Ronan Hix

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Education

Princeton University — **Princeton, NJ**

Ph.D in Astrophysics — *Expected May 2028*

M.S. in Astrophysics — *May 2025*

Thesis Advisor: *Prof. Eve Ostriker*

University of Maryland — **College Park, MD**

B.S. in Physics – *High Honors in Physics* — *May 2023*

B.S. in Astronomy – *High Honors in Astronomy* — *May 2023*

Minor in Germanic Studies — **GPA:** 4.0/4.0

Thesis Advisor: *Prof. Massimo Ricotti*

Other Research Appointments

University of Florida – *NSF REU Student* — **Gainesville, FL**

Advisor: *Prof. Zachary Slepian* — *2022*

Oak Ridge National Lab – *DOE/ORISE HERE Student* — **Oak Ridge, TN**

Advisor: *Dr. Bronson Messer* — *2018-2019*

Research Interests

The Interstellar Medium (ISM): Impacts of Cosmic Rays – Galactic Winds and Outflows – Stellar Feedback – Chemical Enrichment – Structure of Molecular Clouds – Dwarf Galaxies

Star Formation: Star Cluster Formation – Origin of the IMF – Stellar and Pre-stellar Feedback – Early Universe SF – Impact of Magnetic Fields – Non-ideal-MHD effects – Core Fragmentation

Additional Experience: GPU acceleration – Data Visualization – Cosmic Ray Air Shower Detection – Supernova Simulations – High-Order Statistics for Cosmology

Presentations and Publications

Publications:

- **Hix R.**; Armillotta L.; Ostriker E.; Kim C.G.; "*Dynamically Controlled Transport of GeV Cosmic Rays in Diverse Galactic Environments*", 2025, ApJ, 994, 1, arXiv: 2509.03519
- **Hix R.**; He C.-C.; Ricotti M.; "*Bimodal Star Formation in Simulations of Strongly Magnetized Giant Molecular Cloud*", 2023, MNRAS, Volume 522, Issue 4, arXiv: 2212.04411
- Turk M., ... , **Hix R.**, et al.; "*Introducing yt 4.0: Analysis and Visualization of Volumetric Data*", 2024, yt-project-4.0-paper

Invited Talks:

- "Cosmic Ray Transport in the Multiphase ISM," *UTK Astrophysics Seminar*, University of Tennessee, 18 March 2026
- "Cosmic Ray Transport and Star Formation in the Multiphase ISM," *Journal of Plasma Physics Frontiers of Plasma Physics Colloquium*, 10 January 2026
- "Simulating Cosmic Rays across Galactic Environments," *Terrapin Astronomical Society*, University of Maryland, 7 April 2025
- "Simulating Star Formation in Magnetized Giant Molecular Clouds," *Physics Undergraduate Committee (PUC) Colloquium*, University of Maryland, 15 November 2022

Selected Contributed Talks:

- "GeV CR Transport in Realistic Galactic Environments," *Unifying Cosmic Ray Research Workshop*, Princeton Center for Theoretical Science, 24 February 2025
- "Dynamically Controlled CR Transport in Diverse Galactic Environments," *Magnetic Fields and Cosmic Rays across Diverse Scales*, Center for Astrophysics, 10 September 2025
- "Simulating Star Formation under the Influence of Strong Magnetic Fields," *2024 Ramses User Meeting*, Flatiron Institute, 24 April 2024
- "Bimodal Star Formation in Simulations of Strongly Magnetized Giant Molecular Cloud," iPoster, *243st Meeting of the AAS*, New Orleans, LA, 12 January 2024 - **Chambliss Awardee**
- "N-Point Correlation Functions using Isotropic Basis Projection and GPU Computing," iPoster, *241st Meeting of the AAS*, Seattle, WA, 12 January 2023
- "New Methods for Producing Air Shower Curvature Corrections from Monte Carlo Data", *HAWC Data and Algorithms Meeting*, 20 October 2020

Honors and Awards

- AAS Chambliss Astronomy Student Achievement Award (2024)
- SPS/SSAI Academic Scholarship Awardee (2022)
- NSF REU Recipient (2022)
- Sigma Pi Sigma (Physics Honors Society) Inductee (2021)
- Honors Citation - University Honors (2020)
- University of Maryland President's Scholarship (2019 - 2023)
- National Merit Scholarship Awardee (2019)
- Eagle Scout (2019)

Technical Experience

Programming Languages:
C/C++, KOKKOS, CUDA, Matlab, Python, ROOT

Simulation Codes:
Athena/*Athena++*, RAMSES, IDEFIX

Software:
yt, CuPy, Pandas, scipy, matplotlib, Git, LaTeX

HPC Experience:
Parallelization, Supercomputing, SLURM

General:
Computational Simulation, Data Processing, Data Analysis, Data Visualization, Software Development and Optimization, Numerical Recipes, Unix shell, Jupyter

Volunteer and Outreach Experience

- **PUPP Teaching Fellow (2025-present)**
  - Teach an enrichment class for a cadre of low-income, high-achieving students at Lawerence High School, to enhance their academic development build college-readiness
  - Develop a curriculum and deliver weekly lessons on topics from science to rhetoric
  - Build critical skills and assist my scholars to become first-gen college students
- **Spring into Science Astronomy Co-Organizer (2025-present)**
  - Organize, develop, and implement Astronomy programming for the University-wide public science outreach event, aimed at young students and their families
  - Introduce nearly 1,500 kids to Astronomy via hands-on demos and interactive showcases
- **Wednesday Lunch Organizer: (2024-2025)**
  - Organized the department's weekly "Wunch" seminar series, where graduate students are able to have informal discussions with speakers about their career paths and experiences.
  - Crafted a diverse speaker program of academic and industry leaders from over a dozen institutions across multiple disciplines, including two Nobel laureates.
- **Solar Eclipse Outreach: (2024)**
  - Volunteered at live public viewing event, distributing eclipse glasses and answering astronomical questions from attendees of all ages.
- **Graduate Application Mentoring: (2023-present)**
  - Assist undergraduates with the graduate school application process via Q&A sessions, one-on-one advice, and reviewing student application materials.
- **Society of Physics Students (SPS) Tutor: (2020-2023)**

  - Helped develop and organize the free physics tutoring service run by the UMD SPS chapter, providing assistance to undergraduate students enrolled in a variety of introductory and upper-level physics courses. Also volunteered several hours a week as a tutor.
- **2022 Physics Congress Volunteer Co-Organizer: (2022)**
  - Coordinated with AIP and the UMD physics department to serve as a local host University for the 2022 Congress, attended by almost 1000 students from across the country.
  - Helped organize and lead lab tours, academic panels, and social activities during the congress, as well as assisted with pre-conference logistics and planning.
- **National SPS Centennial 5k Co-Organizer: (2022)**
  - Organized a fundraising 5k in liaison with the UMD physics department, national SPS, and American Institute of Physics (AIP). Coauthored SPS Observer Article (Pg. 14)
- **Astronomy Department Peer Mentoring: (2022-2024)**
  - Served as a peer mentor for 2 first-year astronomy students.
  - Assisted their transition into both astronomy and the university through advice, recommendations, and explanations on topics both academic and interpersonal.
- **SPS Peer Mentoring Organizer: (2021-2023)**
  - Matched underclassmen physics majors and transfer students with experienced upperclassmen and coached mentors on how to use their experience to help mentees succeed.
  - Served as a mentor for a first-year physics student.
- **SPS Officer: (2019 - 2023)**
  - Supported the academic and personal pursuits of physics students. Organized a wide range of activities, including invited lectures, skill development workshops, town halls, social events, peer-mentoring, a breakfast stand, and even a free tutoring clinic.
  - **SPS Vice President**: (2022 - 2023), Treasurer: (2021-2022)
- **Physics Undergraduate Committee Member (PUC): (2019 - 2023)**
  - Provides peer support for students, showcases undergraduate research achievement, and champions student causes to university and physics department leaders.