Gillian D. Beltz-Mohrmann, Ph.D.

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Professional Appointments

Postdoctoral Research Fellow - Argonne National Laboratory 2022-
Cosmological Physics and Advanced Computing Group

Graduate Research Assistant - Vanderbilt University 2016-2022
Department of Physics & Astronomy

Education

Ph.D. - Vanderbilt University, Nashville, TN May 2022
Ph.D. in Astrophysics Advisor: Andreas Berlind
Thesis: *Developing an Accurate Probe of the Galaxy-Halo Connection: Baryonic Effects, Small-Scale Galaxy Clustering, and Halo Model Extensions*

B.A. - Wellesley College, Wellesley, MA May 2016
B.A., *cum laude* Advisors: Kim McLeod, James Battat
Astrophysics major, German minor

Honors & Awards

Most Outstanding Student Publication Award 2020
Vanderbilt Physics & Astronomy Department

Graduate Student Poster Competition Winner 2019
Vanderbilt Data Science Symposium

Akunuri V. Ramayya Award for Outstanding Teaching Assistant 2018
Vanderbilt Physics & Astronomy Department

Provost Graduate Fellowship 2016–2021
Vanderbilt University

Undergraduate Chambliss Achievement Honorable Mention 2016
227th American Astronomical Society Meeting

Sarah Frances Whiting Medal for Achievement in Astronomy 2014
Wellesley College

Grants

XSEDE Grant 2019, 2020
Awarded 58.4k total Node Hours (2.8M CPU hours) on Stampede2

McMinn Research Grant 2019, 2020
Vanderbilt Physics & Astronomy Department ($3,000 total)

Graduate Summer Research Award 2018
Vanderbilt College of Arts and Sciences ($1,900)

1st & 2nd Author Publications

Submitted & Published
Total Citations: 86

6. **Beltz-Mohrmann, G. D.**, Szewciw, A. O., Berlind, A. A., Sinha, M., 2023, "Toward Accurate Modeling of Galaxy Clustering on Small Scales: Halo Model Extensions and Lingering Tension", 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

In Preparation

2. **Beltz-Mohrmann, G. D.**, Hearin, A. P., Alarcon-Gonzalez, A., Bekcer, M. R., 2023, "On the redshift-evolution of the HOD of DESI galaxy samples", in prep.

1. **Beltz-Mohrmann, G. D.** et al. 2023, "DESI C3 Emulator Mock Challenge", in prep.

Recent Talks

Winter DESI Meeting Dec. 2023
Introducing DESI-Diffsky: A Differentiable Forward Model for Making Multi-wavelength, Multi-tracer DESI Mocks

KITP Workshop, UC Santa Barbara Jan. 2023
Building a physical understanding of galaxy evolution with data-driven astronomy
Toward Accurate Modeling of Galaxy Clustering on Small Scales: Halo Model Extensions & Lingering Tension

CAMELS Workshop, Center for Computational Astrophysics Dec. 2022
Toward Accurate Modeling of Galaxy Clustering on Small Scales: Halo Model Extensions & Lingering Tension

N-Body Shop Workshop June 2022
Accurate Modeling of Galaxy Clustering on Small Scales

High-Energy and AstroPhysics Seminar, University of Utah Jan. 2022
Developing an Accurate Probe of the Galaxy-Halo Connection

KICP Seminar, University of Chicago Nov. 2021
Developing an Accurate Probe of the Galaxy-Halo Connection

Galaxies and AGN Journal Club, Johns Hopkins University July 2021
Impact of baryonic physics on the abundance, clustering, & concentration of halos

Galaxy Lunch talk, Yale University March 2021
Can we ignore baryons in halo modeling?

KITP Workshop, UC Santa Barbara Aug. 2020
Galaxy-Halo Connection Across Cosmic Time
HMF Discrepancies between Hydrodynamic and DMO Simulations

Galaxy-halo Connection Workshop, Universität Innsbruck March 2020
Taking Halo Modeling to the Next Level

Mentoring

DESI Mentorship Program Fall 2023 -
Mentor for students in the DESI Collaboration

GEM Fellowship Program, Argonne National Laboratory Summer 2023
Mentored a graduate student in the GEM Fellowship program for 13 weeks; helped her develop a gradient descent pipeline in Jax for forward modeling galaxy SEDs

STEM Research Program, Harpeth Hall High School, Nashville, TN 2017 – 2019
Mentored a high school student for two years; taught her Python and guided her on a project measuring the rotation of galaxy groups in SDSS; 1st place winner at Middle Tennessee Science & Engineering Fair in 2018 and 2019

Teaching

Conference for Undergraduate Women in Physics Jan. 2023
Argonne National Lab
Developed and lead several python workshops during the conference; taught students Python basics and introduced them to galaxy redshift data from SDSS

Graduate Teaching Assistant, Vanderbilt University Fall 2016 – Spring 2019
Introductory Astronomy Lab instructor

Lectured on lab concepts; helped develop and improve lab material; taught students to use 8 inch telescopes; guided students with mini end-of-semester research project and poster session; graded labs and lecture exams (10 hours per week)

Astronomy Tutor, Vanderbilt University Fall 2016

Individual tutor for introductory astronomy lectures (1-2 hours per week)

Supplemental Instruction Leader, Wellesley College Fall 2014 – Spring 2016

Created supplemental lessons and material and lead extra problem solving sessions for introductory physics lectures (8 hours per week)

Physics Tutor, Wellesley College Fall 2013 – Spring 2016

Worked through problems sets with students individually or in a group; helped students to understand concepts from lecture (4 hours per week)

Summer Academy at Vanderbilt for the Young July 2017

Developed material for a week-long course for middle school students to learn VPython and build a solar system simulation

Vanderbilt Student Volunteers for Science Fall 2016

Gave monthly chemistry and physics demonstrations to middle school classes

Skills & Experience

Programming Languages: PYTHON, C, MATLAB, BASH, GIT, LaTeX
Misc.: scikit-learn, Jax, emcee
Parallel Computing: MPI, OPENMP
Simulation Software: GADGET-2 & GADGET-4, CAMB, 2LPTIC, ROCKSTAR
Observing Experience:
$\sim$ 80 hours using 2.3 meter telescope at Wyoming Infrared Observatory
$\sim$ 80 hours using 0.6 meter telescope at Williams College
$\sim$ 200 hours using 0.6 meter telescope at Wellesley College
$\sim$ 100 hours using $8''$ reflector telescopes at Wellesley College and Vanderbilt University
$\sim$ 100 hours using $6''$ and $12''$ historic refractor telescopes at Wellesley College
Scholarly Journal Peer Reviewer: JCAP, Physics of the Dark Universe

Public Service & Outreach

AAS Congressional Visits Day (virtual) 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 answered questions about being an astronomer

Meet the Astronomer Night at Dyer Observatory Oct. 2018

Public talk and Q&A

Whitin Observatory Volunteer, Wellesley College 2012–2016

Gave monthly public talks and telescope demonstrations to guests of all ages

Collaborations

Leadership:

LasDamas (Large Suite of Dark Matter Simulations) Collaboration 2017–2022

Co-Investigator & XSEDE Allocation Manager

General Member:

Dark Energy Spectroscopic Instrument Collaboration 2022–

C3 Working Group, Sustainability Committee

LSST Dark Energy Science Collaboration 2022–
CAMELS Collaboration 2022–
N-Body Shop Collaboration 2020–
American Astronomical Society 2015–

Pre-doctoral Positions

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