

# NICHOLAS T. MARSTON

Astronomy and Physics Researcher

[Website](#) | [GitHub](#) | [LinkedIn](#)

**Position:** Post-Bacc Reseracher at the University of Wisconsin-Madison

**Research Interests:** Dynamics, Exoplanets, Compact Objects, Computational Astrophysics, Stellar Astrophysics

**Methods:** Computational & Numerical Astrophysics, Periodic Analysis, Semi-Analytical Analysis

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## Statement

I graduated from the University of Wisconsin-Madison in 2025, where I studied Astronomy, Physics, and Scandinavian Studies. I am currently a post-baccalaureate researcher at my alma mater, where I work with Professors Juliette Becker, Nicholas Stone, and Melinda Soares-Furtado. My projects are focused on modeling the interior structures and thermal histories of observed exoplanets, and modeling the dynamics of compact objects embedded in AGN disks. My previous work includes variable star analysis using Kepler mission data for the open cluster NGC 6819 and developing relevant data processing tools and pipelines. I graduated in 2025 with my B.S. in Physics, Astronomy-Physics, and Scandinavian Studies, with Certificates in Italian and European Studies.

## Experience

### Post-Baccalaureate Researcher

Prof. Nicholas Stone, University of Wisconsin-Madison

Summer 2025 - present

- Development and use of N-body integration codes
- Investigation of of Active Galactic Nuclei (AGN) as a pathway to compact binary formation by modeling the orbits of objects embedded within an AGN disk
- Design and facilitation of binary-single scattering experiments considering variable gas drag and post-Newtonian contributing forces

### Post-Baccalaureate Researcher

Prof. Juliette Becker, University of Wisconsin-Madison

Spring 2025 - Present

- Computationally modeling the interior structures and thermal evolution of exoplanets
- Few-body simulations of multi-planet systems

### Undergraduate/Post-Baccalaureate Researcher

Prof. Melinda Soares-Furtado, University of Wisconsin-Madison

Spring 2023 - present

- Analysis of Kepler mission data in combination with Gaia DR3 data to characterize periodicity and other properties of stars in the open cluster NGC 6819.
- Design and implementation of pipelines used to classify light curves by autocorrelation and Lomb-Scargle features

## Education

### B.S. in Astronomy-Physics, Physics, Scandinavian Studies

University of Wisconsin-Madison

2022-2025

- Certificates in European Studies, Italian

### A.A.S in Cyber Security

Saint Paul College

2018 - 2021

- Graduated with High Distinction
- Completed through high school dual-enrollment program

## Publications and Presentations

### Do Super-Puffs Defy Core Accretion? Population-Wide Interior Structure Constraints

Marston, N. T., Becker, J., Howe, A. R. 2026 *ApJ* ()

<https://doi.org/10.3847/1538-4357/ae78d1>

### Kepler Image-Subtracted Light Curves and Variable Star Catalog of NGC 6819

Soares-Furtado, M., Kuenzi, R., McClure, R. L., Marston, N. T., Linck, E., Mathiew, R. M., Vanderburg, A., Hartman, J. D., Cudworth, K., Gagliano, R., Jacobs, T., Kristiansen, M. H., Omohundro, M., Schwengeler, H. M. 2026 *AJ* ()

<https://doi.org/10.48550/arXiv.2606.24114>

### The TEMPO Survey II: Science Cases Leveraged from a Proposed 30-Day Time Domain Survey of the Orion Nebula with the Nancy Grace Roman Space Telescope.

Soares-Furtado, M., Limbach, M. A., Vanderburg, A., Bally, J., Becker, J., Rosen, A. L., Bouma, L. G., Vos, J. M., Howell, S. B., Beatty, T. G., Best, W. M. J., Cody, A. M., Distler, A., D'Onghia, E., Heller, R., Hensley, B. S., Hinkel, N. R., Jackson, B., Kounkel, M., Kraus, A., Mann, A. W., Marston, N., Robberto, M., Rodriguez, J. E., Steffen, J. H., Teske, J. K., Townsend, R., Yarza, R., Youngblood, A. 2024 *arXiv* (Preprint)

<https://doi.org/10.48550/arXiv.2406.01492>

## Other Scholarly Activities

|                                                                                                  |             |
|--------------------------------------------------------------------------------------------------|-------------|
| Code/Astro Software Engineering Workshop for Astronomy (CIERA/Northwestern University)           | Summer 2025 |
| Penn State Summer School in Statistics for Astronomers                                           | Summer 2025 |
| 2025 Sagan Summer Workshop: Exoplanet Demographics (NExSci)                                      | Summer 2025 |
| Intro to Deep Learning with Keras (UW-Madison Data Science Hub)                                  | Spring 2025 |
| Intensive Italian Language Summer Program (Umbra Institute, Perugia, Italy)                      | Summer 2024 |
| Intensive Norwegian Language Level III - Oslo International Summer School (Universitetet i Oslo) | Summer 2024 |

## Awards & Achievements

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |
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| Foreign Language & Area Studies (FLAS) Fellowship - U.S. Dept. of Education                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Summer 2023, 2024 |
| The Foreign Language and Area Studies Fellowship is a competitive grant awarded to undergraduate and graduate students funded by the U.S. Department of Education. The grant provides a total of \$8,500 to assist students in acquiring foreign language and either area or international studies competencies. I received this grant to participate in the University of Oslo-International Summer School's high-level intensive Norwegian language course, through which I reached CEFR-B2/C1 (Upper Intermediate/Advanced) fluency. <i>In 2024, I was awarded the fellowship for a second consecutive year</i> to take an advanced Italian language course through the Umbra Institute in Perugia, Italy. Through this course I reached a CEFR-B2 (Upper-intermediate) fluency level. <b>Both grants were awarded for my proposal for my proposal to expand global scientific collaboration by bridging language and cultural gaps.</b> |                   |
| Named to Dean's List                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2025              |
| Presidential Scholarship Recipient - St. Olaf College                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2021-2022         |
| Began Studies at St. Olaf College with 101 previously earned credit hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2021              |
| Named to President's List - Saint Paul College                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2019, 2020, 2021  |
| Member of Mu Alpha Theta Mathematics Honor Society - Saint Paul College                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2020-2021         |
| AP Scholar Award Recipient                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2020              |
| Named to President's List - Saint Paul College                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2019              |
| Presidential Scholarship Recipient - St. Olaf College                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2021-2022         |

## Leadership & Community Involvement

### University Physical Society (Physics Club) - UW-Madison

President

Fall 2023 - Spring 2025

- Organization of STEM outreach events, networking events with up to 100 in attendance, GRE preparation seminars, peer-tutoring, collaboration events with the UW-Madison Physics Department, and coordination/facilitation of a group tour/visit to Fermilab's SQMS and Muon g-2
- Organization/Hosting of a faculty lecture series, including contacting and coordinating with guest lecturers.

### Dept. of Astronomy Curriculum Committee - UW-Madison

Undergraduate Representative

Fall 2024 - Spring 2025

- Assisted in restructuring the University of Wisconsin's Astronomy-Physics undergraduate program
- Acted as a liaison between department administration and the undergraduate student body

### Triangle Science & Engineering Fraternity

Information Systems Officer, Health & Wellness Officer

Fall 2022 - Spring 2025

- Maintained and implemented upgrades to a website using HTML and Next.js, managed communications between over 100 active members & alumni
- Collaborated with the End Overdose Organization to host overdose prevention & Naloxone administration training

- Consistent high-level play and mentorship

- 2021 National championship runners-up

- Regional Finalist/National Competitor in the American Mathematical Association of Two-Year Colleges (AM-ATYC) Student Research League
- Participated in and helped to facilitate tutoring, outreach, and club participation in Mu Alpha Theta's Rocket City Math League

## Skills & Courses

### Relevant Coursework

|                                                                            |             |
|----------------------------------------------------------------------------|-------------|
| PHYS 772 High Energy Astrophysics                                          | Fall 2025   |
| ASTRON 620 Exoplanets                                                      | Spring 2025 |
| PHILOS 562 Philosophy of Quantum Mechanics                                 | Spring 2025 |
| PHYS 406 Special Topics: General Relativity                                | Fall 2024   |
| ASTRON 335 Cosmology                                                       | Fall 2024   |
| MATH 561 Differential Geometry                                             | Spring 2024 |
| PHYS 448/449 Atomic & Quantum Physics (Two Semester Sequence)              | 2023-2034   |
| ASTRON 465 Observational Astronomy Lab                                     | Fall 2023   |
| Abstract Algebra, Number Theory, Real Analysis (Taken at St. Olaf College) | 2021-2022   |

### Technical Skills

#### Programming

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Python                                                                                                                                                                                      | Expert - 8+ years |
| · Extensive experience with relevant libraries, tools, and integrations, including Astropy, Astroquery, LightKurve, Pandas, Numpy, Scipy, Multiprocessing, GSpread, Matplotlib, and Seaborn |                   |
| Java                                                                                                                                                                                        | Expert - 6+ years |
| C++/C#                                                                                                                                                                                      | 3+ years          |
| Linux & Bash Scripting                                                                                                                                                                      | 3+ years          |
| Git/Version Control                                                                                                                                                                         | 3+ years          |
| ADQL/SQL Query Automation                                                                                                                                                                   | 2+ years          |

#### Selected Research Techniques

- Hands on experience with frequency-space and power spectral analysis
- Lomb-Scargle, Box Least Squares, and other periodogram analysis techniques
- Optical & Radio data processing pipeline development
- Illustris & TNG-50
- Deep Learning & Machine Learning
- Experience working with/contributing to computational modeling codes in C++
- Optimizing simulation codes to significantly decrease time-to-run and resource usage
- Scientific Writing & In-depth literature review

### Languages

|           |                           |
|-----------|---------------------------|
| English   | Native                    |
| Norwegian | CEFR-B2/C1 (Fluent)       |
| Italian   | CEFR-B2 (Proficient)      |
| Danish    | Reading Proficiency       |
| Swedish   | Conversational Competence |

## Research Advisors / References

**Dr. Melinda Soares-Furtado**  
Assistant Professor  
University of Wisconsin-Madison  
Depts. of Astronomy, Physics  
mmsoares@wisc.edu

**Dr. Juliette Becker**  
Assistant Professor  
University of Wisconsin-Madison  
Dept. of Astronomy  
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**Dr. Nicholas Stone**  
Assistant Professor  
University of Wisconsin-Madison  
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