Cailin Plunkett

caplunk@mit.edu | cailinplunkett.github.io

Research Interests

Probing black hole properties and binary star evolution using gravitational-wave data. Emphasis on both data-driven and simulation-based methods.

Education

Massachusetts Institute of Technology — **Cambridge, MA**
Ph.D. candidate in Physics (advisor: Salvatore Vitale) — *Aug. 2023 – May 2028 (exp.)*

Amherst College — **Amherst, MA**
B.A. in Physics and Mathematics — *Sept. 2019 – May 2023*
Summa cum laude with distinction (GPA: 4.0/4.0)

Awards, Fellowships, and Honors

National

Graduate Research Fellowship, *National Science Foundation*	*2025–8*
LeRoy Apker Award, *American Physical Society*	*2023*
Phi Beta Kappa Membership	*2023*
Barry M. Goldwater Scholarship	*2022*

Institutional

Kellogg Fellowship ($130,000 over three years), *Amherst College*	*2025–8*
Three Minute Thesis, People's Choice Award, *Amherst College*	*2023*
Bancroft Prize in Public Speaking, *Amherst College*	*2023*
William Warren Stifler Prize in Physics, *Amherst College*	*2023*
Mary Dailey Irvine Outstanding Thesis, *Five College Astronomy Dept.*	*2023*
Summer Research Fellowship, *University of Michigan*	*2022*
LIGO Summer Research Fellowship, *Caltech*	*2021*
Porter Prize in Astronomy, *Amherst College*	*2020*

Publications

First-author papers

6. **C. Plunkett**, M. Zevin, S. Vitale. "Surprisingly normal? GW241011 and GW241110 in the context of hierarchical merger classification" Submitted to *Phys. Rev. D*, (2026).
5. **C. Plunkett**, J. Heinzel, N. Wolfe, D. Gerosa, S. Vitale. "Spinformation: do gravitational-wave events carry information beyond effective spins?" Submitted to *Phys. Rev. D*, (2026).

4. **C. Plunkett**, T. Callister, M. Zevin, S. Vitale. "Signatures of a subpopulation of hierarchical mergers in the GWTC-4 gravitational-wave dataset." *Phys. Rev. Lett.* 137, 021404 (2026).

   This work was highlighted as a *Phys. Rev. Lett.* Editors' Suggestion, described in a Physics Viewpoint, written up in Astrobites, and covered in Scientific American.

3. **C. Plunkett**, M. Mould, S. Vitale. "Constraining Population III stellar populations with next-generation gravitational-wave observatories." *Phys. Rev. D* 112, 023039 (2025).
2. **C. Plunkett**, K. Follette, G.-D. Marleau, E. Nielsen. "Accreting companion occurrence rates using a new method to compute emission-line survey sensitivity." *The Astronomical Journal* 169 262 (2025).
1. **C. Plunkett**, S. Hourihane, K. Chatziioannou. "Concurrent estimation of noise and compact-binary signal parameters in gravitational-wave data." *Phys. Rev. D* 106, 104021 (2022).

Co-authored papers

3. S. Agrawal et al., incl. **C. Plunkett**. "Red vs. Blue: How metallicity shapes black hole dynamics and mergers in dense star clusters.".Submitted to *The Astrophysical Journal*, (2026).
2. M. Mould, J. Heinzel, S. Álvarez-López, **C. Plunkett**, N. Wolfe, S. Vitale. "Measurement prospects for the pair-instability mass cutoff with gravitational waves." *Phys. Rev. D* 113, 103021 (2026).
1. S. Betti et al., incl. **C. Plunkett**. "The Comprehensive Archive of Substellar and Planetary Accretion Rates." *The Astronomical Journal* 166 262 (2023).

Presentations

Scientific

Kavli Astrophysics Symposium (contributed) — **Cambridge, UK**
Toward asynchronous multi-messenger black-hole astrophysics — *Sept. 2026*

AAS 248 Summer Meeting (invited, special session) — **Pasadena, CA**
Next-generation gravitational-wave observatories: astrophysics with compact binaries across cosmic time — *June 2026*

Caltech LIGO Seminar — **Pasadena, CA**
Black hole formation histories with gravitational waves across cosmic time — *June 2026*

APS Global Physics Summit (contributed) — **Denver, CO**
What we talk about when we talk about hierarchical mergers — *Mar. 2026*

University of Tokyo RESCEU Seminar — **Tokyo, JP**
Black hole populations with gravitational waves: then, now, and the future — *Jan. 2026*

APS Global Physics Summit (contributed) — **Anaheim, CA**
Unveiling the stellar origins of high-redshift black hole mergers with next-generation gravitational-wave observatories — *Mar. 2025*

APS April Meeting (invited) **Sacramento, CA**
Protoplanet population properties: a new method to compute survey sensitivity *Apr. 2024*

APS April Meeting (contributed) **New York, NY**
Marginalizing over noise uncertainty in gravitational-wave parameter estimation *Apr. 2022*

Outreach and engagement

Amherst College **Amherst, MA**
Physics and Astronomy graduate school panel *Oct. 2026*

Mount Holyoke College **Mount Holyoke, MA**
Astronomy and Planetary Science graduate school panel *Mar. 2026*

Worcestor Polytechnic Institute Physics **Worcester, MA**
Women and Gender Minorities in Physics panel *Feb. 2026*

Leadership, Outreach, and Engagement

MIT Physics Graduate Admissions Advisory Council *Jan. 2024 – present*

- Co-chair (since Aug. 2025) of advisory council aiming to improve equity in admissions and ensure all talented students receive due consideration.
- Organize webinars on the graduate application process, reaching 200+ students yearly
- Coordinate and mentor for MIT's graduate application assistance program, through which I have individually supported 10+ students.

MIT Summer Research Program *Jan. 2024 – present*

- Serve on admissions committee for summer program that targets students with limited access to research. Improve access to career preparation and networking resources.

Climate and Community Committee *Oct. 2020 – May 2023*

- Co-chair of Physics and Astronomy Dept. committee charged with addressing systemic access issues and institutional barriers to success in physics and astronomy, both in and beyond the Department.

Spectra Phys. & Astro. Club *Sept. 2021 – May 2023*

- Ran a club to support physics students. Designed and led mentorship program and research internship symposium for two years. Developed application peer-review workshop.

Amherst Observatory *Sept. 2022 – May 2023*

- Student manager of the observatory, which hosts five telescopes for teaching and recreation. Led training sessions and programmed middle school outreach events.