MADISON VANWYNGARDEN

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Education

University of Arizona | Tucson, AZ *August 2025-present*

- NSF Graduate Research Fellow at Steward Observatory

Boston University | Boston, MA *May 2024*

- Graduated Magna Cum Laude with a BA in Astronomy & Physics, GPA: 3.85/4.0

Research Experience

University of Arizona Egami Group | University of Arizona *August 2025 - present*

- Led the reduction and analysis of an ALMA 2mm survey following up the 60 lensing clusters observed by the JWST Cycle 4 treasury program VENUS

Canadian Institute for Theoretical Astrophysics | University of Toronto *September 2024 – May 2025*

- Investigated the origin of biases and the effect of catalog incompleteness on the measurement of the Hubble constant from the gravitational wave + galaxy catalog method. First-author publication in *ApJ*.

European Center for Nuclear Research (CERN) | Geneva, Switzerland *February - July 2023*

- Applied machine-learning techniques in Python and ROOT to argue for the introduction of timing-capable detectors within the inner tracker of the ATLAS experiment.

Harvard-Smithsonian Astrophysical Observatory Summer REU Program | Cambridge, MA *June - August 2022*

- Developed Python software to compare theoretical exoplanet formation and evolution mechanisms against existing orbital and planetary observations. Published this work as first-author in *AJ*.

BU White Dwarf Research Group | Boston, MA *February 2021 - May 2022*

- Identified and catalogued new pulsating white dwarf stars through photometric analysis in Python, increasing the known sample by 20%. Derived stellar rotation periods and contributed as a co-author to a publication in *MNRAS.*

Publications

VanWyngarden, M., Fishbach, M., Vijakumar, A., Guerrero, A., Holz, D. (2026). How Low Can You Go: Constraining the Effects of Catalog Incompleteness on Dark Siren Cosmology. *The Astrophysical Journal,* 10.3847/1538-4357/ae8c3d

VanWyngarden, M., Cloutier, R. (2023). Modeling Radius Valley Emergence Mechanisms with Multi-Transiting Systems*. The Astronomical Journal,* 10.3847/1538-3881/ad6903.

Romero, A. D., Kepler, S. O., Hermes, J.J., Amaral, L. A., Uzundag, M., Bognár, Z., Bell, K. J., **VanWyngarden, M.**, Baran, A., Pelisoli, I., Oliverira da Rosa, G., Koester, D., Klippel, T. S., Fraga, L., Bradley, P. A., Vučković, M., Heintz, T. M., Reding, J. S., Kaiser, B. C., & Charpinet, S. (2022). Discovery of 74 new bright ZZ-Ceti stars with the first three years of TESS. *Monthly Notices of the Royal Astronomical Society, 2022MNRAS.511.1574R.*

Presentations

"Establishing the Onset of Obscuration: An ALMA & JWST Joint Census of Dusty Star Forming Galaxies"

- JWST Through Cluster Lenses Conference – Oral talk *August 2026*

"How Low Can You Go: Constraining the Effects of Catalog Incompleteness on Dark Siren Cosmology"

- 247th Meeting of the American Astronomical Society – Oral talk *January 2026*
- University of Toronto TASTY (Toronto AStrophysics Talks Y'all) – Oral talk *April 2025*

"Modeling Multiple Radius Valley Emergence Mechanisms with Multi-Transiting Systems"

- Harvard-Smithsonian CfA Astronomy REU Symposium – Oral talk *August 2022*
- 241st Meeting of the American Astronomical Society – iPoster *January 2023*
- Barry Goldwater Research Symposium – Poster *August 2023*
- Conference for Undergraduate Women in Physics – Poster *January 2024*

"Identification of 63 New Pulsating White Dwarf Stars with TESS"

- Boston University 24th Annual Undergraduate Research Symposium – Poster *October 2021*

Teaching Experience

PY212: General Physics II | Undergraduate Learning Assistant *September 2023 - May 2024*

- Led three weekly discussion sections and held two office hours to assist 75+ students in an introductory course on electricity and magnetism. Completed a course on pedagogical practices in STEM disciplines.

Leadership, Mentorship, & Outreach

TIMESTEP | Graduate Mentor *August 2026 - present*

- Mentor undergraduates through their first research experience and help lead weekly workshops on research skills and professional development

Astrobites | Author *January 2026 - present*

- Author for the grad student-run website, Astrobites, communicating recent astrophysical research through accessible daily articles. You can read my articles here.

Boston University Astronomical Society | Co-President *August 2021 - May 2024*

- Restarted the society, recruited 30+ new members, coordinated ~10 university-wide outreach events, secured funding from the Astronomy department, and assisted in planning and leading bi-weekly meetings.

Society of Women in Space Exploration | President *August 2021 - May 2024*

- Planned bi-weekly meetings with the executive board and coordinated events with other on-campus organizations focused on the representation of women in STEM. Responsible for email communications with members.

Peers for Incoming Student Mentorship (PRISM) | Mentor *August 2022 – May 2024*

- Mentored freshman through course registration, starting research, and combating imposter syndrome during their first year in the physics department

Honors & Awards

NSF Graduate Research Fellowship 2025

Fulbright Student Award 2024

Awarded an 8 month grant to conduct research at the Canadian Institute for Theoretical Astrophysics

BU Institute for Astrophysical Research Undergraduate Research Prize 2024

BU Physics Faculty Award for Joint & Interdisciplinary Majors 2024

73rd Lindau Nobel Laureate Meeting 2024

One of 200 international undergraduates selected to participate in Lindau, Germany

Universities' Space Research Association Distinguished Undergraduate 2023

One of 5 students chosen from 98 nationwide nominations for academic achievement, leadership, and engagement.

Goldwater Scholar 2023

One of 2 awardees from BU for exceptional achievement in research in the natural sciences.

Augustus Howe Buck Scholar 2023

One of the highest honors awarded to students in the College of Arts and Sciences, this full-tuition scholarship is held by only 2-4 students in the college.

Boston University Presidential Scholarship recipient 2020-2024

Tuition scholarship awarded to students demonstrating exceptional academic achievement.

Boston University Dean's List 2020-2024

BU Undergraduate Research Opportunities Program Faculty Matching Grant 2020

National Merit Scholar 2020

Skills

- *Programming*: proficient in Python (incl. Astropy, Pandas, Matplotlib), Mathematica, and Linux command line
- *Computer Software*: proficient in SAOImageDS9, LaTeX/Overleaf, and GitHub