

# DR. HANNAH BISH

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Space Telescope Science Institute

3700 San Martin Dr, Baltimore MD 21218, USA

## EDUCATION

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**University of Washington**, Seattle WA, USA

Ph.D., Astronomy

2022

Advisor: Prof. Jessica Werk

Ph.D. Thesis: *Multiphase Gas Flows in the Milky Way's Halo*

M.S., Astronomy

2016

**Rutgers University**, New Brunswick NJ, USA

B.S., Astrophysics, *magna cum laude*

2014

Advisor: Prof. Eric Gawiser

Senior Thesis: *Ly- $\alpha$  Emission in High-Redshift Galaxies*

## PROFESSIONAL APPOINTMENTS

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**Marie Curie Postdoctoral Fellow**, European Southern Observatory, Garching, Germany

Research: *The Circumgalactic Medium in the ByCycle Survey*

2026 - 2028

Supervisor: Dr. Celine Peroux

**Postdoctoral Fellow**, Space Telescope Science Institute, Baltimore MD, USA

2022 - 2026

Primary Research: *Mapping the UV Interstellar Radiation Field in 3D*

Secondary Research: *Impact of Satellite Galaxies on the CGM*

Supervisor: Dr. Joshua Peek

**Research Assistant**, University of Washington, Seattle WA, USA

2016 - 2022

Research: *Kinematics & Structure of Gas Flows in the Galactic Halo*

Advisor: Prof. Jessica Werk

**Teaching Assistant**, University of Washington, Seattle WA, USA

2014 - 2016

Courses Taught: Intro Astronomy (ASTR 101), The Planets (ASTR 150)

**Research Assistant**, Rutgers University, New Brunswick NJ, USA

2012 - 2014

Research: *Ly- $\alpha$  Emission Strength in Star-Forming Galaxies*

Advisor: Prof. Eric Gawiser

**REU Student Researcher**, American Museum of Natural History, New York NY, USA

2010

Research: *High Proper Motion Stars in the SUPERBLINK Survey*

Advisor: Prof. Sebastien Lepine

## TEACHING

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*Guest Lecturer*, Astronomy Course for Middle School Girls, University of Washington

Summer 2016

*Teaching Assistant*, ASTR 101: Intro to Astronomy with Prof. Oliver Fraser

Winter 2016

*Teaching Assistant*, ASTR 101: Intro to Astronomy with Prof. Ana Larson

Fall 2015

*Teaching Assistant*, ASTR 150: The Planets with Prof. Toby Smith

Summer 2015

*Teaching Assistant*, ASTR 101: Intro to Astronomy with Prof. Chris Laws

Spring 2015

*Teaching Assistant*, ASTR 101: Intro to Astronomy with Prof. Oliver Fraser

Winter 2015

*Teaching Assistant*, ASTR 150: The Planets with Prof. Toby Smith

Fall 2014

# JOURNAL ARTICLES

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## FIRST AUTHOR:

1. **Bish, H.V.**; Tollerud, E.; Hamanowicz, A. “*COS-SAGA I: Connecting the CGM of Milky Way Analogs and Their Satellite Populations*” (in prep.)
2. **Bish, H.V.**; Peek, J.E.G.; Murray, C.; Gordon, K.; Clark, S.; Hamden, E. “*LightCube: A Parsec-Resolution 3D Model of the Local Far-Ultraviolet Interstellar Radiation Field*” (submitted to ApJ)
3. **Bish, H.V.**; Werk, J.K.; Di Teodoro, E.M.; Peek, J.E.G.; Zheng, Y.; Putman, M.E. “*Differential Accretion of Ionized Low-Velocity Gas at the Milky Way’s Disk-Halo Interface*” 2026, ApJ, 997, 2
4. **Bish, H.V.**; Werk, J.K.; Peek, J.E.G.; Putman, M.E.; Zheng, Y. “*QuaStar: Measuring the Milky Way’s Obscured Low-Velocity Circumgalactic Medium*” 2021, ApJ, 912, 8
5. **Bish, H.V.**; Werk, J.K.; Prochaska, J.X.; Rubin, K.H.R.; Zheng, Y.; O’Meara, J.M.; Deason, A.J. “*Galactic Gas Flows from Halo to Disk: Tomography and Kinematics at the Milky Way’s Disk-Halo Interface*” 2019, ApJ, 882, 76

## CO-AUTHORED:

1. Tollerud, E.J.; Hamanowicz, A.; **Bish, H.V.**; Geha, M.; Wechsler, R.H.; Mao, Y; Kallivayalil, N.; Weinder, B.; Bordoloi, R.; Tumlinson, J.; Wetzel, A. “*COS-SAGA I: The Circumgalactic Medium of NGC3067 and its Lone Satellite*” (submitted to ApJL)  
– Contribution: Reduced and analyzed COS spectra, assisted with metallicity calculation.
2. Werk, J.K.; Tchernyshyov, K.; **Bish, H.V.**; Zheng, Y.; Putman, M.; Peek, J.E.G.; Schiminovich, D. “*The Plane Quasar Survey: First Data Release*”, 2024, ApJS, 273, 21  
– Contribution: Carried out four half-nights of observations, reduced data for catalog.
3. Werk, J.K., Rubin, K.H.R., **Bish, H.V.**; Prochaska, J.X.; Zheng, Y.; O’Meara, J.M.; Lenz, D.; Hummels, C.; Deason, A.J. “*The Nature of Ionized Gas in the Milky Way Galactic Fountain*” 2019, ApJ, 887, 89  
– Contribution: Data reduction and analysis of low ions, two figures, scientific discussion.
4. Vargas, C.J., **Bish, H.V.**, Acquaviva, V., Gawiser, E.J., Finkelstein, S.L., Ciardullo, R., Ashby, M., Feldmeier, J., Ferguson, H., Gronwall, C., Guaita, L., Hagen, A., Koekemoer, A., Kurczynski, P., Newman, J., & Padilla, N. “*To Stack or Not to Stack: Spectral Energy Distribution Properties of Ly-Emitting Galaxies at  $z=2.1$* ”. 2013, ApJ, 783, 26.  
– Contribution: SED fitting and primary data analysis, six figures, scientific discussion.

## PRESENTATIONS

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### INVITED TALKS:

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| Rutgers University seminar series - <i>A 3D View of the Local ISM: Accretion at the Disk-Halo Interface and the UV Interstellar Radiation Field</i>                 | 2026 |
| American Museum of Natural History seminar series - <i>A 3D View of the Local ISM: Accretion at the Disk-Halo Interface and the UV Interstellar Radiation Field</i> | 2026 |
| CCA Accretion at the Disk-Halo Interface Workshop - <i>Low-Velocity Accretion and DHI Kinematics in the Inner Milky Way</i>   | 2025 |
| University of Wisconsin - <i>LightCube: A 3D Model of the Local UV Interstellar Radiation Field</i>   | 2023 |
| Carnegie Observatories - <i>LightCube: A 3D Model of the Local UV Interstellar Radiation Field</i>  | 2023 |
| SAGA Collaboration Meeting - <i>QuaStar: A First Look at the Milky Way’s Hidden CGM</i>   | 2023 |
| STScI RadioQuiet Meeting - <i>QuaStar: A First Look at the Milky Way’s Hidden CGM</i>   | 2021 |
| STScI Milky Way Halo Meeting - <i>QuaStar: A First Look at the Milky Way’s Hidden CGM</i>   | 2021 |
| MUSYC LAE Meeting - <i>SED Properties of <math>z\sim 2-3</math> LAEs</i>  | 2013 |
| MUSYC LAE Meeting - <i>SpeedyMC Results for <math>z=2.1</math> LAEs with CANDELS SEDs</i>   | 2012 |

## CONTRIBUTED TALKS:

Inter+Stellar Symposium - <i>LightCube: A 3D Model of the Local UV Interstellar Radiation Field</i>	2025
EAS 2025 - <i>LightCube: A 3D Model of the Local UV Interstellar Radiation Field</i>	2025
IAU GA XXIII - <i>LightCube: A 3D Model of the Local UV Interstellar Radiation Field</i>	2024
AAS #243 353.06 - <i>LightCube: A 3D Model of the Local UV Interstellar Radiation Field</i>	2024
AAS #241 245.03D - <i>Galactic Gas Flows from Halo to Disk</i>	2023
AAS #236 205.03 - <i>QuaStar: A First Look at the Milky Way's Hidden CGM</i>	2020
Wolfe Symposium in Astrophysics - <i>Milky Way Gas Kinematics at the Disk-Halo Interface</i>	2018
Rutgers University - <i>MCMC SED Fitting in CANDELS</i>	2013
Tri-State Astronomy Conference - <i>Physical Properties of LAEs at <math>z = 2.1</math></i>	2013
CANDELS Team Meeting - <i>To Stack or Not to Stack: SED Properties of <math>z=2.1</math> LAEs</i>	2013

## POSTERS:

AAS #225 143.55 - <i>What Determines the Strength of Ly<math>\alpha</math> Emission in Star-Forming Galaxies?</i>	2015
AAS #223 145.05 - <i>To Stack or Not to Stack: Physical Properties of LAEs at <math>z = 2.1</math></i>	2014
Aresty Research Symposium - <i>To Stack or Not to Stack: Physical Properties of LAEs at <math>z = 2.1</math></i>	2014
AAS #221 147.32 - <i>Physical Properties of Lyman Alpha Emitters in CANDELS</i>	2013

## HONORS AND AWARDS

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PI, HST Proposal (HST-GO-17733), 75 orbits	2025
Title: <i>Reaping the Whirlwind: Accretion &amp; Outflow in the Inner Milky Way</i>	
Marie Skłodowska-Curie Postdoctoral Fellowship	2025-2028
PI, ACCESS Explore Proposal (PHY230181), 400,000 SUs ( $\sim 333,000$ compute hours)	2025
Co-I, HST Proposal (HST-GO-17733), 30 orbits	2024
Title: <i>When Clouds Collide: Observing Gas Accretion onto the Milky Way's Disk</i>	
PI, ACCESS Explore Proposal (PHY230181), 400,000 SUs ( $\sim 333,000$ compute hours)	2023
AAS Rodger Doxsey Prize	2022
Co-I, HST Proposal (HST-GO-16679), 71 orbits	2021
Title: <i>Mainly on the Plane: Solving the Milky Way CGM Anomaly with Low-Latitude QSOs</i>	
Graduate Student Prize for Research Excellence, University of Washington	2019
Graduate Student Presentation Award, Wolfe Symposium in Astrophysics	2018
Co-I, HST Proposal (HST-GO-15154), 17 orbits	2017
Title: <i>Tracing Gas Flows from Halo to Disk: Observing the Milky Way's Galactic Fountain</i>	
ARCS Foundation Graduate Fellowship	2014 - 2017
Magna cum laude, Rutgers University	2014
Honors thesis in Astrophysics, Rutgers University	2014
Aresty Research Center Grant, Rutgers University	2013
Richard J. Plano Summer Research Internship Award	2013
Rutgers University Academic Excellence Award	2013

## MENTORING AND OUTREACH

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<i>Invited Speaker</i> , Astronomy on Tap, Baltimore MD	2024
<i>Invited Speaker</i> , New Jersey Astronomical Association, Glen Gardner NJ	2023
<i>Volunteer</i> , Math Alliance Graduate Recruiting for Underrepresented Students, virtual	2021
<i>Mentor</i> , Pre-Major in Astronomy Program (Pre-MAP), University of Washington Supervised research of four students: <i>Brittany Platt, Magdalyn Paige, Olivia Petry,</i> & <i>Travis Mandeville</i>	2016 - 2020
<i>Invited Speaker</i> , Everett Astronomical Society, Everett WA	2019
<i>Invited Speaker</i> , Astronomy on Tap, Seattle WA	2019
<i>Volunteer</i> , Meany Middle School Astronomy Outreach, Seattle WA	2019
<i>Organizer</i> , EquiTea Journal Club, University of Washington Planned monthly discussions and workshops about issues of equity and inclusion	2017 - 2019
<i>Volunteer</i> , ARCS Educational Astronomy for Children & Parents, Seattle WA	2017
<i>Volunteer</i> , Planetarium Presenter for Visiting Groups, University of Washington	2016 - 2017

## PROFESSIONAL SERVICE

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<i>Committee Member</i> , ISM* Code of Conduct Committee, STScI	2025 - 2026
<i>Organizer</i> , Low Density Universe ‘supergroup’, Space Telescope Science Institute	2022 - 2026
<i>Local Organizing Committee Member</i> , STScI Spring Symposium	2025
<i>Scientific Referee</i> , The Astrophysical Journal	2024
<i>Panel Support</i> , JWST TAC Cycle 2 Peer Review, Space Telescope Science Institute	2023
<i>Committee Member</i> , University of Washington Graduate Admissions	2020
<i>Organizer</i> , EquiTea journal club for equity and inclusion	2018 - 2019
<i>Organizer</i> , Prospective Student Visit, University of Washington	2017

## TECHNICAL SCHOOLS AND WORKSHOPS

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- CosmicAI Astro-AI Boot Camp, University of Texas at Austin 05/2025  
*1-week intensive boot camp covering a broad overview of AI methods and scientific applications in a high-performance computing environment, with a focus on challenges in the domain of astronomy.*
- Docker training, Space Telescope Science Institute, USA 12/2023  
*2-day training on use of Docker containers to effect reproducible computational environments. Such environments are useful for ensuring reproducible research outputs and sharing open-source code.*
- Interstellar Institute, Institut Pascal, France 07/2023  
*3-week program for research development and collaboration among ISM experts. Worked with other participants to determine the best approach to building my 3-D model of the interstellar radiation field (currently under development) and investigate use cases.*
- AWS training, Space Telescope Science Institute, USA 05/2023  
*2-day training on using Amazon Web Services (AWS) for computationally-intensive research tasks.*
- Planetarium training, University of Washington, USA 10/2019  
*1-day training on planetarium equipment/software and development of custom planetarium shows for a range of visiting audiences at the university.*
- Python Software Engineering Boot Camp, University of Washington, USA 09/2014  
*2-day workshop on Python tools for scientific computing in astronomy.*

## OBSERVING EXPERIENCE

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### AWARDED PROPOSALS:

HST-GO 18050 Cycle 33, HST COS, 75 orbits (PI)	2025
HST-GO 17733 Cycle 32, HST COS, 30 orbits (Co-I)	2024
HST-GO 16679 Cycle 29, HST COS, 71 orbits (Co-I)	2021
2020 Q4, APO 3.5-m, 20 hours (Co-I)	2020
2020B, MDM 2.4-m OSMOS, 20 hours (Co-I)	2020
HST-GO 15154 / Cycle 25, HST COS, 17 orbits (Co-I)	2017

### OBSERVING NIGHTS:

Apache Point Observatory 3.5-m DIS, 1 night	2021
Apache Point Observatory 3.5-m DIS, 4 half-nights	2020
Keck HIRES, 3 half-nights	2017
Keck HIRES, 3 half-nights	2016
Apache Point Observatory 3.5-m DIS, 5 half-nights	2015
Manastash Ridge Observatory 0.75-m, 2 nights	2015
Schommer Observatory 20-in, 2 nights	2013
Green Bank Observatory 40-ft, 8 hours	2012

### DATA REDUCTION:

coaddx1d/IDL and personal pipeline/Python, HST COS  
xid1/IDL and HIRES/IDL, Keck HIRES  
PypeIt/Python, Apache Point Observatory 3.5-m DIS and MDM 1.3-m/2.4-m OSMOS  
PyDIS/Python, MDM 2.4-m OSMOS  
IRAF, Apache Point Observatory 3.5-m DIS, Schommer Observatory 20-in

## COMPUTING

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### AWARDED COMPUTING TIME:

ACCESS Explore (PHY230181), 800,000 SUs/~666,000 hrs. on Purdue Anvil Cluster (PI) 2024-2025

### EXPERIENCE:

Python: advanced, daily user  
IDL: intermediate  
JavaScript & D3: intermediate  
Hyak supercomputer user, department time allocation, University of Washington  
FASRC supercomputer user, department time allocation, Harvard University  
Anvil supercomputer user, ~666,000 hours, Purdue University

## REFERENCES

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**Prof. Jessica K. Werk**

jwerk@uw.edu

Associate Professor

Department of Astronomy, University of Washington

**Dr. Joshua E. G. Peek**

jegpeek@stsci.edu

Associate Astronomer, Project Scientist

Data Science Mission Office, Space Telescope Science Institute

**Dr. Catherine Zucker**

catherine.zucker@cfa.harvard.edu

Astrophysicist

Smithsonian Astrophysical Observatory, Center for Astrophysics | Harvard & Smithsonian