

Catherine Slaughter, M.Sc.

PhD Student, Minnesota Institute for Astrophysics

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Education

- 2023–Present **Ph.D. Astrophysics**, The University of Minnesota, Minneapolis, MN.
GPA: 3.92/4.00
- 2021–2023 **M.Sc. Astronomy Research**, Leiden University, Leiden, Netherlands.
Average Grade: 8.04/10
US Equivalent GPA: 3.92/4.00
- First-Year Thesis: *A Modeled Radiation Field Search for Bubble Structures in the Greater Orion Nebula*
 - Master's Thesis: *Disentangling the Shadows of a Planetary Collision*
- 2017–2021 **B.A. Astronomy and Physics**, Dartmouth College, Hanover, NH.
GPA: 3.54/4.00
Study abroad: SAAO, South Africa, Winter 2019.

Research Experience

- 2023–Present **Pre-Thesis Doctoral Research**, Minnesota Institute for Astrophysics, Skillman Group, Minneapolis, MN.
Calibrating the RR Lyrae Population in WLM with HST and JWST ERS. Makes use of combined observations from the Hubble and James Webb Space Telescopes to find and analyze periodicity of RR Lyrae stars in nearby dwarf galaxy WLM. Adapted existing analysis methodology for use with JWST data products. Creating catalog of WLM RR Lyrae to calibrate distance determination from JWST and the forthcoming Roman Space telescope observations.
- 2022–2023 **Master's Thesis Project**, Leiden Observatory, Kenworthy Group, Leiden, NL.
Disentangling the Shadows of a Planetary Collision. Modeled planetesimal collision remnants and their resulting transit light curves in Python. Fit modeled light curves to real data of the ASASSN-21qj system to better study the geometry of a real planetary collision event. Such collisions are important to our understanding of planet system formation. While we have few observations of them, we expect to observe more with LSST.
- 2021–2022 **First Year Master's Project**, Leiden Observatory, Tielens Group, Leiden, NL.
A Modeled Radiation Field Search for Bubble Structures in the Greater Orion Nebula Region. Used SOFIA and Herschel data, along with a new radiation-field modeling code to develop a method for searching for kinematic structures in gas clouds based on expected local radiation field contribution. Additionally identified a possible previously unreported fossil bubble structure in Orion Molecular Cloud A.
- 2020–2021 **Undergraduate Culminating Research Project**, Dartmouth College Dept. of Physics and Astronomy, Chaboyer Group, Hanover, NH.
Refining the Age of the Universe with Globular Clusters. Implemented new numerical analysis methods along with Monte Carlo Main-Sequence fitting to determine the ages of several nearby globular clusters with significantly decreased error. Doing so sets a hard lower limit for the age of the universe, potentially helpful for future research in the Hubble Tension.
- 2020–2021 **Caltech SURF**, California Institute of Technology, Harrison Group, Pasadena, CA.
Analyzing Straylight X-ray Binaries with NuSTAR. Analyzed previously unused stray-light observations from NuSTAR of several low-mass neutron star x-ray binaries.
- 2018–2019 **Undergraduate Researcher**, Dartmouth College Dept. of Physics and Astronomy, Chaboyer Group, Hanover, NH.
Improving Metal-Poor Stellar Evolution Models. Calibrated stellar evolution models against certain metal-poor subdwarfs. Analyzed spectral data and measured emission line equivalent widths in SPLOT. Created model atmospheres using MOOG.

Publications

Jiaqi Martin Ying, Brian Chaboyer, Emily M. Boudreaux, Catherine Slaughter, Michael Boylan-Kolchin, and Daniel Weisz. The Absolute Age of M92. *The Astronomical Journal*, 166(1):18, July 2023.

Brian W. Grefenstette, et al. StrayCats: A Catalog of NuSTAR Stray Light Observations. *The Astrophysical Journal*, 909(1):30, March 2021.

Presentations and Colloquia

- Jun 2024 **AAS Summer Meeting**, Madison, WI, Poster.
"Calibrating the RR Lyrae Population in WLM with HST and JWST ERS"
- Jun 2023 **Leiden Observatory Master's Colloquium**, Leiden, NL, Talk.
"Disentangling the Shadows of a Planetary Collision"
- Jan 2023 **AAS Annual Meeting**, Seattle, WA, Poster.
"A Modeled Radiation Field Search for Feedback Structures in the Greater Orion Nebula Region"
- Aug 2020 **Caltech SFP Symposium**, Pasadena, CA, Poster.
"Analyzing Straylight X-ray Binaries with NuSTAR"
- May 2020 **Wilder Department Symposium**, Hanover, NH, Poster.
"Refining the Age of the Universe Using Globular Clusters: Prerequisite Work"
- May 2018 **Wetterhan Science Symposium**, Hanover, NH, Poster.
"Improving Metal-Poor Stellar Evolution Models"

Honors and Awards

- 2023–2025 **Ney Graduate Fellowship**, *Minnesota Institute for Astrophysics*, \$32,000/year.
Selective two-year research stipend fellowship awarded to incoming graduate students in Astrophysics at the University of Minnesota.
- Jan 2022 **AAS FAMOUS Grant**, *American Astronomical Society*, \$1000.
Travel grant awarded to an early-career astronomer to attend a single AAS meeting, at which the awardee will present her or his research.
- 2021–2022 **James B. Reynolds Scholarship for Foreign Study**, *Dartmouth College*, \$25,000.
Fellowship awarded to recent Dartmouth graduates pursuing long-term research or study outside the United States.
- Summer 2020 **Caltech SURF Grant**, *California Institute of Technology*, \$6620.
Awarded to Caltech Summer Undergraduate Research Fellows.
- Spring 2020 **Undergraduate Leave Term Grant**, *Dartmouth College*, \$5200.
Competitive grant awarded to students conducting a term of full-time research.
- Nov 2019 **Francis L. Town Scientific Prize**, *Dartmouth College Dept. of Physics and Astronomy*.
A prize offered annually to "one meritorious and deserving student in each department of scientific study at the College" at the end of Sophomore year.
- Sep 2018 **Sophomore Research Scholar**, *Dartmouth College*, \$2000.
Competitive grant awarded to second-year students assisting faculty in their research.
- Jan–Jun 2018 **Women in Science Project Fellowship**, *Dartmouth College*, Hourly.
Funding for first-year undergraduate women at Dartmouth College to engage in research in the sciences.

Teaching and Outreach Experience

- Summer 2022 **Astronomer-in-Residence**, *CIDSR and Boise State University*, Part-Time, Central Idaho.
Traveled the Central Idaho Dark Sky Reserve (with particular focus on the towns of Stanley, Ketchum/Sun Valley, and Hailey) for various public outreach and engagement events. Duties included public observing, lecturing, mentoring undergraduate students in outreach, and curriculum development.
- 2018–2021 **Public Observing Guide**, *Dartmouth College Dept. of Physics and Astronomy*, Part-Time, Hanover, NH.
Designed and Lead weekly PO programs serving Dartmouth College and the greater community in the Upper Valley. Duties included nighttime lecturing, target selection, and telescope setup and operation.

- 2019–2021 **Dartmouth Emerging Engineers Tutor**, *Thayer School of Engineering*, Part-Time, Hanover, NH.
Tutored first-year students taking introductory math, physics, and computer science courses. The DEE program especially targets first-gen and low-income students for peer support and mentoring.
- Summer 2019, Spring 2020 **Introductory Astronomy Teaching Assistant**, *Dartmouth College Dept. of Physics and Astronomy*, Part-Time, Hanover, NH.
Teaching assistant for an introductory astronomy course geared toward arts and humanities students. Duties included conducting lab sessions, grading, and general student support.
- Summer 2018 **Astronomy and Nature Guide**, *Mountains of Stars*, Full-Time, Crawford Notch, NH.
Worked with the general public in order to educate about astronomy, spread awareness for environmental issues, and encourage widespread social change. Duties included lecturing, target selection, telescope setup and operation, tabletop demonstrations, planetarium shows, and social media management.

Relevant Extracurriculars

- 2023–Present **Daily Rotation Author**, *The Astrobites Collaboration*.
Writes and edits summary articles of recently-published astrophysical literature to better communicate cutting-edge research to a broader audience (primarily undergraduate physical science majors). Astrobites has served as the astro-ph reader’s digest since 2010. Recent work can be found on the *Astrobites website*.
- 2022–Present **VAST Organizing Committee**, *Virtual Astronomy Software Talks*.
Assists in the planning, organization, and presentation of *VAST* seminars. Primary role includes establishing connections across continents and fields, monitoring audience questions, and general planning. VAST is dedicated to identifying and highlighting important work in astronomical software development, which is often overlooked by traditional metrics of scientific productivity.

Skills

Programming	PYTHON, C, C++, SHELL SCRIPT, MATLAB	<i>Experienced</i>
	FORTRAN, JAVA, VHDL, CSS, HTML	<i>Beginner</i>
Software	Conda, DS9, L ^A T _E X, AMUSE	
Technical	Machine Learning, Data Analysis and Visualization, Telescope Operation and Maintenance	
Languages	English	<i>Native Speaker</i>
	Spanish	<i>Conversational</i>
Other	Social Media Management, Science Outreach, Written and Oral Communication	

References available upon request.