BRADEN GARRETSON

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EDUCATION

Purdue University August 2020 - Present
Bachelors of Science, Physics
Minors in Astronomy and Mathematics
College of Science

RESEARCH INTERESTS

Time Domain Astronomy Supernovae, Light Curve Classification, Machine Learning Applications
X-Ray Astronomy Magnetars and Supernova Remnants

RESEARCH EXPERIENCE

Astronomy Research Assistant January 2021 - Present
Advisor: Professor Dan Milisavljevic

Big Data and Machine Learning

- Develop methods of rapidly inferring physics from supernovae light curves using Amortized Posterior Inference
- Produced the first massive catalog of probabilistic classifications of supernova-like light curves from the Zwicky Transient Facility of its size (13k) along with open-source code shared on GitHub
- Collect "templet" light curves to improve the Recommender Engine for Intelligent Transient Tracking's (REFITT) ability to predict the future behavior of transients.
- Develop methods to accurately classify, detect anomolies, and predict the future behavior of supernova light curves using machine learning
- Develop methods to associate supernovae with their host galaxies and cross match that info with catalogs
- Present research findings at multiple weekly laboratory meetings.

SN2023ixf

- Spectral reduction of extremely high resolution echelle spectra of SN2023ixf from NEID
- Identification of important spectral lines and characterizing their evolution
- Alignment of echelle spectra orders for data visualization

PHYS 324 Teaching Assistant August 2022 - Present
Advisor: Professor Dan Milisavljevic

- Leads group of 4 undergraduate students through an entire research project of my own design
- Leads weekly meetings with my group of 4 as well as participating in group meetings with the whole class.
- Teaches students the coding skills necessary to do original research
- Leads students through the process of reading and writing scientific literature
- Given multiple 50 minute lectures during the professors absence.
- Assisted students in making detailed reports of their work and prepare a poster presentation for Purdue Undergraduate Research Conferences

Projects

1. Population study of Type Ia/Type IIn supernovae and their host galaxy environments using MOSFIT
2. Rapid Identification of Transients From The Zwicky Transient Facility Using a Convolutional Variational Autoencoder

West Virginia University REU Student May 2022 - July 2022
Advisor: Dr. Harsha Blumer

· Reducing swift and XMM-Newton x-ray spectra of magnetar J1818.0-1607
· Analyzing Chandra data of supernova remnant MSH 11-52

PUBLIC TALKS

Interviews

· Interviewed by AAS Journals Senior Lead Editor Professor Frank Timmes as apart of the AAS journal author series on YouTube.

Talks and Poster Presentations

· Poster Presentation at the American Astronomical Society meeting 241 in Seattle, Washington (January 2023)
· Poster Presentation at the American Astronomical Society meeting 243 in New Orleans, Louisiana (January 2024)
· Presented 20 minute presentation on my supernova light curve catalog at the 2022 online Spoken-WERRD conference.
· Poster presentation on the long term x-ray evolution of magnetar J1818.0-1607 at the West Virginia University summer research symposium.

TECHNICAL EXPERIENCE

Technical Experience

· Programming Languages: Python, Latex, Bash, R
· Computer Platforms: Microsoft Windows, Linux
· Astronomy Software: SAO DS9, Astropy, Heasoft, Ciao, SAS

Telescope Experience

· McGraw-Hill 1.3m Telescope, MDM Observatory: 1 night

REFEREED PUBLICATIONS

1. **Garretson, B.**, Milisavljevic, D., Subrayan, B., Dickinson, D., Population Study of Supernovae and their Host Galaxy Environments using Amortized Posterior Inference, 2023 (in prep)
2. Dickkinson, D., Milisavljevic, D., **Garretson, B.**, Dessart, L., Margutti, R., Chornock, R., and Subrayan, B., Intense, eXtreme, Fleeting: Narrow Emission in Echelle Spectra of SN 2023ixf (in prep)
3. Subrayan, B., Milisavljevic, D., Moriya, T., Weil, K., Lentner, G., Linvill, M., Banovetz, J., **Garretson, B.**, Reynolds, J., Sravan, N., Chornock R., Margutti, R., Inferencing Progenitor and Explosion Properties of Evolving Core-collapse Supernovae from Zwicky Transient Facility Light Curves *RNAAS*
4. Subrayan, B., Milisavljevic, D., Chornock, R., Raffaella, M., Ramakrishnan, V., Duffell, P., Dickinson, D., Lee, K., Giannios, D., Lentner, G., Linvill, M., **Garretson, B.**, Duong, T., Jacobson-Galán, W., LeBaron, N., Matthews, D., Sears, H., Venkatraman, P. Scary Barbie: An Extremely Energetic, Long-Duration Tidal Disruption Event Candidate Without a Detected Host Galaxy at z = 0.995 *RNNAS*

NON-REFEREED PUBLICATIONS

1. **Garretson, B.**, Milisavljevic, D., Reynolds, J., Weil, K. E., Surbrayan, B., Banovetz, J., Lee, R. R. Supernova Host Galaxy Association and Photometric Classification of Over 10,000 Light Curves from the Zwicky Transient Facility *RNAAS* (Submitted, Dec. 2021; Accepted Dec. 7 2021)

AWARDS AND SCHOLARSHIPS

- Margie and Don Bottorff Undergraduate Physics Scholarship 2022
- OUR Research Scholarship 2023
- Federal Pell Grant 2020-Present

EXTRA-CIRRUCULAR

- Member of the Purdue Bands and Orchestra August 2020-2022
- Member of the Purdue Astronomy Club January 2022-Present
- Member of the Purdue Society of Physics Students August 2023-Present
- Member of Saturday Morning Astrophysics January 2022-Present