Skylar Grayson

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Research Interests

Extragalactic astronomy, computational astrophysics, galaxy evolution, active galactic nuclei, feedback processes, Sunyaev-Zel'dovich effect, astronomy education, course-based undergraduate research experiences, online education

Education

Arizona State University Aug. 2021 - Present
Tempe, AZ
Doctor of Philosophy in Astrophysics
Average unweighted GPA: 4.0/4.0

Whitman College Aug. 2017 - May 2021
Walla Walla, WA
Bachelor of Arts in Physics-Astronomy, Minors in Mathematics and French
Average unweighted GPA: 3.966/4.0

Universite de Nantes/IES Abroad Jan. 2020 - May 2020
Nantes, France
Average unweighted GPA: 4.0/4.0

Fellowships, Awards, and Honors

National Science Foundation Graduate Research Fellowship 2023-Present
Karen Valentine Science Communication Award ($2,000) 2023
ASU President's Professor Award for Innovation - Online Undergraduate Research Scholars Program 2023
Graduated summa cum laude, Whitman College 2021
Inducted into Phi Beta Kappa National Honor Society 2020
Academic Distinction every semester of undergraduate studies 2017-2021
Bates Foundation Music Scholarship ($4,000) 2018-2021
Walter Brattain Merit Scholarship ($16,000) 2017-2021
Bend Chamber of Commerce Woman of the Year-Young Hero Award ($2,000) 2017

Research Experiences

Characterizing AGN feedback using Cosmological Simulations June 2021 - Present
Arizona State University
Mentored by Dr. Evan Scannapieco

- Studied active galactic nuclei (AGN) feedback as a possible solution to the cosmic downsizing problem Constrained AGN feedback implementations in simulations via mock-observations of the Sunyaev Zel'dovich (SZ) effect and thermal x-ray emission in the circumgalactic medium
- Compared against observations from the Atacama Cosmology Telescope and SRG/eROSITA

Understanding Motivations of MOOC Learners May 2023 - Present
Arizona State University
Mentored by Dr. Molly Simon and Dr. Sanlyn Buxner

- Surveyed students in three astronomy Massive Open Online Courses (MOOCs)
- Characterized motivations, demographics, and participation levels
- Looked at the impact of the COVID-19 pandemic on the MOOC landscape

Assessing Online Research Experiences for Undergraduates October 2021 - Present
Arizona State University
Mentored by Dr. Molly Simon

- Studied the large-scale implementation of online research experiences at Arizona State's online degree program
- Conducted interviews of students to provide qualitative data for analysis
- Developed codebook, determined inter-rater reliability, and began preliminary analysis of interviews
- Conducted an extensive literature review to create documentation for internal and external circulation
- Research will be continued with programs currently in progress

Asymmetric Dark Matter June 2020 - May 2021
Whitman College
Mentored by Dr. Moira Gresham

- Studied potential bottleneck scenarios in bound states of asymmetric dark matter
- Used Mathematica to determine conditions in our parameter space where energy conservation and cosmological requirements were met
- Calculated cross-sections and reaction rates for the formation of 2-body bound states
- Showed that if the conditions for forming a two-body state were met, there would be not bottlenecks in forming larger bound states
- Research was worked into a Senior Honors Thesis along with a review of the implications of an asymmetric dark matter model

Simulations of Physical Vapor Deposition May 2019 - August 2019
Sandia National Laboratories
Mentored by Dr. Remi Dingreville

- Ran 10,000+ simulations of physical vapor deposition
- Studied the impact of a range of variables on a resulting surface roughness
- Wrote final report and gave a presentation on method/results

Late Stage Pharmaceuticals May 2018 - August 2018
Lonza Bend

- Assisted with client projects including running HPLC, dissolution, and purity tests
- Developed a research project determining the robustness of a Pion Rainbow dissolution test by testing the impact of a wide range of variables
- Wrote final report and gave a presentation on method/results
- Did outreach to local elementary schools and children's fairs to generate interest in studying science

Publications

Grayson, S, Scannapieco, E, & Dave, R. 2023 Distinguishing AGN Feedback Models with the Thermal Sunyaev-Zel'dovich Effect. *ApJ*, 957:17

Hewitt, HB, Simon, MN, Mead, **Grayson, S**, C, Beall, GL, Zellem, RT, Tock, K, & Pearson, KA. 2023 Development and Assessment of a Course-Based Undergraduate Reserach Experience (CURE) for Online Astronomy Majors. *PRPER*, 19, 020156

Invited Talks

AGN Feedback Implementation in Cosmological Simulations, Theoretical Astrophysics and Cosmology Seminar, University of Arizona, January 2024

First-Authored Conference Presentations

Grayson, S., Scannapieco, E., and Dave, R.*Distinguishing AGN Feedback Models via the Thermal Sunyaev Zel'dovich Effect in SIMBA*, AAS (Poster), January 2024

Grayson, S., Ojeda, A., Buxner, S., Wenger, M., Simon, M., and Impey, C. *Understanding the Motivations of Learners in Three Astronomy Massive Open Online Courses*, AAS (Talk), January 2024

Grayson, S., Hewitt, H. B., Simon, M. N., Mead, C., Beall, G. L., Zellem, R. T., Tock, K., and Pearson, K. A. *Qualitatively Assessing An Online Research Course for Astronomy Majors,* SHAW-IAU (Poster), November 2023

Grayson, S., Scannapieco, E., and Dave, R.*Characterizing AGN Feedback Processes at z∼1 with SIMBA,* SIMBA Collaboration Meeting (Talk), May 2023

Grayson, S., Scannapieco, E., and Dave, R.*Modeling the Thermal Sunyaev-Zel'dovich Effect Using SIMBA,* Oases in the Cosmic Desert (Poster), February 2023

Grayson, S. and Gresham, M. *Exploring Bottlenecks in Asymmetric Dark Matter Bound State Formation,* Whitman College Undergraduate Research Conference (Poster and Talk), March 2021

Co-Authored Conference Presentations

Hewitt, H. B., Simon, M. N., Mead, C., **Grayson, S.** and Beall, G. *Two Semesters of Results From an Online Exoplanet Research Course for Astronomy Majors*, AAS, January 2024

Simon, M. N., Hewitt, H. B., Mead, C., **Grayson, S.** and Beall, G. *The Development and Assessment of a Course-Based Undergraduate Research Experience (CURE) for Online Astronomy Majors*, AstroEdu Conference, May 2023

Relevant Work Experience

Sundial Academic Facilitator August 2024
Arizona State University

- Developed curriculum and taught a nine day science camp for incoming undergraduates identified to be in 'at risk' populations
- Worked with 30 students to develop foundation mathematical and conceptual skills for physics, astronomy, and geology degrees

Lecture Teaching Assistant August 2022 - May 2023
Arizona State University

- Part-time TA for introductory astronomy lecture for non-majors
- Monitored the chat and fielded questions in Zoom during hybrid lectures twice a week
- Held office hours and was available for questions via email
- Graded weekly assignments

Lab Teaching Assistant August 2021 - May 2022
Arizona State University

- TA for introductory astronomy labs for non-majors
- Worked with 60+ students in three lab sections
- Created and presented 30 minutes presentations covering the lab material and concepts each week, guided students through the lab, held office hours and was available for questions via email, and assessed student work and provided feedback

Physics Fellow January 2019 - May 2021
Whitman College

- TA for introductory physics courses and 300-level Particle Physics course
- Met weekly with students to work on group homework assignments
- Helped students develop good homework and collaboration strategies

Peer Tutor August 2018-May 2021
Whitman College

- Met weekly with students in physics, astronomy, and mathematics courses
- Helped with homework, developing good study habits, and tailoring practices to specific classes
- Included professional development work, meetings with professors, and providing reports on sessions

Science Communication

Social Media

- Platforms on TikTok (165,000+ followers), Instagram (39,000+ followers), Threads (25,000+ followers), and YouTube (11,000+ followers),
- An emphasis on sharing science in an honest and relatable way. Content focused around current science news, fun facts, and my experience as a grad student

Selected Appearances

- NASA Social for Artemis 1: One of only 100 influencers accepted to attend the launch of Artemis 1 and spend the weekend touring Kennedy Space Center and talking to NASA administration and astronauts
- Guest on Everything STEAM Podcast: Discussed my research, JWST, and science communication
- Youth STEM Matters Magazine: Interviewed by a group of young women around the world about my experience as a woman in STEM, career paths in science, and my research

Astrobites Author: January 2024- Present

- Link to my paper summaries
- Served on the DEI Committee and Co-Chaired the Education Committee beginning August 2024

Extracurricular Activities and Outreach

SESE Inclusive Community Committee: Arizona State University, 2024-

- Served as Graduate Student representative to help build a more inclusive department

SESE Graduate Council: Arizona State University, 2023-

- Served as Vice President and President on the council, acting as a liason between students and faculty, planning events, and working to improve the graduate student experience

SESE TA Training Committee: Arizona State University 2024-

- Worked with faculty and other graduate students to design and present a three-hour orientation on Teaching Assistant duties for incoming graduate students in the School of Earth and Space Exploration
- Created and organized an online page of resources for TAs

GSPA Grant Reviewer: Arizona State University, 2023-

- Reviewed research grants from fellow graduate students at Arizona State University
- Provided feedback and rated $\sim$ 20 grants

Letters to a Pre-Scientist 2023-2024

- Exchanged letters with an eighth grader over the course of an academic school year
- Wrote to share my experience as a STEM professional and to broaden interest in STEM careers

SESE Open House Committee Member: Arizona State University, 2022-2023

- Member of the committee for the School of Earth and Space Exploration's Open House, held once a semester
- Assisted in outreach and planning

Local Organizing Committee Member: Oases in the Cosmic Desert Meeting (ASU), Feb 2023

Percussionist: Whitman College Music Department, Aug 2017-May 2021

- Leader of the Percussion Ensemble: planned and led rehearsals, arranged pieces and put on a concert for the community Fall 2019, Anticipated Spring 2021
- Section Leader in Wind Ensemble Fall 2019-Spring 2021

Relevant Coursework

Physics: Classical Mechanics, Thermal Physics, Acoustics, Particle Physics, Quantum Mechanics, Electricity and Magnetism, General Relativity

Astronomy: Stellar Astrophysics, Cosmology, Galactic Astronomy, Observational Astronomy, Interstellar Medium, Radiative Transfer, Astro-Statistics

Mathematics: Calculus, Differential Equations, Linear Algebra, Statistics

Skills

- Programming languages: Python, Wolfram, C, R
- Operating systems: Windows, Mac OS, Linux
- Software: LaTeX, SPSS, Mathematica, ParaView
- Soft Skills: Communication, Leadership, Problem Solving, Teaching/Tutoring
- Languages: French-Proficient