

I am an astrophysics PhD candidate developing explainable machine learning tools to improve data analysis pipelines for constraining the global 21 cm cosmology signal. Recently, I built LSTM- and KAN-based emulators that leverage characteristics of the signal to deliver unprecedented accuracy and speed, enabling unbiased Bayesian inference of multiple physical parameters (see [my GitHub](#))

## EDUCATION

### University of Colorado, Boulder

Ph.D., Astrophysics

expected July 2026

M.S., Astrophysics

2023

### University of Michigan, Ann Arbor

B.S., Physics; and Highest Honors in Astronomy & Astrophysics

2020

## PEER-REVIEWED PUBLICATIONS (>150 citations listed in ADS; h-index: 6)

10. **J. Dorigo Jones**, et al. Nonlinear Map-making of the Low-frequency Galactic Foreground using 21CMLSTM. In prep.
9. D. W. Barker, et al. including **J. Dorigo Jones**. Seeking the Dark Ages of the Universe: Modeling Radio Observations with LuSEE-Night from the Far Side of the Moon. In prep.
8. H. Camacho, et al. incl. **J. Dorigo Jones**. Linear Map-making with LuSEE-Night. Sub. to *OJAp*
7. J. J. Hibbard, et al. including **J. Dorigo Jones**. (2026). Results from NASA's First Radio Telescope on the Moon: Terrestrial Technosignatures and the Low-frequency Galactic Background Observed by ROLSES-1 on Board the Odysseus Lander. *AJ*, 171, 26
6. **J. Dorigo Jones**, B. Reyes, D. Rapetti, et al. (2025). The Wrath of KAN: Enabling Fast, Accurate, and Transparent Emulation of the Global 21 cm Cosmology Signal. *ApJ*, 991, 152
5. **J. Dorigo Jones**, S. Bahauddin, D. Rapetti, J. Mirocha, & J. Burns. (2024). 21CMLSTM: A Fast Memory-based Emulator of the Global 21 cm Signal with Unprecedented Accuracy. *ApJ*, 977, 19
4. **J. Dorigo Jones**, D. Rapetti, J. Mirocha, J. J. Hibbard, J. Burns, & N. Bassett. (2023). Validating Posteriors Obtained by an Emulator when Jointly Fitting Mock Data of the Global 21 cm Signal and High-z Galaxy UV Luminosity Function. *ApJ*, 959, 49
3. **J. Dorigo Jones**, S. Johnson, et al. (2022). Improving blazar redshift constraints with the edge of the Ly $\alpha$  forest: 1ES 1553+113 and implications for observations of the WHIM. *MNRAS*, 509, 4330
2. **J. Dorigo Jones**, M. S. Oey, K. Pagneot, N. Castro, & M. Moe. (2020). Runaway OB Stars in the Small Magellanic Cloud: Dynamical versus Supernova Ejections. *ApJ*, 903, 43
1. M. S. Oey, **J. Dorigo Jones**, N. Castro, P. Zivick, G. Besla, et al. (2018). Resolved Kinematics of Runaway and Field OB Stars in the Small Magellanic Cloud. *ApJ Letters*, 867, L8

## NON-PEER-REVIEWED PUBLICATIONS

5. **J. Dorigo Jones** et al. (2025). Emulating Global 21 cm Cosmology Observations from the Lunar Far Side to Achieve Quick and Reliable Physical Constraints. *Proceedings of the International Astronomical Union*.
4. J. D. Turner, et al. including **J. Dorigo Jones**. (2025). Studying Exoplanets in the Radio from the Moon. White Paper for National Academies call "Key Non-Polar Destinations Across the Moon"
3. S. D. Bale, et al. including **J. Dorigo Jones**. (2023). LuSEE 'Night': The Lunar Surface Electromagnetics Experiment. Summary Paper for International Union of Radio Science General Assembly and Scientific Symposium (50+ citations listed in ADS)
2. B. D. Oppenheimer, et al. including **J. Dorigo Jones**. (2022). A Multi-Wavelength, Multi-Model Exploration of How Feedback Disrupts Gaseous Atmospheres. *Bulletin of the AAS*, 54(1)
1. M. S. Oey, **J. Dorigo Jones**, et al. (2022). Dynamical vs Supernova Acceleration of OB Stars in the Small Magellanic Cloud. *Proceedings of the International Astronomical Union*. 18(S361):82-87

## AWARDS AND ACHIEVEMENTS

Astrophysics Graduate Fellowship (\$3,000), CU Boulder APS Department	2024
Chambliss Astronomy Achievement Graduate Student Award, AAS 241	2023
Astronomy Research Award for Best Senior Thesis, U-M Department of Astronomy	2020

## RESEARCH EXPERIENCE

**Research Assistant** — Prof. Jack Burns and Dr. David Rapetti 2022 - Present  
*Astrophysical and Planetary Sciences Department / CASA, University of Colorado, Boulder*

- Created the most accurate and fastest neural network emulators of the global 21 cm signal that enable unbiased physical parameter constraints on the Cosmic Dawn. Used explainable ML methods, trained on cosmological simulations, and performed Bayesian nested sampling

**Research Assistant** — Prof. Sean D. Johnson 2020 - 2021  
*Department of Astronomy, University of Michigan*

- Reduced and analyzed *HST* COS NUV spectra of a blazar to confirm its redshift and the nature of metal absorption lines. Developed a technique to constrain the redshift of featureless AGN/blazars by characterizing the edge of the HI Ly $\alpha$  forest seen in the spectra of  $\approx 200$  AGN.

**Research Assistant** — Prof. Sally Oey 2017 - 2020  
*Department of Astronomy, University of Michigan*

- Analyzed *Gaia* proper motions,  $v \sin i$ , and masses of  $\approx 300$  OB stars in the SMC to place novel constraints on stellar ejection mechanisms: Most runaways are dynamically ejected, 2-step ejections are significant, and Oe/Be stars likely originate as post-mass-transfer binaries.

## INVITED TALKS

1. Los Alamos National Laboratory, Center for Space and Earth Science. Host: G. Salvesen. 11/2024

## CONFERENCE TALKS AND POSTER PRESENTATIONS

8. **J. Dorigo Jones**, et al. *Emulating Global 21 cm Cosmology Observations from the Lunar Far Side to Achieve Quick and Reliable Physical Constraints*. Oral Talk, USNC-URSI NRS. 01/2026
7. **J. Dorigo Jones**, et al. *Preparing to Analyze Lunar-based 21 cm Observations with Novel Signal Emulators*. Lightning Talk, 8th Global 21-cm Workshop. 09/2025
6. **J. Dorigo Jones**, J. O. Burns, D. Rapetti, & S. M. Bahauddin. *Extracting Early Universe Physics From the First Lunar-based Observations of the 21 cm Signal with a Novel Memory-based Emulator*. Oral Talk, IAUS No. 397: UniversAI: Exploring the Universe with Artificial Intelligence. 06/2025
5. **J. Dorigo Jones**, D. Rapetti, N. Bassett, J. J. Hibbard, et al. *Validating and Improving Bayesian Parameter Estimation for Global 21-cm Cosmology*. Poster, AAS Meeting #242, 101.04. 06/2023
4. **J. Dorigo Jones**, N. Bassett, D. Rapetti, J. J. Hibbard, J. Mirocha, J. O. Burns. *Radio Astrophysics from the Moon: Utilizing a Global 21-cm Signal Emulator to More Efficiently Conduct Bayesian Parameter Estimation*. Poster (**Chambliss Award**), AAS Meeting #241, 104.26. 01/2023
3. **J. Dorigo Jones**, N. Bassett, D. Rapetti, et al. *Utilizing Global 21-cm Signal Emulators to Forecast Constraints on Astrophysical Parameters with ARES*. Poster, 5th Global 21-cm Workshop. 10/2022
2. **J. Dorigo Jones**, S. D. Johnson, S. Muzahid, et al. *Constraining the Redshift of Featureless Blazar 1ES 1553+113 and Implications for the WHIM*. Poster, AAS Meeting #238, 116.02. 06/2021
1. **J. Dorigo Jones**, Paggeot, Oey, et al. *Runaway OB Stars in the Small Magellanic Cloud: Dynamical Ejections Dominate over Supernova Ejections*. Poster, AAS Meeting #235, 110.18. 01/2020

## TEACHING & SERVICE

<b>Graduate Student Representative</b> , Admissions Committee, CU Boulder APS	2024–2026
Performed triage twice to select the best PhD applicants from >1,000 applications	
<b>Teaching Assistant (two semesters)</b> , CU Boulder APS	2021–2022
Taught & graded weekly recitations and labs for 300-level Astrophysics I and Intro Astro	
<b>Graduate Student Representative</b> , Colloquium Committee, CU Boulder APS	2021–2022
<b>Treasurer</b> , Student Astronomical Society, University of Michigan	2018–2020
<b>Undergraduate Representative</b> , Curriculum Committee, U-Michigan Astronomy	2018–2020