

Brendan Boyd

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biboyd.github.io

Education

SUNY Stony Brook University Physics & Astronomy Department <i>PhD Candidate in Physics,</i> <i>with Concentration in Astronomy</i>	2020-Present
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Michigan State University College of Natural Science Honors College <i>Bachelor of Science, Astrophysics</i> <i>Minors in Math and CMSE</i>	2016-2020
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Research Experience

Type Ia Supernovae Progenitor Modeling Using the MAESTROeX hydrodynamic code to study the Convective Urca Process during simmering phase of white dwarfs.	2022-Present
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Galactic Modeling Research Studied ENZO simulations produced by FOGGIE collaboration to better understand the Circumgalactic Medium (CGM). Generated synthetic spectra of the CGM to better inform/compare to observations.	2019-2020
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MSU Campus Observatory Assisted in data collection and reduction using 24-inch telescope. Observed cataclysmic variables, supernovae and transiting exoplanets.	2018-2019
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HAWC Research Group Studied gamma ray sources using the HAWC Observatory. Mainly worked on improving the detection sensitivity through machine learning techniques.	2016-2018
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Publications

Brendan Boyd et al. “3D Convective Urca Process in a Simmering White Dwarf”. In: *The Astrophysical Journal* 979.2 (Jan. 2025), p. 216. DOI: 10.3847/1538-4357/ad9bb0. URL: <https://dx.doi.org/10.3847/1538-4357/ad9bb0>

B. Boyd et al. “Approximating Convective Urca Cooling in a Simmering White Dwarf”. In: *Journal of Physics Conference Series*. Vol. 2997. Journal of Physics Conference Series. IOP, Apr. 2025, 012006, p. 012006. DOI: 10.1088/1742-6596/2997/1/012006

B. Boyd et al. “Sensitivity of 3D Convective Urca Simulations to Changes in Urca Reactions”. In: *Journal of Physics Conference Series*. Vol. 2742. Journal of Physics Conference Series. IOP, Apr. 2024, 012001, p. 012001. DOI: 10.1088/1742-6596/2742/1/012001. arXiv: 2311.07743 [astro-ph.SR]

Zhi Chen et al. “A Framework for Exploring Nuclear Physics Sensitivity in Numerical Simulations”. In: *Journal of Physics Conference Series*. Vol. 2742. Journal of Physics Conference Series. IOP, Apr. 2024, 012021, p. 012021. DOI: 10.1088/1742-6596/2742/1/012021

Alexander Smith Clark et al. “pynucastro 2.1: an update on the development of a python library for nuclear astrophysics”. In: *Journal of Physics Conference Series*. Vol. 2742. Journal of Physics Conference Series. IOP, Apr. 2024, 012003, p. 012003. DOI: 10.1088/1742-6596/2742/1/012003

Alexander I. Smith et al. “pynucastro: A Python Library for Nuclear Astrophysics”. In: *The Astrophysical Journal* 947.2, 65 (Apr. 2023), p. 65. DOI: 10.3847/1538-4357/acbaff

Brendan Boyd et al. “SALSA: A Python Package for Constructing Synthetic Quasar Absorption Line Catalogs from Astrophysical Hydrodynamic Simulations”. In: *The Journal of Open Source Software* 5.52, 2581 (Aug. 2020), p. 2581. DOI: 10.21105/joss.02581

Teaching Experience

Teaching Assistant - Stony Brook University

AST 248: The Search for Life in the Universe. A course designed to give an overview of the current knowledge of life outside of Earth and how we are searching for it. Topics such as habitability in our solar system, biosignatures, Fermi Paradox, etc.

Fall 2020, Spring 2021, Fall 2021

Undergraduate Learning Assistant - Michigan State University

AST 208: Planets & Telescopes. A course dedicated to learning the different observational techniques and data processing used in astronomy as well as the study of exoplanets.

Spring 2020

AST 207: The Science of Astronomy. A course introducing the many concepts and techniques used in astronomy to astrophysics majors.

Fall 2019

ISP 205: Visions of the Universe. A survey astronomy course focusing on the modern conception of observation, stars and cosmology.

Spring 2019

Computational Skills

Programming Languages:

Proficient in Python

Proficient in C++

Competent in MPI parallelism

Competent in OpenMP threading

Competent in FORTRAN

Basic knowledge of HTML

Invited Talks

FSU Astronomy Seminar

2024

Presented work on hydrodynamic simulations of the Convective Urca Process at the Florida State University astronomy seminar.

SNEx Group 2024
Presented work on hydrodynamic simulations of the Convective Urca Process at the SNEx group; a group focused on type Ia SNe research, both observational and theoretical.

SBU IACS Student Seminar 2023
Presented work at the Stony Brook IACS student seminar on the challenges associated with using numerical fluid simulations to study astrophysics, with particular focus on Type Ia Supernovae.

Summer Schools Attended

International High Performance Computing Summer School 2022
Summer school for early-career computational scientists. Familiarized students with major state-of-the-art aspects of HPC and Big Data Analytics. Provided advanced mentoring and facilitated international networking.

Conferences Attended

Nuclei in the Cosmos 2025 2025
Presented poster on new nuclear networks used in simulations of the Convective Urca Process at NIC - Nuclear Astrophysics conference.

American Astronomical Society Meeting 245 2025
Presented poster on recently published paper pertaining to the Convective Urca Process.

ASTRONUM 2024 2024
Presented a talk on simulations of the Convective Urca Process at ASTRONUM - International Conference on Numerical Modeling of Space Plasma Flows.

Nuclei in the Cosmos 2023 2023
Presented poster on simulations of the Convective Urca Process at NIC - Nuclear Astrophysics conference.

ASTRONUM 2023 2023
Presented a poster on simulations of the Convective Urca Process at ASTRONUM - International Conference on Numerical Modeling of Space Plasma Flows.

American Astronomical Society Meeting 241 2023
Presented poster on simulation of the Convective Urca Process at the winter AAS Meeting

Certification

CIMER Mentoring Training 2024
Completed a training workshop grounded in the Entering Mentoring series from the Center for the Improvement of Mentored Experiences in Research

Work Experience

IT Helpdesk Staff 2018-2019
Member of the Physics and Astronomy IT staff. Focused on providing immediate assistance with new installations and software issues on various OS's for researchers and faculty

Community Service and Outreach

MSU Observatory Public Nights 2018
Open house events at the MSU Observatory. Taught the public about astronomy and the work done at the observatory. Assisted people with looking through telescopes.

MSU Science Festival 2017-2018
Annual event used to inform and inspire the general public. Worked a station explaining the HAWC experiment and Cosmic Rays.

Tour de Ville 2016-2020
Annual charity bicycle ride put on by the Northville Rotary Club. Help with sending mass emails for the event as well as contributing the day of the ride (e.g. setting up of rest stops along course)

Honors and Awards

Peter B. Kahn Prize 2024
Awarded to Physics & Astronomy graduate student for outstanding research and travel.

Hantel Fellowship 2017, 2019
Awarded to Michigan State undergraduates conducting research in physics.

Michigan State Dean's List 2016-2020
Recognized for eight semesters as a student with at least a 3.5 GPA.

References

Available Upon Request