

Meredith LeFevre

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EDUCATION

University of Iowa

August 2023 – (Anticipated) May 2027

Bachelor of Science in Physics and Astronomy, Minors in Mathematics, Geoscience, and Dance

GPA: 3.91 cumulative

Relevant Course Work:

- *Fundamental Astronomy I and II*
- *Intro to Quantum Mechanics I and II*
- *Observational Techniques in Astronomy*
- *Planetary Geology*
- *Electricity and Magnetism I and II*
- *Intro to Astrophysics I and II*
- *Intro to Environmental Remote Sensing*
- *Intro to Ordinary Differential Equations*

PROFESSIONAL EXPERIENCE

Undergraduate Teaching Assistant – Clear Skies, University of Iowa

Spring 2026 - Present

- Assisted with instruction and student engagement for General Education astronomy courses
- Supported astronomy outreach events, public observing nights, and nighttime sky demonstrations
- Provided hands-on support for astronomy laboratory and observational activities

Department of Physics and Astronomy Outreach Committee, University of Iowa

Spring 2026 – Present

- Coordinate outreach logistics and volunteer efforts for observing nights, school outreach, and space physics events
- Help improve departmental outreach communication, scheduling, and event planning across programs

PSAPS (Prairie Section of the American Physical Society) Annual Meeting Organizing Committee, University of Iowa

Spring 2026 – Fall 2026

- Help organize scientific and undergraduate programming for the PSAPS Annual Meeting (October 22–24, 2026), including sessions in astronomy, plasma, particle, and materials physics
- Coordinate outreach events, career panels, website development, invited speaker outreach, and conference logistics

Outreach Coordinator: Society of Physics Students, University of Iowa

Fall 2025 – Present

- Lead and coordinate public observing nights and departmental outreach events
- Collaborate with faculty, students, and the community to promote engagement and fellowship in physics and astronomy

Undergraduate STEM Ambassador, Iowa Space Grant Consortium

Fall 2025 – Present

- One of 11 undergraduate students selected statewide to represent ISGC in promoting NASA's mission through STEM outreach and community engagement
- Represent the Iowa Space Grant Consortium through STEM outreach, professional development, and collaboration with students, educators, and community partners across Iowa

Helio & Space Physics Outreach Committee, University of Iowa

Fall 2025

- Led solar observing activities, provided educational materials, and engaged the public using 3D-printed models of NASA's TRACERS mission instruments
- Facilitated an interactive exhibit on the history of the University of Iowa's space missions, inviting alumni and visitors to share their experiences and connections to space science

RESEARCH PROJECTS

Classifying Galactic Center Sources Through X-ray Time-Domain Analysis

Spring 2026– Present

Undergraduate Researcher – Advisor: Dr. Dustin Swarm, University of Iowa

- Investigate Galactic Center X-ray sources using Chandra X-ray Observatory data to distinguish magnetic and non-magnetic cataclysmic variables
- Perform time-domain analysis of X-ray light curves for ~34 sources to identify periodic variability
- Use spin and orbital periodicity to improve source classification and refine white dwarf mass estimates

The Iowa Idea at Great Heights - Iceland Solar Eclipse High-Altitude Ballooning Project

Spring 2026 – Summer 2026

High-Altitude Magnetosphere Measurement & Eclipse Research (HAMMER) Team

Data and Instrumentation Lead

- Led instrumentation strategy for a high-altitude balloon mission in Iceland (July 2026), integrating a magnetometer to measure geomagnetic field strength within the auroral oval
- Developed calibration procedures, sampling strategy, and onboard data logging systems for geomagnetic measurements in stratospheric conditions
- Implemented data analysis and sonification techniques to translate auroral dynamics for research and outreach
- Participated in flight operations and post-launch analysis after the payload exceeded the planned recovery range due to a cutdown system failure, preventing retrieval of flight data

Tully-Fisher Relation Analysis with Fixed Inclination: Comparison of Forward, Inverse, and Unified Models

Spring 2024

Undergraduate Researcher – Advisor: Dr. Hai Fu, University of Iowa

- Explored forward, inverse, and unified models of the Tully-Fisher Relation, focusing on the impact of treating galaxy inclination as a known parameter rather than a probabilistic variable
- Gained experience simplifying astrophysical models and comparing fitting approaches under different statistical assumptions
- Compared modeling assumptions to examine how fixed inclination influences interpretation of the Tully-Fisher Relation

Analysis of Linear Regression Methodologies: HyperFit vs LMFIT for Uncertain and Correlated Data Sets

Fall 2024

Undergraduate Researcher – Advisor: Dr. Hai Fu, University of Iowa

- Conducted a comparative analysis of HyperFit and LMFIT for modeling the Tully-Fisher Relation using galaxy data; evaluated differences in statistical assumptions, flexibility, and treatment of uncertainties
- Determined that LMFIT is ideal for one-dimensional regression with clear predictor-response relationships and flexible nonlinear modeling, while HyperFit is better suited for multidimensional data with complex error structures, intrinsic scatter, and rotational invariance

POSTERS & PRESENTATIONS

“Dead Stars That Still Shine: X-rays from the Galactic Center”, Public Observing Night Presentation, University of Iowa

June 2024

Public Talk

- Developed and delivered a public astronomy presentation on stellar evolution, white dwarfs, binary star systems, and X-ray astronomy for a general audience.
- Highlighted ongoing undergraduate research using observations from the Chandra X-ray Observatory to classify cataclysmic variables through X-ray variability analysis.

“Mission HAMMER: A Multidisciplinary Exploration of Earth’s Magnetosphere Through Immersive Art”, Spring Undergraduate Research Festival, University of Iowa

April 2024

Co-Author

- Presented mission concept and experimental design for a high-altitude balloon study of magnetospheric and atmospheric variability
- Contributed to instrumentation strategy, calibration planning, and onboard data acquisition systems
- Outlined integration of scientific measurements with immersive media (360° imaging, sonification) for research and outreach

TECHNICAL TRAINING

Programming Languages & Tools

Python (NumPy, Matplotlib, Jupyter Notebook), LaTeX, CIAO (Chandra X-ray analysis), Unix/Linux Command Line

Van Allen Observatory Training, University of Iowa

April 2024

- Trained on the University of Iowa’s 17-inch f/6.8 Cassegrain telescope mounted on a PlaneWave L-500 direct-drive Alt-Az mount
- Gained experience with SBIG 6303E CCD imaging system and LRGB filter set for astrophotography and observation
- Operated 6-inch Celestron telescope with internal alignment software and 4-inch Orion telescopes for educational observing and public outreach

SCIENCE OUTREACH EXPERIENCE

Project HOPE (Healthcare Occupations Preparation and Exploration), University of Iowa

May 2026

Volunteer

- Helped facilitate robotics sessions for middle school students through hands-on soldering activities
- Guided groups of ~10 students in basic electronics, tool safety, and STEM problem-solving

Cub Scout Astronomy Outreach, University of Iowa

October 2025

Volunteer

- Led the “Cub Scout Adventure” astronomy elective, introducing first-grade students to basic observational astronomy concepts
- Guided scouts in observing the night sky and identifying constellations
- Demonstrated the use of telescopes and binoculars for sky observation

Physics Demonstration Volunteer – Hawkeyes on Science & Hawkeyes in Space, University of Iowa

Fall 2025 – Present

Volunteer

- Presented interactive physics and astronomy demonstrations to K–12 students and community audiences
- Explained core concepts including electromagnetism, waves, optics, and space science using hands-on experiments
- Adapted scientific explanations for diverse age groups to promote STEM accessibility and engagement
- Assisted with setup, operation, and safe handling of demonstration equipment

Partial Solar Eclipse Day, University of Iowa

April 2024

Volunteer

- Set up and managed telescopes and outreach equipment at the University of Iowa Sciences Library for the April 8th Solar Eclipse
- Answered visitor’s questions about eclipse safety, telescope use, and basic solar astronomy

Public Observing Nights, University of Iowa**Fall 2024 - Present***Volunteer*

- Set up and take down of telescopes, signage, and outreach materials
- Assist with public engagement and explain basic telescope anatomy and astronomical concepts

CONFERENCES & WORKSHOPS

**Discovery Science Center Summer School for Matter at Extreme Conditions,
Center for Matter at Atomic Pressures, University of Rochester****June 2026***Attendee*

- Participated in an intensive program on extreme states of matter in laboratory and astrophysical systems
- Applied Python to investigate topics in astrophysics, planetary science, and quantum materials
- Engaged with researchers and gained exposure to computational tools in high-energy-density physics

APS Global Physics Summit, Denver Colorado**March 2026***Attendee*

- Attended invited and contributed sessions on dark matter, black hole astrophysics, and cosmic rays, engaging with current research directions
- Engaged with researchers during poster sessions to discuss methodologies and findings across institutions
- Explored graduate programs and research opportunities through career and graduate school fairs

**APS CU*iP (Conference for Undergraduate Women and Gender Minorities in Physics),
Michigan Technological University
Denver, Colorado****January 2025****March 2026***Attendee*

- Participated in panels on graduate school pathways, research fields, and inclusivity in physics
- Attended workshops on nanotechnology and Python coding
- Toured research facilities and engaged with faculty and graduate students

**Coding the Cosmos: Introduction to Gravitational Waves,
Missouri University of Science and Technology****May 2024***Attendee*

- Analyzed gravitational wave data using Python (NumPy, Matplotlib) for scientific computation and visualization
- Explored compact object mergers, gravitational wave detection, and analysis methods used by LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA

AWARDS

Girl Scout Gold Award**October 2022**

- Repainted a large-scale U.S. map at Hesston Elementary School (116-hour service project for Hesston, Kansas community)

Dean's List, University of Iowa**Fall 2023 – Present****Independent Creative Research by Undergraduates (ICRU) Fellowship,
University of Iowa****Fall 2026 – Spring 2027****Phi Beta Kappa, Alpha of Iowa Chapter, University of Iowa****Spring 2026 - Present****National Scholars Award****Aug 2023 – May 2027**