

# Gillian D. Beltz-Mohrmann, Ph.D.

Cosmological Physics and Advanced Computing Group  
Argonne National Laboratory, Lemont, IL 60439  
gbeltzmohrmann@anl.gov  $\diamond$  <https://gbeltzmo.github.io/>

---

Professional Appointments	Postdoctoral Research Fellow - Argonne National Laboratory	2022-2025
	Cosmological Physics and Advanced Computing Group	
	Graduate Research Assistant - Vanderbilt University	2016-2022
	Department of Physics & Astronomy	
Education	Vanderbilt University, Nashville, TN	May 2022
	Ph.D. in Astrophysics	Advisor: Andreas Berlind
	Thesis: <i>Developing an Accurate Probe of the Galaxy-Halo Connection: Baryonic Effects, Small-Scale Galaxy Clustering, and Halo Model Extensions</i>	
	Wellesley College, Wellesley, MA	May 2016
	B.A., <i>cum laude</i>	Advisors: Kim McLeod, James Battat
	Major: Astrophysics; Minor: German	
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	
1st & 2nd Author Publications	Submitted & Published	
	Total Citations: 101	
	8. Beltz-Mohrmann, G. D., Pope, A., et al., 2025, “Illuminating the Physics of Dark Energy with the Discovery Simulations,” submitted to the Open Journal of Astrophysics, arXiv:2503.05947	
	7. Pearl, A. N., Beltz-Mohrmann, G. D., Hearin, A. P., 2024, “DiffOpt: Parallel optimization of Jax models,” Journal of Open Source Software, 9(104), 7522	
	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., et al., 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

## Nth Author Publications

### Submitted & Published

Total Citations: 11

3. OpenUniverse Collaboration et al., 2025, “OpenUniverse2024: A shared, simulated view of the sky for the next generation of cosmological surveys”, arXiv:2501.05632
2. Lange, Johannes U. et al., 2024, “Systematic Effects in Galaxy-Galaxy Lensing with DESI”, The Open Journal of Astrophysics, 7, 57
1. Yuan, Sihan et al., 2024, “Redshift evolution and covariances for joint lensing and clustering studies with DESI Y1”, Monthly Notices of the Royal Astronomical Society, 533, 1

## Recent Talks

<b>ELG Mock Challenge Workshop</b> Donostia International Physics Center <i>Lessons Learned from the DESI Emulator Mock Challenge</i> <i>Simulation-based Forward Modeling with Diffsky</i>	February 2025
<b>Winter DESI Meeting</b> , Cancun, Mexico <i>Updates on the DESI Emulator Mock Challenge</i>	December 2024
<b>University of Arizona</b> <i>A Differentiable Forward Model of the Galaxy-Halo Connection</i>	October 2024
<b>Cosmology Talks Miniworkshop</b> (invited expert) <i>Cosmology Beyond 2pt Statistics</i>	August 2024
<b>DHWFEST</b> , University of Utah <i>A New Forward Model of the Galaxy-Halo Connection</i>	July 2024
<b>Summer DESI Meeting</b> , Marseille, France <i>DESI Alternative Clustering Methods</i>	July 2024
<b>New Strategies for Extracting Cosmology from Galaxy Surveys</b> Sesto, Italy <i>Simulation-based Forward Modeling of Cross-Survey Cross-Correlations with Diffsky</i>	July 2024
<b>Fundamental Physics from Future Spectroscopic Surveys</b> Lawrence Berkeley National Lab <i>Making multi-wavelength, multi-redshift predictions for Cross-Survey Cosmological Analyses</i>	May 2024
<b>Winter DESI Meeting</b> , Hawaii, USA <i>Introducing DESI-Diffsky: A Differentiable Forward Model for Making Multi-wavelength, Multi-tracer DESI Mocks</i>	Dec. 2023
<b>KITP Workshop</b> , UC Santa Barbara Building a physical understanding of galaxy evolution with data-driven astronomy <i>Toward Accurate Modeling of Galaxy Clustering on Small Scales: Halo Model Extensions &amp; Lingering Tension</i>	Jan. 2023
<b>CAMELS Workshop</b> , Center for Computational Astrophysics <i>Toward Accurate Modeling of Galaxy Clustering on Small Scales: Halo Model Extensions &amp; Lingering Tension</i>	Dec. 2022
<b>N-Body Shop Workshop</b> , Center for Computational Astrophysics <i>Accurate Modeling of Galaxy Clustering on Small Scales</i>	June 2022
<b>High-Energy and AstroPhysics Seminar</b> , University of Utah <i>Developing an Accurate Probe of the Galaxy-Halo Connection</i>	Jan. 2022
<b>KICP Seminar</b> , University of Chicago <i>Developing an Accurate Probe of the Galaxy-Halo Connection</i>	Nov. 2021
<b>Galaxies and AGN Journal Club</b> , Johns Hopkins University <i>Impact of baryonic physics on the abundance, clustering, &amp; concentration of halos</i>	July 2021
<b>Galaxy Lunch talk</b> , Yale University <i>Can we ignore baryons in halo modeling?</i>	March 2021
<b>KITP Workshop</b> , UC Santa Barbara Galaxy-Halo Connection Across Cosmic Time	Aug. 2020

	<i>HMF Discrepancies between Hydrodynamic and DMO Simulations</i> <b>Galaxy-halo Connection Workshop</b> , Universität Innsbruck <i>Taking Halo Modeling to the Next Level</i>	March 2020
<b>Teaching</b>	<b>Conference for Undergraduate Women in Physics</b> , Argonne Developed and led a Python workshop <b>Graduate Teaching Assistant</b> , Vanderbilt University Introductory Astronomy Lab instructor <b>Astronomy Tutor</b> , Vanderbilt University <b>Summer Academy at Vanderbilt for the Young</b> <b>Supplemental Instruction Leader</b> , Wellesley College <b>Physics Tutor</b> , Wellesley College	Jan. 2023  Fall 2016 – Spring 2019  Fall 2016 July 2017 Fall 2014 – Spring 2016 Fall 2013 – Spring 2016
<b>Mentoring</b>	<b>Harmandeep Gill</b> (University of Toronto, undergraduate) Topic: Modeling Lyman Break Galaxies in Jax <b>Ivan Kraskov</b> (University of Toronto, undergraduate) Topic: Modeling IGM absorption in Jax <b>Emily Martsen</b> (University of Chicago, graduate) Topic: Measuring the Two-point Clustering of Galaxy Clusters <b>DESI Mentorship Program</b> <b>Resherle Verna</b> (UT Austin, graduate) GEM Fellowship Program Topic: Forward modeling galaxy SEDs with Jax <b>Caleigh Dennis (Harpeth Hall High School)</b> Topic: Measuring the rotation of galaxy groups in SDSS 1st place winner at Middle Tennessee Science & Engineering Fair in 2018 & 2019	October 2024 - October 2024 - September 2024 - October 2023 - Summer 2023  September 2017 – May 2019
<b>Grants</b>	<b>XSEDE Grant</b> Awarded 58.4k total Node Hours (2.8M CPU hours) on Stampede2 <b>McMinn Research Grant</b> Vanderbilt Physics & Astronomy Department (\$3,000 total) <b>Graduate Summer Research Award</b> Vanderbilt College of Arts and Sciences (\$1,900)	2019, 2020  2019, 2020  2018
<b>Skills &amp; Experience</b>	<b>Programming Languages:</b> PYTHON, C, BASH, GIT, L <sup>A</sup> T <sub>E</sub> X <b>Misc.:</b> Jax, scikit-learn, emcee, GADGET, CAMB, 2LPTIC, ROCKSTAR <b>Parallel Computing:</b> MPI, OPENMP <b>Observing Experience:</b> ~ 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	
<b>Public Service &amp; Outreach</b>	<b>Science Careers in Search of Women panelist</b> , Argonne <b>Conference for Undergraduate Women in Physics</b> , Argonne <b>AAS Congressional Visits Day (virtual)</b> <b>Science Day with Nashville Girl Scout Troop</b> <b>Meet the Astronomer Night at Dyer Observatory</b> <b>Vanderbilt Student Volunteers for Science</b> <b>Whitin Observatory Volunteer</b> , Wellesley College	March 2023 Jan. 2023 Sept. 2020 March 2019 Oct. 2018 Fall 2016 2012–2016
<b>Collaborations</b>	<b>Dark Energy Spectroscopic Instrument (DESI)</b> C3 and GQC Working Groups Alternative Clustering Methods Topical Group (co-leader, November 2024-) <b>LSST Dark Energy Science (DESC)</b>	2022–  2022–

<b>Large Suite of Dark Matter Simulations</b> (LasDamas)	2017–2022
Co-Investigator & XSEDE Allocation Manager	
<b>CAMELS</b>	2022–
<b>N-Body Shop</b>	2020–
<b>American Astronomical Society</b>	2015–

**Professional  
Service**

**Scholarly Journal Peer Reviewer:**

Monthly Notices of the Royal Astronomical Society  
Astronomy & Astrophysics  
Journal of Cosmology and Astroparticle Physics  
Physics of the Dark Universe