New York, New York
cfilion@flatironinstitute.org

Carrie Filion

Research Fellow

carriefilion.github.io
github.com/CarrieFilion

Interests:

Local Group archaeology, galactic dynamics, galactic chemical evolution, spectroscopic surveys, data sonification

Key Numbers

Six refereed first author publications ◇ **Twelve** refereed, **Four** submitted supporting author publications – **three** of which are undergraduate mentee's work ◇ **twelve** mentees, including both undergraduate and graduate students

Appointments

Flatiron Research Fellow 2024-present
Center for Computational Astrophysics, Flatiron Institute, New York, NY

Education

The Johns Hopkins University
PhD in Astronomy and Astrophysics, *Dissertation Advisor: Rosemary F.G. Wyse* 2020-2024
M.A. in Physics and Astronomy, *Advisor: Rosemary F.G. Wyse* 2018-2020

Bryn Mawr College
A.B. with Honors in Physics, *Magna Cum Laude* 2015-2018

Awards and Grants

American Physical Society Women in Physics Group Grants* 2023
American Astronomical Society International Travel Grant 2022
NASA FINESST Fellowship 2021 - 2024
Alumni Association Student Grant* 2018
* successful grant proposal that I led on behalf of a service-oriented group
Note: Cannot apply for grants in current position

First Author Publications

1. **Filion, C.** et al., 2025, "Counterculture Stars: Slow and Retrograde Stars with Low-Alpha Disk Abundances", ApJ, 989, 70
2. **Filion, C.** et al., 2024, "The Low-Mass Stellar Initial Mass Function in Nearby Ultra-Faint Dwarf Galaxies", ApJ, 967, 165
3. **Filion, C.** et al., 2023, "The Non-Axisymmetric Influence: Radius and Angle-Dependent Trends in a Barred Galaxy", MNRAS, 524, 1
4. **Filion, C.** et al., 2022, "Faint Stars in a Faint Galaxy. II. the Low-Mass Stellar Initial Mass Function of the Boötes I Ultrafaint Dwarf Galaxy", ApJ, 939, 38
5. **Filion, C.** & Wyse, R.F.G., 2021, "The Far-away Blues: Exploring the Furthest Extents of the Boötes I Ultra-faint Dwarf Galaxy", ApJ, 923, 218
6. **Filion, C.** et al., 2020, "Faint Stars in a Faint Galaxy. I. Ultradeep Photometry of the Boötes I Ultrafaint Dwarf Galaxy", ApJ, 901, 82

Mentoring

Dissertation Advisor Primary Mentor:
Mentor and Primary Advisor, *Masters Student*: G.G Since Fall 2025
Mentored a City University New York masters bridge program thesis on a spectroscopic outlier detection project

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Project Advisor and Mentor:

Mentor and Advisor, *Ph.D. Student*: Z.H — Since Spring 2026
Served as a science advisor to a Ph.D. candidate at the University of Texas on a Gaia spectroscopy project

Mentor and Advisor, *Ph.D. Student*: A.S. — Since Fall 2025
Served as a science advisor to a Ph.D. candidate at the University of Utah on an M-dwarf spectroscopy project

Mentor and Advisor, *Undergraduate Student*: D.R. — Summer 2025 - Fall 2025
Mentored an undergraduate student from North Carolina Central State through the National Society of Black Physicists program on a data driven stellar abundances project

Mentor and Advisor, *Ph.D. Student*: S.H. — Summer - Fall 2025
Served as a science and career advisor to a Ph.D. candidate at the University of Arizona

Mentor and Advisor, *Undergraduate Student*: K.D. — 2022-2025
Mentored and co-advised an undergraduate student at Johns Hopkins University — now a graduate student at the University of Maryland — on a Galactic archaeology research project

Career Mentor, *Masters Student*: E.M. — Since Fall 2024
Served as a career mentor and additional support for a City University of New York masters bridge program student

Co-Advisor/Co-Mentor:

Masters Students: E.T., A.R. — Since Fall 2025
Co-mentored two City University of New York masters bridge program students on Milky Way-oriented projects

Undergraduate Students: A.G., C.L., M.H.M. — 2024-2025, 2025-2026
Co-advised undergraduate students at the University of Edinburgh on basis function expansion-oriented projects. One student is now a graduate student at the Johns Hopkins University

Advising Groups:

Sonification Group — Since Spring 2026
Leading a group of three NYU students in the Music and Audio Research Laboratory group in sonification projects

Spectra Summer Camp — Summer 2025
Built an eleven person mentorship pod to support both students and mentors working on related projects

Selected Presentations

Invited talk: Yale Data Science x Astronomy-Astrophysics Seminar, *New Haven, Connecticut* 2026
Invited talk: Department of Astronomy and Space Sciences at Istanbul University Talks series, *Instanbul, Turkey* 2026
Contributed talk: International Conference for High Performance Computing, *St. Louis, Missouri* 2025
Invited talk: Bryn Mawr College colloquium, *Bryn Mawr, Pennsylvania* 2025
Two contributed talks: National Astronomy Meeting, *Durham, UK* 2025
Invited talk: American Museum of Natural History Seminar, *New York, New York* 2023
Contributed talk: IAUS 377 Early Disk-Galaxy Formation from JWST to the Milky Way*, *Kuala Lumpur, Malaysia* 2023
Invited talk: University of Notre Dame Astrophysics Seminar, *South Bend, Indiana* 2022
Invited talk: University of Wisconsin-Madison Monday Science Seminar, *Madison, Wisconsin* 2022
* - indicates competitively chosen contributed talk

Selected Workshops and Schools

Organized:

Exoplanets in the Galactic Context, Flatiron Institute, NYC — Fall 2026
Co-organized a workshop to bridge the exoplanet and galactic astronomy communities with the goal of defining the key questions around exoplanets in the broader context

Sonification for Research: Techniques, Efficacy, and Applications (SoniTEA), Flatiron Institute, NYC — 2025
Organized and ran a workshop on sonification and audio display for research applications

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Sonification: from Data to Sound, Math for America, NYC 2025
Organized and ran a workshop for math and science teachers in the NYC area

Basis Function Expansions for Galactic Dynamics Workshop, Tucson, AZ 2024
Co-organized and ran a workshop for graduate students at the University of Arizona

Attended:

Universe of Sound Astrophysical Data Sonification Workshop, Center for Astrophysics, Cambridge, MA 2024

Stellar Astrophysics in the Era of Gaia, Spectroscopic, and Asteroseismic Surveys MIAPbP, Garching, Germany 2023
Competitively chosen

Wide-Field Spectroscopy vs Galaxy Formation Theory, Tucson, AZ 2023
Co-chaired a session on M31 and the Milky Way

Observing Proposals

All That Glitters Isn't Gold (But It Could Be!): Constraining 3rd-Peak R-Process Abundances in Hyades
Proposed ultraviolet Hubble Space Telescope STIS spectroscopic observations of stars in the Hyades open cluster to constrain heavy element abundances Co-I, *submitted*, 2026

Prime Focus Spectrograph Subaru Strategic Program (PFS SSP)
Proposed, as a part of a multi-national collaboration, a multi-year, 365-night survey to be conducted on the Subaru PFS. Survey is now taking data Co-I, *successful*, 2024

Cool Subdwarfs in the Galactic Halo
Proposed to observe candidate cool subdwarfs in the stellar halo using unfilled fibers on PFS. Co-I, *successful*, 2023

Exploring the Spatial Extent of Boötes I Ultra Faint Dwarf Spheroidal Galaxy with Blue Horizontal Branch Stars
Proposed a program to obtain spectra of candidate member stars of the Boötes I ultra faint dwarf galaxy on the Apache Point Observatory 3.5 meter PI, *successful*, 2021

The ZERO survey - Search for zero-metal stars in the Galaxy with HSC/NB395
Proposed for 2.5 nights on Subaru's Hyper Suprime-Cam to search for metal-poor stars Co-I, *successful*, 2021

Additional Publications

Refereed

1. Horta, D., et al. 2026, The Milky Way's Circular Velocity Curve Measured Using Element Abundance Gradients, ApJ, *1000, 8*
2. Jurado, C., et al. 2026, Dynamical Origins of Azimuthal Metallicity Variations in the Galactic Disk: Insights from Kinematic Ridges with Gaia, ApJ, *998, 152*
3. Rose, J.C., et al. 2026, The DREAMS Project: Disentangling the Impact of Halo-to-Halo Variance and Baryonic Feedback on Milky Way Satellite Galaxies, *submitted*, ApJ
4. Rose, J.C., et al. 2026, The DREAMS Project: A New Suite of 1,024 Simulations to Contextualize the Milky Way and Assess Physics Uncertainties, *submitted*, ApJ
5. Martinez, M.H., et al.*† 2026, Inclinations and Position Angles for Disc Galaxies in the SGA sample, RASTI, *submitted*
6. Kane, S.G., et al. 2025, On the connection between nitrogen-enhanced field stars and the Galactic globular clusters, MNRAS, *546, 1*
7. Ding, K., et al.*† 2025, Machine Learning Techniques to Distinguish Giant Stars from Dwarf Stars Using Only Photometry - Pushing Redwards, ApJ, *170, 6*

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8. Manea, C., et al. 2025, Optical Spectroscopy Reveals Hidden Neutron-capture Elemental Abundance Differences among APOGEE-identified Chemical Doppelgängers, ApJ, 993, 1
9. McClure, R.L, et al. 2025, Secular Attrition of Classical Bulges by Stellar Bars, ApJ, *Submitted*
10. Esser, N., et al. *****, 2025, "Constraints on asteroid-mass primordial black holes in dwarf galaxies using Hubble Space Telescope photometry", A&A, 698, A290
11. Ganapathy, A., et al.†, 2025, "Disc Asymmetry Characterisation in JWST-Observed Galaxies at 1 < z < 4" , MNRAS, 539, 2
12. McClure, R.L., et al., 2025, "The Impact of Classical Bulges on Stellar Bars and Boxy-Peanut-X Features in Disc Galaxies", MNRAS, 537, 2
13. Hackshaw, Z., et al. *****, 2024, "[X/Fe] Marks the Spot: Mapping Chemical Azimuthal Variations in the Galactic Disk with APOGEE", ApJ, 977, 143
14. Ogami, I., et al., 2024, "Detection of a Spatially Extended Stellar Population in M33: A Shallow Stellar Halo?", ApJ, 971, 107
15. Ogami, I., et al., 2024, "The structure of the stellar halo of the Andromeda galaxy explored with the NB515 for Subaru/HSC. I.: New Insights on the stellar halo up to 120 kpc", MNRAS, 536, 1
16. Hunt, J., et al., 2024, "Radial Phase Spirals in the Solar Neighbourhood", MNRAS, 527, 11393

* - Indicates second or third author, †- Indicates mentee paper

White Papers

1. Galactic Archaeology with the Subaru ʻŌnohiʻula Prime Focus Spectrograph Strategic Program — Co-I, 2026

   Co-authored a white paper detailing the Galactic archaeology component of the PFS survey, available at arXiv:2604.09875

2. RomAndromeda: The Roman Survey of the Andromeda Halo — Co-I, 2023

   Co-authored a white paper detailing a 2-passband, 2-epoch wide-field Roman imaging campaign on the halo of M31, available at arXiv:2306.12302

Selected Service and Community Engagement

Sandbox Films Summer Camp, scientist attendee at interdisciplinary film retreat	2026
Committee member for Committee for Accessibility Rights and Equity, American Astronomical Society	Since 2026
Night at the Library public talk, Brooklyn Public Library	2026
Math for America workshops organizer and facilitator, Math for America	2025, 2026
Co-producer of Labocine short-form documentary film	2025
Working Group on Accessibility and Disability, American Astronomical Society	Since 2025
Hiring committee, Center for Computational Astrophysics	2025
Review Panelist, National Science Foundation	2025
Invited public talk, New Jersey State Museum	2025, 2026
Local organizing committee, Women in Physics Summit, JHU	2022, 2023
Co-Founder & Host, No-Z Galaxies Journal Club	2022
Journal Referee	Since 2021
Community Engagement President	2018-2021
Head Teaching Assistant, AS 171.104 General Physics for Biology Majors	2019

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Collaborations

EXP Development Group
Core member of a Flatiron-led group developing a holistic approach to galaxy dynamical evolution using basis function expansions, see `exp-code.github.io/`

DaRk mattEr with AI and siMulationS (DREAMS) Project
Lead of the dynamics working group within the DREAMS project, a group working to run large numbers of cosmological simulations to better understand the nature of dark matter and galaxy formation

Prime Focus Spectrograph (PFS) Collaboration
An international collaboration dedicated to planning and carrying out a 360-night survey on the Subaru PFS. I have **earned data rights** to the galactic archaeology component of the survey