

# Gillian Dora Beltz-Mohrmann, PhD

Postdoctoral Fellow, Cosmological Physics & Advanced Computing Group, Argonne National Laboratory

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**DOB:** February 4, 1994

**Website:** <https://gbeltzmo.github.io>

**Citizenship:** United States

**Research Interests:** Large-scale structure, Cosmology, Galaxy-halo connection, Galaxy clustering

## ACADEMIC POSITIONS

Postdoctoral Fellow, Argonne National Lab

August 2022–

Graduate Research Assistant, Vanderbilt University

2016–2022

## EDUCATION

Ph.D., Astrophysics, Vanderbilt University

2022

Advisor: Andreas Berlind

Thesis: *Developing an Accurate Probe of the Galaxy-Halo Connection:*

*Baryonic Effects, Small-Scale Galaxy Clustering, and Halo Model Extensions*

M.A., Astrophysics, Vanderbilt University

2018

B.A., Astrophysics, German, *cum laude*, Wellesley College

2016

Advisors: Kim McLeod, James Battat

## REFERENCES

Dr. Andrew Hearin, Argonne National Laboratory

ahearin@anl.gov

Professor Andreas Berlind, Vanderbilt University

a.berlind@nsf.gov

Professor Ferah Munshi, George Mason University

fmunshi@gmu.edu

## MEMBERSHIP

Dark Energy Spectroscopic Instrument (DESI) Collaboration

2022–

LSST Dark Energy Science Collaboration (DESC)

2022–

CAMELS Collaboration

2022–

N-Body Shop Collaboration

2020–

LasDamas Project (Co-Investigator & Allocation Manager on XSEDE)

2017–

American Astronomical Society

2015–

## HONORS & AWARDS

Vanderbilt Physics & Astronomy Dept. - Most Outstanding Student Publication Award

2020

Vanderbilt Data Science Symposium - Graduate Student Poster Competition (1st place)

2019

Vanderbilt Akunuri V. Ramayya Award for Outstanding Teaching Assistant

2018

Vanderbilt Provost Graduate Fellowship

2016–2021

Undergraduate Chambliss Astronomy Achievement Award (Honorable Mention)

2016

Wellesley College Sarah Frances Whiting Medal for Achievement in Astronomy

2014

## GRANTS

XSEDE - Awarded 58.4k Node Hours (2.8M CPU hours) on Stampede2

2019, 2020

Vanderbilt Physics & Astronomy Dept. - McMinn Research Grants (\$3,000 total)

2019, 2020

Vanderbilt College of Arts and Sciences - Graduate Summer Research Award (\$1,900)

2018

## PUBLICATIONS

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**Refereed First & Second Author Publications: 6**

**Total Citations: 75**

### Submitted & Published

6. **Beltz-Mohrmann, G. D.**, Szewciw, A. O., Berlind, A. A., Sinha, M., 2023, “Toward Accurate Modeling of Galaxy Clustering on Small Scales: Extensions to the Standard Halo Model”, *The Astrophysical Journal*, 948, 100
5. Szewciw, A. O., **Beltz-Mohrmann, G. D.**, Berlind, A. A., Sinha, M., 2021, “Toward Accurate Modeling of Galaxy Clustering on Small Scales: Constraining the Galaxy-Halo Connection with Optimal Statistics”, *The Astrophysical Journal*, 926, 15
4. **Beltz-Mohrmann, G. D.**, Berlind, A. A., 2021, “The impact of baryonic physics on the abundance, clustering, and concentration of halos”, *The Astrophysical Journal*, 921, 112
3. **Beltz-Mohrmann, G. D.**, Berlind, A. A., Szewciw, A. O., 2020, “Testing the Accuracy of Halo Occupation Distribution Modelling using Hydrodynamical Simulations”, *Monthly Notices of the Royal Astronomical Society*, 491, 5771
2. Dale, D. A., **Beltz-Mohrmann, G. D.**, Egan, A. A., Hatlestad, A. J., Herzog, L. J., Leung, A. S., McLane, J. N., Phenicie, C., Roberts, J. S., Barnes, K. L., Boquien, M., Calzetti, D., Cook, D. O., Kobulnicky, H. A., Staudaher, S. M., van Zee, L., 2016, “Radial Star Formation Histories in Fifteen Nearby Galaxies”, *The Astronomical Journal*, 151, 4
1. Souza, S. P., **Beltz-Mohrmann, G.**, Sami, M., 2014, “The Light Curve and Period of MT696”, *The Journal of the American Association of Variable Star Observers*, 42, 154

## RECENT TALKS & POSTERS

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### Invited Talks

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|---|------------|
| KITP: Building a physical understanding of galaxy evolution with data-driven astronomy<br><i>Toward Accurate Modeling of Galaxy Clustering on Small Scales:<br/>Halo Model Extensions &amp; Lingering Tension</i> | Jan. 2023  |
| CAMELS Workshop, Center for Computational Astrophysics<br><i>Toward Accurate Modeling of Galaxy Clustering on Small Scales:<br/>Halo Model Extensions &amp; Lingering Tension</i>                                 | Dec. 2022  |
| High-Energy and AstroPhysics Seminar, University of Utah<br><i>Developing an Accurate Probe of the Galaxy-Halo Connection</i>   | Jan. 2022  |
| Kavli Institute for Cosmological Physics Seminar, University of Chicago<br><i>Developing an Accurate Probe of the Galaxy-Halo Connection</i>  | Nov. 2021  |
| Galaxies and AGN Journal Club talk, Johns Hopkins University<br><i>The impact of baryonic physics on the abundance, clustering, &amp; concentration of halos</i>  | July 2021  |
| Galaxy Lunch talk, Yale University<br><i>The impact of baryonic physics on the abundance, clustering, &amp; concentration of halos</i>  | March 2021 |

### Contributed Talks

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|---|------------|
| N-Body Shop Workshop<br><i>Accurate Modeling of Galaxy Clustering on Small Scales</i>   | June 2022  |
| Kavli Institute for Theoretical Physics: Galaxy-Halo Connection Across Cosmic Time<br><i>HMF Discrepancies between Hydrodynamic and DMO Simulations</i> | Aug. 2020  |
| Universität Innsbruck: The Connection Between Galaxies and Dark Matter Halos<br><i>Taking Halo Modeling to the Next Level</i>                           | March 2020 |

## SKILLS & EXPERIENCE

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**Programming Languages:** PYTHON, C, MATLAB, BASH, GIT, L<sup>A</sup>T<sub>E</sub>X

**Machine Learning:** scikit-learn

**Parallel Computing:** MPI, OPENMP

**High Performance Computing:** Experience on Stampede2 supercomputer:

Running cosmological N-body simulations using GADGET-2 & GADGET-4, generating power spectra and initial conditions using CAMB and 2LPTIC, identifying spherical overdensity halos using ROCKSTAR, and running large MCMC parameter searches

**Observing Experience:**

~ 80 hours using 2.3 meter telescope at Wyoming Infrared Observatory

~ 80 hours using 0.6 meter telescope at Williams College

~ 200 hours using 0.6 meter telescope at Wellesley College

~ 100 hours using 8" reflector telescopes at Wellesley College and Vanderbilt University

~ 100 hours using 6" and 12" historic refractor telescopes at Wellesley College

## TEACHING

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Co-mentored high school student Caleigh Dennis	2017–2019
Two-time 1st place winner at Middle Tennessee Science & Engineering Fair	
Graduate Teaching Assistant, Dept. of Physics & Astronomy, Vanderbilt University	2016–2019
Instructor for <i>Introductory Astronomy Lab</i>	
Astronomy Tutor, Vanderbilt University	Fall 2016
Private tutor for undergraduate students in <i>Introduction to Astronomy</i>	
Supplemental Instruction Leader, Wellesley College	2014–2016
Lead problem-solving sessions for students in <i>Introductory Mechanics</i>	
Physics Tutor, Wellesley College	2013–2016
Helproom and private tutor for all undergraduate physics courses	

## OUTREACH

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Conference for Undergraduate Women in Physics at Argonne National Lab	Jan. 2023
Volunteered to run a python workshop to teach students about coding and galaxy clustering	
AAS (virtual) Congressional Visits Day	Sept. 2020
Spoke with state representatives about the importance of funding scientific research	
Science Day with Nashville Girl Scout Troop	March 2019
Built bottle rockets and talked to girls about being an astronomer	
Meet the Astronomer Night at Dyer Observatory	Oct. 2018
Gave a public talk about large-scale structure	
Volunteer for Summer Academy at Vanderbilt for the Young	July 2017
Helped design week long python course for middle school students	
Vanderbilt Student Volunteers for Science	Fall 2016
Gave monthly science demonstrations to middle school classes	
Whitin Observatory Volunteer, Wellesley College	2012–2016
Gave monthly public talks and telescope demonstrations	

## PRE-DOCTORAL POSITIONS

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LIGO Summer Undergraduate Research Fellow, Caltech	Summer 2015
NSF Summer REU, University of Wyoming	Summer 2014
Summer Research Fellow, Keck Northeast Astronomy Consortium, Williams College	Summer 2013
Undergraduate Research Assistant, Wellesley College	2013–2016