

DR. HANNAH BISH

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Space Telescope Science Institute
3700 San Martin Dr, Baltimore MD 21218, USA

EDUCATION

University of Washington , Seattle WA, USA	
Ph.D., Astronomy	2022
Advisor: Prof. Jessica Werk	
Ph.D. Thesis: <i>Multiphase Gas Flows in the Milky Way's Halo</i>	
M.S., Astronomy	2016
Rutgers University , New Brunswick NJ, USA	
B.S., Astrophysics	2014
Advisor: Prof. Eric Gawiser	
Senior Thesis: <i>Ly-α Emission in High-Redshift Galaxies</i>	

PROFESSIONAL APPOINTMENTS

Postdoctoral Fellow , Space Telescope Science Institute, Baltimore MD, USA	2022 - present
Primary Research: <i>3D Interstellar Radiation Field Maps</i>	
Secondary Research: <i>Impact of Satellite Galaxies on the CGM</i>	
Supervisor: Dr. Joshua Peek	
Research Assistant , University of Washington, Seattle WA, USA	2016 - 2022
Research: <i>Kinematics & Structure of Gas Flows in the Galactic Halo</i>	
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: <i>Ly-α Emission Strength in Star-Forming Galaxies</i>	
Advisor: Prof. Eric Gawiser	
REU Student Researcher , American Museum of Natural History, New York NY, USA	2010
Research: <i>High Proper Motion Stars in the SUPERBLINK Survey</i>	
Advisor: Prof. Sebastien Lepine	

TEACHING

<i>Guest Lecturer</i> , Astronomy Course for Middle School Girls, University of Washington	Summer 2016
<i>Teaching Assistant</i> , ASTR 101: Intro to Astronomy with Prof. Oliver Fraser	Winter 2016
<i>Teaching Assistant</i> , ASTR 101: Intro to Astronomy with Prof. Ana Larson	Fall 2015
<i>Teaching Assistant</i> , ASTR 150: The Planets with Prof. Toby Smith	Summer 2015
<i>Teaching Assistant</i> , ASTR 101: Intro to Astronomy with Prof. Chris Laws	Spring 2015
<i>Teaching Assistant</i> , ASTR 101: Intro to Astronomy with Prof. Oliver Fraser	Winter 2015
<i>Teaching Assistant</i> , ASTR 150: The Planets with Prof. Toby Smith	Fall 2014

TECHNICAL SCHOOLS AND WORKSHOPS

- 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.

HONORS AND AWARDS

- Co-I, HST Proposal (HST-GO-17733), 30 orbits 2024
Title: *When Clouds Collide: Observing Gas Accretion onto the Milky Way's Disk*
- PI, ACCESS Explore Proposal (PHY230181), 400,000 SUs (~300,000 compute hours) 2023
- AAS Rodger Doxsey Prize 2022
- Co-I, HST Proposal (HST-GO-16679), 71 orbits 2021
Title: *Mainly on the Plane: Solving the Milky Way CGM Anomaly with Low-Latitude QSOs*
- 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: *Tracing Gas Flows from Halo to Disk: Observing the Milky Way's Galactic Fountain*
- 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

PROFESSIONAL SERVICE

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

MENTORING AND OUTREACH

<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

OBSERVING EXPERIENCE

AWARDED PROPOSALS:

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
xidl/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

AWARDED COMPUTING TIME:

ACCESS Explore (PHY230181), 400,000 SUs/ \sim 333,000 hrs. on Purdue Anvil Cluster (PI) 2024

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, \sim 333,000 hours, Purdue University

PRESENTATIONS

INVITED TALKS:

University of Wisconsin - *LightCube: A 3D Model of the Local UV Interstellar Radiation Field* 2023
Carnegie Observatories - *LightCube: A 3D Model of the Local UV Interstellar Radiation Field* 2023
SAGA Collaboration Meeting - *QuaStar: A First Look at the Milky Way's Hidden CGM* 2023
STScI RadioQuiet Meeting - *QuaStar: A First Look at the Milky Way's Hidden CGM* 2021
STScI Milky Way Halo Meeting - *QuaStar: A First Look at the Milky Way's Hidden CGM* 2021
MUSYC LAE Meeting - *SED Properties of $z\sim 2-3$ LAEs* 2013
MUSYC LAE Meeting - *SpeedyMC Results for $z=2.1$ LAEs with CANDELS SEDs* 2012

CONTRIBUTED TALKS:

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

POSTERS:

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

JOURNAL ARTICLES

FIRST AUTHOR:

1. **Bish, H.V.**; Peek, J.E.G.; Murray, C.; Gordon, K.; Clark, S.; Hamden, E. “*LightCube: A 3-D Model of the Local Interstellar Radiation Field*” (in prep.)
2. **Bish, H.V.**; Tollerud, E.; Hamanowicz, A. “*COS-SAGA I: Connecting the CGM of Milky Way Analogs and Their Satellite Populations*” (in prep.)
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*” (submitted to ApJ)
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*”
– 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.

REFERENCES

Prof. Jessica K. Werk

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Associate Professor

Department of Astronomy, University of Washington

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Associate Astronomer, Project Scientist

Data Science Mission Office, Space Telescope Science Institute

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Astrophysicist

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