativistic QFT III

Research Science Institute
Cambridge, MA

Administrative Manager — *April 2023 - Sept 2023*

- Managed budget of $40,000 and coordinate reimbursements for staff of over 25
- Coordinated academic and research opportunities between 7+ academic institutions

Research Science Institute *Cambridge, MA*

Teaching Assistant *July 2022 - Aug 2022*

- Advised students on research papers and presentations
- Ran and organized end of program symposium with attendance of 200

University of Michigan-Dearborn, Department of Mathematics *Dearborn, MI*

REU Student Mentor *May 2024 - June 2024*

- Advised undergraduate math students a part of the University of Michigan-Dearborn REU to complete summer-long research project

University of Michigan-Dearborn, Department of Mathematics *Dearborn, MI*

Tutor II *Jan 2022 - May 2024*

- Tutored for the Math Learning Center in introductory and advanced mathematics and physics courses

Wayne County Dispute Resolution Center *Dearborn, MI*

Data Engineer and Web Development Intern *July 2020 - Aug 2022*

- Created and implemented software solutions to improve company workflow through automating of different forms helping prevent over 600 evictions
- Managed company database with 5,000+ client entries
- Oversaw the development and maintained company website

Honors & Awards

2025 **Rackham Merit Fellowship**, University of Michigan, Rackham Graduate School
2025 **Barrett Prize – Outstanding Research in Astrophysics**, MIT Department of Physics
2025 **Graduate Research Fellowship**, National Science Foundation GRFP
2025 **Phi Beta Kappa**, Massachusetts Institute of Technology
2025 **Sigma Pi Sigma**, Massachusetts Institute of Technology
2025 **Finalist**, American Astronomical Society Chambliss Competition
2022 **Valedictorian**, Allen Park High School
2022 **Third Place Grand Award in Mathematics**, Regeneron International Science and Engineering Fair
2022 **Second Place in Mathematics Research**, National Security Agency
2022 **Third Place Karl Menger Award**, American Mathematical Society
2022 **Grand Award in Mathematics**, Science and Engineering Fair of Metro Detroit
2022 **Semifinalist**, Regeneron Science Talent Search
2022 **Third Place Team Award**, Lower Michigan Math Competition (affiliated with UM-Dearborn Math)
2021 **Third Place Team Award**, Alma Autumn Math Challenge (affiliated with UM-Dearborn Math)
2021 **Top 5 Oral Presentation Award**, Research Science Institute

Skills

Scientific Computing/Presentation MATLAB, Python (+ standard AI/ML packages), R, LaTeX, LabView
Programming Languages Java, C#, C++, Swift 2.0
Web Development HTML, Javascript, CSS, GSuite, SQL
Personal Problem solving, verbal/written communication, time management, teaching