# Mariah Jones *Theoretical Astrophysicist*

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## Summary

*Recent astrophysics graduate from Vassar College with extensive research experience in exoplanetary dynamics, supermassive black hole phenomena, and magneto-hydrodynamic simulations. Adept at leveraging Python, LaTeX, and data analysis to tackle complex astrophysical problems. Demonstrates a strong commitment to advancing representation through social media outreach and public speaking. Proven ability to contribute to high-impact research projects at prestigious institutions, with a focus on enhancing scientific understanding and public engagement. Other interests and involvements include music performance, stage and film acting, and sketch comedy.*

## Education

Vassar College — Poughkeepsie, New York

**B.A. in Astronomy & Physics** — *2021 – 2025*

Concentration in French and Francophone Studies
Major Advisors: Ed Buie II, Jose Périllan

## Research Experience

Center for Computational Astrophysics (CCA), Flatiron Institute — Summer 2025

**Exploring the Origins of Long Secondary Periods in Betelgeuse through Simulated Dust-Companion Interactions**

Used N-body simulations with REBOUND to model Betelgeuse, a putative low-mass companion, and dust test particles. Investigated whether gravitational, radiative, or thermal effects can explain the observed phase offset between Betelgeuse's radial velocity and lightcurve variability. Explored different dust-launching models and initial velocities to test the companion's role in shaping the circumstellar environment.
PI: Jared Goldberg

Vassar College — Current

**Turbulent Magneto-hydrodynamic Simulations of the Circumgalactic Medium**

Investigated the non-equilibrium states of metals in the extreme environments of the circumgalactic medium by modeling their turbulent conditions with the MAIHEM code.
PI: Ed Buie II

SETI Institute — Summer 2024

**Stability of Co-orbitals in Extrasolar Multi-Planet Systems**

Used numerical simulations to explore how an exoplanet's residence in a crowded, near-resonant system affects the stability of its co-orbital companions, specifically Trojans and horseshoe companions.
PI: Matija Ćuk

The South Pole Telescope — February - June 2024

**Variability of Sagittarius A* on Short Time Scales**

Investigated the supermassive black hole at the center of our galaxy, focusing on its accretion process and time-scale variability in linear polarization using SPT observational data.
PI: Paul Chichura, Tom Crawford

The University of Chicago — Summer 2023

**Modeling Asteroids Using Microwave Telescope Data**

Developed an interface to model asteroid shape, rotation, and thermophysical properties. Used South Pole Telescope data to constrain thermal inertia of asteroid (2) Pallas, achieving promising accuracy.
PI: Paul Chichura, Tom Crawford, John Carlstrom

Vassar College — Spring 2023

**Experimental Physics Lab Course**

Recreated pivotal experiments in modern physics, gaining hardware and quantitative investigation skills. Experiments included the Michelson interferometer, the photoelectric effect, and atomic spectroscopy.
Professors: Juan Merlo, Suzannah Zhang

The Contemporary Physics Education Project — Summer 2022

**Making Contemporary Physics Accessible**

Explored contemporary physics topics and presented findings at a symposium. Collaborated with a nonprofit to enhance physics education methods for general audiences.
PI: Cindy Schwarz

The University of Pittsburgh — October 2020 – August 2021

**Gas-phase Mass–Metallicity Relation for Massive Galaxies at z  0.7 with the LEGA-C Survey**

Developed Python skills to measure gas-phase metallicities of massive galaxies and helped create a Python coding boot camp to promote equity in physics and astronomy.
PI: Brett Andrews, Rachel Bezanson

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## Honors & Awards

**2025**
TEAM-UP Together Scholarship
National Society of Black Physicists (NSBP) Summer Scholar
Vassar Scholarship

**2024**
National Society of Black Physicists (NSBP) Outstanding Oral Presentation Award
Underrepresented Minority (URM) Communities in Planetary Science Travel Grant
The Hartmann Student Travel Grant
TEAM-UP Together Scholarship
Vassar Scholarship
NSF Research Fund, SETI Institute

**2023**
The Asprey Center for Collaborative Approaches to Science Grant
Vera C. Rubin Fund
Vassar Scholarship
NSF Research Fund, The University of Chicago

**2021**
Vassar Scholarship
VC First Year Fees Grant
NSF Research Fund, The University of Pittsburgh
National Honor Society Scholarship
Highest Honors

**2020**
QuestBridge College Match Full Scholarship

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## Publications

56th Annual Meeting of the AAS Division for Planetary Sciences
*Investigating the stability of trojan and horseshoe co-orbitals in extra-solar multiplanet systems* (2024). Abstract ID: 106

Keck Northeastern Astronomy Consortium
*Investigating the stability of trojan and horseshoe co-orbitals in extra-solar multiplanet systems* (2024). ISBN: 1-882334-34-5

243rd American Astronomical Society Meeting
*Modeling Asteroids and Using Microwave Telescope Data to Constrain Thermophysical Properties* (2024). Abstract ID: 4900

Keck Northeastern Astronomy Consortium
*Modeling Asteroids and Using Microwave Telescope Data to Constrain Thermophysical Properties* (2023). ISBN: 1-882334-33-7

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## Talks & Posters

Simons-NSBP Scholars Closing Ceremony
*Simulating Dust-Companion Interactions to Understand the Long Secondary Period of Betelgeuse* (2025)

Flatiron Institute Summer Intern Poster Session
*Simulating Dust-Companion Interactions to Constrain Betelgeuse Dimming* (2025)

AAS HEAD Frontier Seminar Series (Invited Talk)
*Investigating the stability of Trojan and horseshoe co-orbitals in extra-solar multiplanet systems* (2024)

National Society of Black Physicists Annual Conference
*Investigating the stability of Trojan and horseshoe co-orbitals in extra-solar multiplanet systems* (2024)

56th Annual Meeting of the AAS Division for Planetary Sciences
*Investigating the stability of trojan and horseshoe co-orbitals in extra-solar multiplanet systems* (2024)

Keck Northeastern Astronomy Consortium
*Investigating the stability of trojan and horseshoe co-orbitals in extra-solar multiplanet systems* (2024)

SETI Institute REU Symposium
*Investigating the stability of trojan and horseshoe co-orbitals in extra-solar multiplanet systems* (2024)

SETI Institute Summer Journal Club
*Constellations of co-orbital planets: horseshoe dynamics, long-term stability, transit timing variations, and potential as SETI beacons* (2024)

Black In Astro Black Space Week
*Modeling Asteroids and Using Microwave Telescope Data to Constrain Thermophysical Properties* (2024)

NASA Cosmic Pathfinders Program: Cosmic Chatter Seminar Series (Invited Talk)
*Modeling Asteroids and Using Microwave Telescope Data to Constrain Thermophysical Properties* (2024)

Vassar College Student Research Department Symposium
*Effects of metallicity variance on the simulated circumgalactic medium* (2024)

The University of Pittsburgh Public Astronomy Seminar (Invited Talk)
*Modeling Asteroids and Using Microwave Telescope Data to Constrain Thermophysical Properties* (2024)

American Physical Society Conference for Undergraduate Women in Physics
*Modeling Asteroids and Using Microwave Telescope Data to Constrain Thermophysical Properties* (2024)

243rd American Astronomical Society Meeting
*Modeling Asteroids and Using Microwave Telescope Data to Constrain Thermophysical Properties* (2024)

Keck Northeastern Astronomy Consortium
*Modeling Asteroids and Using Microwave Telescope Data to Constrain Thermophysical Properties* (2023)

Vassar College Summer Research Department Symposium
*Modeling Asteroids and Using Microwave Telescope Data to Constrain Thermophysical Properties* (2023)

The University of Chicago REU Symposium
*Modeling Asteroids and Using Microwave Telescope Data to Constrain Thermophysical Properties* (2023)

The South Pole Telescope (SPT) Summer Collaboration Meeting at The University of Chicago
*Mariah Jones: A Fireslide Presentation* (2023)

Undergraduate Summer Research Institute (URSI) Symposium
*The Contemporary Physics Education Project* (2022)

## Technical Skills

- Languages and Software: Python, LaTeX, Bash, MATLAB, LabVIEW, C++, Jupyter, GitHub, Microsoft Office, Anaconda packages, CAD, Arduino
- Operating Systems: MacOS, Windows, Linux, Android, Arduino
- Other Skills: Signal processing, data and noise reduction, data analysis, observational astronomy, data modeling, visualization

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## Outreach

56th Division for Planetary Sciences Meeting Press Conference — Speaker

A theoretical exploration of co-orbiting bodies in exoplanet systems. Article and video linked.

The South Pole Telescope — Outreach Volunteer

Participated in a community physics and astronomy outreach event targeted toward elementary students, helping with arts and crafts projects that conveyed astrophysical processes and encouraged interest in science.

The Contemporary Physics Education Project — Non-Profit Consultant

Proposed methods to improve grade-school physics education and recorded bi-weekly mini-lessons on contemporary physics topics for general audiences.

Modeling Asteroids Using Microwave Telescope Data — Astrobites

How 1 High School Senior Is Defying the Odds and Shooting for the Stars — TODAY

She's Making the Jump from Women's Shelter to Vassar to… Jupiter? — Pittsburgh Post Gazette

Baldwin Senior Collaborates on Astrophysics and Metallicity Research at Pitt — TribLive

Mariah Jones, 18, Goes from Women's Shelter in Pittsburgh to Full Ride Scholarship for Astrophysics at Vassar — GoodBlackNews

QuestBridge Scholarship — The Lisa Show

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## References


Ed Buie II
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Tom Crawford
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