Name: Ally Payne

Code: 693

Home institution: Southeastern Universities Research Association

Name of task: 3D Modeling of Solar System Objects for Exoplanetary Interpretations

Role in task/ what I do for CRESST: As a post baccalaureate researcher with the Planetary Spectrum Generator team, I am currently working on developing advanced 3D spectral simulations of Venus, Earth, Mars, and Jupiter. My current project will use state-of-the-art general circulation models to create these planetary spectra. The goal of my research is to develop exoplanet analogs to learn more about our ability to detect and characterize distant planets that may share similar characteristics to those in our own solar system. With the potential development of the Habitable Worlds Observatory, we are now faced with the crucial task of enhancing the interconnect between instrumental capabilities and scientific interpretation. Methods of direct imaging will be applied to this project to understand the impact that these future flagship missions may have on our ability to analyze exoplanet atmospheres.

Background: I graduated from the University of Washington, Seattle in June 2023 and spent the last two years of my undergraduate education actively participating in various research projects. My main focus was studying the circumgalactic medium of (relatively) nearby galaxies with the Student Quasar Absorption Diagnosticians (SQuAD). This work was supplemented with various projects in exoplanet science. I have a fascination with all things space and found it difficult to settle on studying just one thing; luckily my university offered a variety of majors that prepared me to pursue a career in astronomy and I chose three! I graduated with a triple major in Applied Physics, Astronomy, and Earth and Space Sciences and received an offer to work on exoplanets full time here at NASA Goddard. My background with the SQuAD gave me a strong introduction to research in spectroscopy and the skills needed to apply myself to a research team. Working here at NASA, I have been fortunate to learn so much about the research process that goes into producing impactful science and publications. I am now applying to graduate schools with the hopes of earning my PhD in Astronomy and plan to continue doing research in an institute upon graduation.

Favorite part of being a CRESST Scientist: I love the work environment that NASA has created, and I feel very lucky to be here. My favorite part of being a CRESST scientist is the feeling of motivation I get from being around so many accomplished and influential scientists.

Highlight of research as a CRESST Scientist: Meeting my new team! The PSG team has welcomed me and taught me so much about pursuing a career in research. Also getting to speak to experts in the field of exoplanet astronomy and learning the value of 3D modeling of planetary systems.

Talks:

- 243rd AAS in New Orleans, Louisiana
    - Upcoming: January 2024
    - Oral presentation on my work with solar system analogs for exoplanet systems
- University of Washington's Theodor Jacobsen Observatory Outreach Presentation
    - August 2023
    - Introduction to my work in the CGM using Hubble and Gemini imaging and spectroscopic data.
- University of Washington's Undergraduate Research Symposium
    - May 2023
    - Presented the results of my research in the CGM with the UW SQuAD
- 241st AAS in Seattle, Washington
    - January 2022
    - iPoster presentation on the SQuAD's work in the circumgalactic medium

Papers: I currently have 3 papers in preparation. The first will focus on the kinematic analysis of the circumgalactic medium of galaxies within the CGM^2 survey. The second will be focused on constraining the most likely explanation for the radius gap through an analysis of transit light curves in the Kepler Survey. The third will be an interpretation of my 3d solar system models that I will be working on throughout the duration of my time as a post bacc researcher.

Awards:

NASA Space Grant (2018-2019), Costco Diversity Scholarship (2018-2022)

Three fun facts:

1. I used to work at Starbucks and can make pretty much any coffee.
2. Me, my mom, AND my best friend all cried when I was offered a job at NASA.
3. Last year I was joking with my friend about meeting Kip Thorne on campus and what we might ask him, only to turn around and see him standing right in front of me.