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
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
Walter Brattain Merit Scholarship ($16,000) 2017-2021
Bates Foundation Music Scholarship ($4,000) 2018-2021

Research Experiences

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

- Studied active galactic nuclei (AGN) feedback via the Sunyaev Zel'dovich (SZ) effect as a possible solution to the cosmic downsizing problem
- Used python to develop code for creating and stacking SZ maps of galaxies
- Compared to millimeter-wave data from SPT and ACT and make predictions for future observations at a range of redshifts and resolutions

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. *Submitted to ApJ*

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. *Submitted to PRPER*

First-Authored Conference Presentations

Characterizing AGN Feedback Processes at z∼1 with SIMBA, SIMBA Collaboration Meeting (Talk), May 2023

Modeling the Thermal Sunyaev-Zel'dovich Effect Using SIMBA, Oases in the Cosmic Desert (Poster), February 2023

Exploring Bottlenecks in Asymmetric Dark Matter Bound State Formation, Whitman College Undergraduate Research Conference (Poster and Talk), March 2021

Co-Authored Conference Presentations

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

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 (130,000+ followers), Instagram (17,000+ followers), Twitter (6,000+ followers), and YouTube (8,000+ 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
- Hearst Television Interview: Appeared on a brief segment about the re-definition of Pluto as a dwarf planet on the anniversary of the IAU decision

Extracurricular Activities and Outreach

SESE Graduate Council: Arizona State University, 2023-

- Served as Vice President on the council, serving as a liason between students and faculty

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
- Operating systems: Windows, Mac OS, Linux
- Software: LaTeX, yt, CAESAR, Mathematica, ParaView
- Soft Skills: Communication, Leadership, Problem Solving, Teaching/Tutoring
- Languages: French-Proficient