David Darrow

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Education

Massachusetts Institute of Technology, Cambridge, MA.   2023–Present
- ○ Candidate for Ph.D. in Applied Mathematics.
- ○ Supervised by Prof. John Bush and Prof. Glenn Flierl.

Cambridge University – Churchill Scholarship, Cambridge, U.K.   2022–2023
- ○ M.Phil. in Scientific Computing, with Distinction. Supported by the 2022 Churchill Scholarship.
- ○ Thesis: *An Efficient, Multi-Wavenumber Model of Stratified Turbulence.*
- ○ Supervised by Prof. Colm Caulfield, and externally by Prof. Gregory Chini (University of New Hampshire).

Massachusetts Institute of Technology, Cambridge, MA.   2018–2022
- ○ GPA: 5.0 (out of 5.0, unweighted). B.S. in Mathematics. Minor in German Studies.

Publications

1. (Pre-print) David Darrow, Eric Chen, and Alex Zitzewitz. On unitary monodromy of second-order ODEs, 2024
2. (Pre-print) David Darrow and Jeffrey S. Ovall. Detecting eigenvectors of an operator that are near a specified subspace, 2024
3. (Pre-print) David Darrow. Convergence to Bohmian mechanics in a de Broglie-like pilot-wave system, 2024
4. David Darrow and John W. M. Bush. Revisiting de Broglie's double-solution pilot-wave theory with a Lorentz-covariant Lagrangian framework. *Symmetry*, 16(2), 2024
5. David Darrow. A convergence rate for extended-source internal DLA in the plane. *Potential Analysis*, Oct 2023
6. David Darrow. Scaling limits of fluctuations of extended-source internal DLA. *Journal d'Analyse Mathématique*, 150(2):449–484, Sep 2023
7. Valeri Frumkin, David Darrow, John W. M. Bush, and Ward Struyve. Real surreal trajectories in pilot-wave hydrodynamics. *Phys. Rev. A*, 106:L010203, Jul 2022
8. David Darrow. A quasi-optimal spectral solver for the heat and Poisson equations in a closed cylinder. *SIAM Undergraduate Research Online*, 2022
9. Daniel Álvarez-Gavela and David Darrow. Caustics of Lagrangian homotopy spheres with stably trivial Gauss map. *Journal of Symplectic Geometry*, 2021

Teaching and Service

MIT PRIMES Mentor, *MIT Mathematics*.   2022–present
- ○ Overseeing and advising the research of Skyler Mao.
- ○ Proving a wide-reaching correspondence between particle statistics and the time-averaged wave field in classical pilot-wave models, analogizing the Born rule of quantum theory.
- ○ Regeneron STS Top 300 Scholar.

MIT PRIMES Mentor, *MIT Mathematics*.   2022–2024
- ○ Oversaw and advised the research of Eric Chen and Alexander Zitzewitz.
- ○ Characterized which second-order holomorphic ODEs (on arbitrary Riemann surfaces) have unitary monodromy.
- ○ Presentation at Joint Mathematics Meetings 2023.

Mathematics Mentor, *MIT Undergraduate Mathematics Association*.   2021–2022
- ○ Advised four new mathematics majors at MIT. Tutored them in proof-writing and specific topics they are studying, while also providing guidance on course selection, career opportunities, and life at MIT.

MIT PRIMES Mentor, *MIT Mathematics*.   2021
- ○ Oversaw and advised the research of Andrew Du.
- ○ Extension of recent quaternion-based techniques in inverse dynamics to muscular systems.

Mathematics, Physics, and Computer Science Tutoring.   2018–2022
- ○ Tutored Quantum Physics II through MIT's Peer Tutoring program.
- ○ Tutored peers at MIT and at Brandeis University in advanced STEM topics: algorithm design, discrete math, real analysis, abstract algebra, mechanics, electromagnetism, quantum physics, theoretical computer science.

Extra-Curricular Programs

FDSE Summer School, *École Polytechnique*, Paris, France. 2024
- Studied the fluid-dynamical aspects of energy transition and climate change, with accompanying numerical and laboratory experiments.

Summer Student Program, *National Security Agency (NSA)*, Cheltenham, U.K. 2022
- One of two DSP 2021 (Director's Summer Program – see below) students selected to participate in the 2022 *Summer Student Program*, in Great Britain's signals intelligence community.

Director's Summer Program, *National Security Agency (NSA)*, Fort Meade, MD. 2021
- Using techniques from abstract probability theory and theoretical statistics, developed and implemented an algorithm to be used at large scale on large amounts of intercepted data in mission critical cryptologic attacks and defense by the NSA. Received Top Secret Information Clearance and Sensitive Compartmented Information clearance.
- Briefed the Director and other senior leaders of the NSA on novel cryptanalytic techniques as a result of my research project. Separately briefed professional researchers at the Institute for Defense Analyses at Princeton Center for Communications Research (CCR).

Budapest Semesters in Mathematics, Budapest, Hungary (offered remotely). 2021
- Advisor: Prof. Gergely Ambrus (Alfréd Rényi Institute of Mathematics)
- Worked with other students within the BSM program to prove transversal properties of families of convex sets.
- (Spanish-language) presentation at XXXVI Coloquio Víctor Neumann-Lara, jointly with Tonatiuh Wiederhold. Awarded fourth place with an honorific mention.

Languages and Skills

German	French	Spanish	Russian	Programming
Proficient	Intermediate	Intermediate	Limited Working	C, C++, MATLAB, Python

Honors and Awards

NDSEG Fellowship, *National Defense Science and Engineering Graduate Fellowship Program*.	2024
Finalist, Hertz Fellowship, *Hertz Foundation*.	2024
Bershadsky Mentorship, *MIT PRIMES*.	2023
MathWorks Fellowship, *MathWorks*.	2023
Levinson Fellowship, *Massachusetts Institute of Technology*.	2023
Phi Beta Kappa Membership, *the Phi Beta Kappa Society*.	2022
Churchill Scholarship, *Winston Churchill Foundation of the United States*.	2022
Ellen Crocker Distinguished Scholar, *MIT Global Languages*.	2021
Fourth Place with Honorific Mention, *XXXVI Coloquio Víctor Neumann-Lara*.	2021
German Studies Excellence Award, Second Prize, *MIT Global Languages*.	2019, 2020
Regeneron Science Talent Search Semifinalist, *Society for Science & the Public*.	2017
Eagle Scout Rank Award, *Boy Scouts of America*.	2017
Siemens Competition Regional Finalist, *Siemens Foundation*.	2017