

## Areas of Expertise

Galaxy evolution, the circumgalactic medium, chemical evolution, galactic and circumgalactic gas flows  
Hydrodynamic simulations, synthetic data, semi-empirical models, coupling theory with observations

## Professional Positions Held

- AURA Associate Astronomer with Tenure 2020–present
  - Science Policies Group Member 2020–present
  - *Nancy Grace Roman Space Telescope* Branch Team Member 2020–2021
- AURA Associate Astronomer w/o Tenure 2017–2020
  - Science Policies Group Member 2016–2020
  - *WFIRST* Team Member 2014–2020
- AURA Assistant Astronomer 2014–2017
  - COS/STIS Instrument Scientist 2014–2016
- Associate Research Scientist, Johns Hopkins University 2015–present
- Postdoctoral Fellow, Space Telescope Science Institute 2013–2014
- Southern California Center for Galaxy Evolution Postdoctoral Fellow, UC Los Angeles 2010–2013

## Education

- Ph.D. **2010, Astronomy, The Ohio State University.** Dissertation advisor: David Weinberg.  
Other advisors: Krzysztof Stanek, Richard Pogge, Paul Martini.  
Dissertation title: *From Galaxies to the Intergalactic Medium*
- M.S. **2007, Astronomy, The Ohio State University.**
- S.B. **2005, Physics, Massachusetts Institute of Technology.** Thesis advisor: Paul Schechter.  
Thesis title: *Gravitationally lensed image simulations for the study of the substructure in galaxy clusters*

## Awards and Other Recognition

- AURA Outstanding Achievement Award for Science 2020
- NASA Group Achievement Award to the WFIRST Project Team for “outstanding performance in developing and optimizing the WFIRST formulation design reference” 2017
- STScI Bonus for contributions to developing the Hubble Spectroscopic Legacy Archive 2016

## Highlights

- **Eleven first-author** and forty-eight total **refereed publications** since 2006; over 3800 citations,  $h=27$ , eleven publications with over 100 citations. Given over **fifty invited talks and colloquia** since 2009.
- PI or co-PI of **over \$4.4 million in grants**, including a NASA Theoretical and Computational Astrophysics Networks Program Grant, an NSF Astronomy & Astrophysics Research Grant, and a NASA Astrophysics Theory Program Grant as PI. PI or co-I on twenty successful Cycles 20–29 *Hubble* proposals (total of 496 prime orbits, plus seven archival/theory).
- PI or co-I for competitively-awarded time of **over 100 million core-hours** on national high-performance supercomputing facilities (~\$2.7 million equivalent).
- Lead of the Archived Synthetic Data Initiative, through which we are ingesting synthetic data into the Mikulski Archive for Space Telescopes and delivering it back to the community in accessible formats
- *Wide-Field InfraRed Survey Telescope* Wide Field Imager Simulations Working Group Co-chair, 2016–2019
- Co-creator of the Hubble Spectroscopic Legacy Archive, a science-ready compilation of all publicly available COS/FUV data
- **Science Organizing Committee chair or co-chair** for **three international conferences** and SOC member for five other international meetings since 2012

### Selected Grants Received

- PI, NASA Theoretical and Computational Astrophysics Networks Program, \$1,653,258 over five institutions**, “Gas and Galaxies Across Cosmic Time with Enzo-E” 2020
- Admin PI, HST Proposal ID #16140 (PI: C. Lochhaas), \$137,400, Cycle 28, Archival Theory Proposal, “What Holds Up the CGM?” 2020
- Co-PI, NSF AST-1910414, \$881,000 over three institutions**, “Collaborative Research: The Spatially Resolved Circumgalactic Medium” 2019
- PI, NASA Astrophysics Theory Program, 17-ATP17-0169, \$705,575**, “Figuring Out Gas & Galaxies in Enzo (FOGGIE): The Gas-Galaxy Connection at  $z > 2$ ” 2018
- Co-I, HST Proposal ID #15020 (PI: A. Fox), Cycle 25, Archival Proposal, “The Mass Outflow Rate of the Milky Way” 2017
- Co-I, HST Proposal ID #15012 (PI: L. Corlies), \$141,449, Cycle 25, Archival Theory Proposal, “Resolving the Small-Scale Structure of the Circumgalactic Medium in Cosmological Simulations” 2017
- Co-I, STScI Admin PI, HST Proposal ID #15075, (\$29,429; PI: J. C. Howk) Cycle 25, “The CGM of Massive Galaxies: Where Cold Gas Goes to Die?” 2017
- Admin PI, HST Proposal ID #14560 (PI: N. Earl), \$122,906, Cycle 24, Archival Proposal, “Diagnosing the Multiphase Circumgalactic Medium” 2016
- PI, NSF AST-1517908, \$833,170 over four institutions**, “Collaborative Research: Multiscale Physics and Feedback in Real and Simulated Circumgalactic Gas Over Cosmic Time” 2015
- Co-I, STScI Admin PI, HST Proposal ID #14268, Cycle 23 (\$73,207, PI: N. Lehner), “Project AMIGA: Mapping the Circumgalactic Medium of Andromeda” 2015
- PI, HST Proposal ID #13919, Cycle 22, Archival Theory Proposal (\$115,246)**, “MAST Interface to Synthetic Telescopes with yt (MISTY): Observing Simulations of the Intergalactic Medium” 2014
- Co-I, STScI Admin PI, HST Proposal ID #13275 (\$10,948, PI: J. K. Werk), Archival Proposal, “The Skeleton in the Closet: Testing the Effect of HII Region Self-Enrichment Using Archival STIS Data” 2013

### Computing Allocations

- PI, NASA HEC-SMD-20-64880130, 1,500,000 Standard Billing Units thus far on NASA’s Pleiades**, “Gas and Galaxies Across Cosmic Time with Enzo-E” (\$705,000 equivalent) 2020–present
- PI, NCSA Blue Waters, 200,000 Node Hours**, “Figuring Out Gas & Galaxies in Enzo (FOGGIE): Galaxy Evolution in a Resolved Intergalactic Medium” (~\$200,000 equivalent) 2018
- PI, NASA HEC-SMD-17-1233, 3,454,126 Standard Billing Units thus far on NASA’s Pleiades**, “Figuring Out Gas & Galaxies in Enzo (FOGGIE): The Gas-Galaxy Connection at  $z > 2$ ” (approximately 64.6 million core hours; \$1,790,202 equivalent) 2018–present
- Co-I, NASA HEC-SMD-17-1445 (PI: L. Corlies), 485,264 Service Units on NASA’s Pleiades, “Resolving the Small-Scale Structure of the Circumgalactic Medium in Cosmological Simulations” (\$77,642 equivalent) 2017

**Computing Allocations, continued**

**Co-PI, XSEDE #AST170022 (PI: L. Corlies), 40,106 Node Hours on TACC's Stampede2**, “Figuring Out Gas & Galaxies in Enzo (FOGGIE): Resolving the Small-Scale Structure of Gas Flows in the Circumgalactic Medium” (\$11,673 equivalent) 2017

**PI, XSEDE startup allocation, TACC's Stampede**, “Figuring Out Gas & Galaxies in Enzo (FOGGIE): High-resolution simulations of the evolving circumgalactic medium” 2017

**Selected Observing Programs**

Co-I HST Proposal ID #16730 (PI: N. Lehner) Cycle 29, 137 primary orbits, 137 parallel orbits, “Connecting the Smoke to the Fire: Mapping Andromeda's Inner Circumgalactic Medium” 2021

Co-I JWST Proposal ID #2433 (PI: J. C. Howk) Cycle 1, 16.1 primary hours, “Imaging the disk-halo boundary layer: PAH emission as a probe of the energetics and physics of interstellar thick disks” 2020

Co-I JWST Proposal ID #1837 (PI: J. Dunlop) Cycle 1, 187.2 primary hours, 47.5 parallel hours, “PRIMER: Public Release IMaging for Extragalactic Research” 2020

Co-I, NASA Keck (PI: R. Bordoloi) 2020A, 1 night of KCWI time, “Direct maps of star-forming regions, gas, and metals at  $z \sim 2$  with KCWI” 2019

Co-I, HST Proposal ID #15887, (PI: A. Fox) Cycle 27, 33 orbits, “The Nature and Origin of Compact High-Velocity Clouds” 2019

Co-I, HST Proposal ID #15161, (PI: K. Barger) Cycle 25, 7 orbits, “The fate of infalling gas during its final approach onto the Milky Way disk” 2017

Co-I, HST Proposal ID #15075, (PI: J. C. Howk) Cycle 25, 45 orbits, “The CGM of Massive Galaxies: Where Cold Gas Goes to Die?” 2017

Co-I, HST Proposal ID #14268, (PI: N. Lehner) Cycle 23, 93 primary orbits, 93 parallel orbits “Project AMIGA: Mapping the Circumgalactic Medium of Andromeda” 2015

Co-I, HST Proposal ID #13851, (PI: R. Bordoloi) Cycle 22, 34 orbits, “How Galaxy Mergers Affect Their Environment: Mapping the Multiphase Circumgalactic Medium of Close Kinematic Pairs” 2014

Co-I, HST Proposal ID #13033 (PI: J. Tumlinson), Cycle 20, 14 orbits, “COS-Halos: New FUV Measurements of Baryons and Metals in the Inner Circumgalactic Medium” 2012

**Mentoring Activities – Research Supervisor**

Ayan Acharyya, Johns Hopkins University postdoctoral researcher 2021–present

Anna Wright, Johns Hopkins University postdoctoral researcher 2020–present

Ramona Augustin, Space Telescope Science Institute postdoctoral researcher 2019–present

Cassandra Lochhaas, Space Telescope Science Institute postdoctoral researcher 2019–present

Raymond Simons, Johns Hopkins University postdoctoral researcher; now Space Telescope Science Institute Giacconi Fellow 2018–present

Lauren Corlies, Johns Hopkins University postdoctoral researcher (currently Deputy Head of Education and Public Outreach for the Vera C. Rubin Observatory) 2016–2018

**Mentoring Activities – Research Supervisor, continued**

Nicholas Earl, STScI Research & Instrumentation Analyst and Software Engineer	2015–present
Melissa Morris, University of Texas at Austin undergraduate (currently a graduate student in astronomy at the University of Wisconsin, Madison), STScI Space Astronomy Summer Program intern	2017
Sean Fillingham, UCLA undergraduate (currently a postdoctoral researcher at the University of Washington), summer REU and senior project	2012–2013
Jennifer Kadowaki, UCLA undergraduate (currently a graduate student in astronomy at the University of Arizona), single quarter research project	2011

**Other Mentoring Activities**

Claire Murray, Space Telescope Science Institute postdoctoral researcher / Johns Hopkins University NSF Postdoctoral Fellow; mentor through the STScI postdoc mentoring program	2018–2020
Tuomas Kangas, Space Telescope Science Institute postdoctoral researcher; mentor through the STScI postdoc mentoring program	2018–2020
Lauren Corlies, LSSST Education & Public Outreach Scientist	2018–present
Yong Zheng, UC Berkeley Miller Fellow	2018–present
Presented poster on the Postdoctoral Mentoring Program at STScI at 231 <sup>st</sup> AAS meeting	2018

**Mission Support Work**

• <i>Hubble Space Telescope</i> Spectrographs	2014–2017
○ Hubble Spectroscopic Legacy Archive: co-creator of initial data release and lead author of associated COS Instrument Science Report (ISR) 2017-04	2015–2017
○ Space Telescope Imaging Spectrograph: author of Instrument Science Report on The Fading of the STIS Ultraviolet Calibration Lamps (STIS ISR 2017-04), PI of special calibration program PID 14489 determining the FUV flux of the HITM2 lamp, PI of flats and dispersion solution monitor calibration programs (PIDs 14419, 14427, 14823, 14824, 14831, 14836), user support deputy and contact scientist for numerous GO programs	2015–2017
○ Cosmic Origins Spectrograph: Co-author on COS ISR 2015-03 on Changes to the COS Extraction Algorithm for Lifetime Position 3, contact scientist for numerous GO programs	2014–2015
• <i>Wide-Field Imaging Survey Telescope</i> : chair of Wide-Field Imager Simulations Working Group, liaison to several Science Investigation Teams and Preparatory Science Teams	2014–present
• Archived Synthetic Data Initiative: creator and lead of program to archive synthetic data generated from astrophysical simulations; presented prototype at STScI townhall at the 235 <sup>th</sup> AAS meeting in January 2020	2018–present
• STScI Science Policies	2016–present
○ Deputy Head of <i>Hubble Space Telescope</i> Science Policies	2019–present
○ Liaison to the <i>Hubble Space Telescope</i> Users Committee	2016–present
○ Manager for several <i>HST</i> Time Allocation Committee panels	2016–present

**Service and Professional Activities**

NASA Astrophysics Data Analysis Program Panel Reviewer	2018
Participant, Alan Alda Science Communication Workshop; Baltimore, MD	2017
NASA Astrophysics Theory Program Panel Reviewer	2016
<i>Wide-Field InfraRed Survey Telescope</i> Science Investigation Teams Panel Reviewer	2015
National Science Foundation Astronomy and Astrophysics Research Grants Panel Reviewer	2021, 2014
<i>Hubble Space Telescope</i> Time Allocation Panel Member, Cycle 20	2012

**Space Telescope Science Institute Service**

Science Recruitment Committee Member	2018–2019
STScI Postdoc Mentoring Program Coordinator	2017–present
STScI Postdoc Hiring Coordination Committee Member	2017–2019
Weekly Galaxy Journal Club staff sponsor	2014–2017
Weekly Galaxy Journal Club organizer	2013–2014
Giacconi and Lasker Fellowships Selection Committee Member	2017
Giacconi Fellowship Selection Committee Member	2015
STScI Science Evaluation Committee Member	2016
STScI Science Research Support Advisory Committee Member	2016
Curator for @stsci twitter account (sole curator until 2019)	2015–2020
Space Telescope Science Institute HotSci Talk Committee Member	2014

**Press Releases and Publicity**

“NASA’s Hubble surveys gigantic galaxy”, joint STScI and ESA/Hubble press release regarding our HST observations of UGC 2885 (which we have dubbed “Rubin’s Galaxy”).	2020
“Illuminating the Gas Between Galaxies with Supercomputing”, press release about the FOGGIE simulations from NASA Ames in conjunction with the Supercomputing 2019 conference, <a href="https://www.nasa.gov/image-feature/ames/illuminating-gas-between-galaxies">https://www.nasa.gov/image-feature/ames/illuminating-gas-between-galaxies</a> ; including being picked up by Vice: <a href="https://www.vice.com/en_us/article/9kepy8/watch-this-ultra-hypnotic-supercomputer-simulation-of-galaxies-feasting">https://www.vice.com/en_us/article/9kepy8/watch-this-ultra-hypnotic-supercomputer-simulation-of-galaxies-feasting</a>	2019
“Milky Way Raids Intergalactic ‘Bank Accounts’, Hubble Study Finds”, press release based on the Fox et al. (2019) ApJ article, “The Mass Inflow and Outflow Rates of the Milky Way” <a href="https://hubblesite.org/contents/news-releases/2019/news-2019-46">https://hubblesite.org/contents/news-releases/2019/news-2019-46</a>	2019
“The life and breath of galaxies”, Knowable Magazine article by Ann Finkbeiner on the circumgalactic medium, based in part on the Tumlinson, Peeples, & Werk (2017) ARA&A article, featuring several quotes from me: <a href="https://www.knowablemagazine.org/article/physical-world/2019/intergalactic-medium-gas-galaxy">https://www.knowablemagazine.org/article/physical-world/2019/intergalactic-medium-gas-galaxy</a> ; reprinted in The Atlantic as “The Space Between Galaxies Isn’t Empty”: <a href="https://www.theatlantic.com/science/archive/2019/08/life-and-breath-galaxies/596767/">https://www.theatlantic.com/science/archive/2019/08/life-and-breath-galaxies/596767/</a>	2019

## Press Releases and Publicity, continued

- “The ecosystem that controls a galaxy’s future is coming into focus”, ScienceNews cover story by Lisa Grossman on the circumgalactic medium, based on the Tumlinson, Peeples, & Werk (2017) ARA&A article and the FOGGIE simulations, featuring several quotes from me: 2018  
<https://www.sciencenews.org/article/cosmic-cloak-controls-galaxy-future-coming-focus>
- “Most Earth-Like Worlds Yet To Be Born, According to Theoretical Study”, press release based on Behroozi & Peeples (2015) MNRAS article, “On The History and Future of Cosmic Planet Formation”; spawned articles in New Scientist, Science Daily, The Huffington Post, Cosmos Magazine, etc. 2015  
[http://hubblesite.org/news\\_release/news/2015-35/1-planets](http://hubblesite.org/news_release/news/2015-35/1-planets)
- “The mystery of the dead galaxies”, Science Magazine article by Ann Finkbeiner on the circumgalactic medium of galaxies that are no longer forming stars, prominently featuring several quotes from me: 2014  
<http://science.sciencemag.org/content/346/6212/905>

## International Conferences Organized

- Science Organizing Committee member for 5th Annual GMT Community Science Meeting, “Chemical Evolution of the Universe”, held in Tarrytown, NY 2017
- Co-Chair**, Science Organizing Committee for “**Astronomy in the 2020s: Synergies with WFIRST**”, a WFIRST/STScI conference with over 100 participants; Baltimore, MD 2017
- Science Organizing Committee member for “Forging Connections: From Nuclei to the Cosmic Web”; East Lansing, MI 2017
- Science Organizing Committee member for “Detecting the Unexpected: Discovery in the Era of Astronomically Big Data”, an STScI workshop; Baltimore, MD 2017
- Science Organizing Committee member for “What Shapes Galaxies?”, an STScI symposium on the physical processes shaping galaxies; Baltimore, MD 2016
- Chair**, Science Organizing Committee for “**Mocking the Universe: Better Science Through Data Simulation**”, an STScI workshop on preparing for and learning from future and current surveys and observing facilities; Baltimore, MD 2015
- Science Organizing Committee member for “The Near-Field Deep-Field Connection”, a meeting on the interface of local relics and the first galaxies; Irvine, CA 2014
- Co-chair**, Organizing Committee for “**The Baryon Cycle**”, an international meeting with 130 participants, on galaxy outflows, inflows, and the circumgalactic medium; Irvine, CA 2012

## Invited Talks at Conferences

1. “Maximizing the Science from Two Great Observatories” Special Session at the January 2020 American Astronomical Society #235 meeting; Invited Talk: “Overview of Joint *HST* / *JWST* Science Policy Synergies” 2020
2. International Conference for High Performance Computing, Networking, Storage and Analysis 2019 (Supercomputing2019): Invited by NASA High-End Computing Capabilities program to give three half-hour presentations about the FOGGIE simulations on the NASA Hyperwall at the NASA booth; 2019  
<https://www.nas.nasa.gov/SC19/demos/demo4.html>

**Invited Talks at Conferences, continued**

3. What matter(s) between galaxies: Unraveling the knots in the Cosmic Web meeting; Abbazia di Spineto, Italy; Invited Talk: “Figuring Out Gas & Galaxies In Enzo” 2019
4. Joint Institute for Nuclear Astrophysics 2019 Frontiers in Nuclear Astrophysics conference at Michigan State University; Invited Talk: “The role of low-density gas in redistributing the heavy elements: Insights from the FOGGIE Simulations” 2019
5. Warm and Hot Baryonic Matter in the Cosmos, a Focus Meeting at the 30th IAU General Assembly; Vienna, Austria; Invited Review Talk: “The Multiphase Circumgalactic Medium” 2018
6. The Near, The Far, and the In-between: Synergy between low and high redshift galaxy evolution studies in the era of *JWST* and *Euclid*; Invited Review Talk: “The Circumgalactic Medium” 2018
7. A Star Was Born: A conference celebrating the scientific achievements of Mike Dopita, Abbazia di Spineto, Italy; Invited Talk: “Figuring Out Gas & Galaxies In Enzo” 2018
8. A Decade of the Star-Forming Main Sequence; Leiden, The Netherlands; Invited Talk: “The Role of the Star-Forming Main Sequence for Chemical Evolution Models” 2017
9. The Circle of Life: Connecting the Intergalactic, Circumgalactic, and Interstellar Media; Kruger Park, South Africa; Invited Talk: “The Simulated Circumgalactic Medium: FOGGIE, MISTY, and other Cloudy matters” 2017
10. *JWST* at the Royal Edinburgh Observatory; Invited Talk: “The Evolution of Metals” 2016
11. Southern Cross Astrophysics Conference Series VIII: Multiwavelength Dissection of Galaxies; Sydney, Australia; Invited Talk: “The Circumgalactic Medium” 2015
12. Metals in Tuscany; Abbazia di Spineto, Italy; Invited Talk, “Stellar and gas metallicity distributions of  $z=0$  galaxies” 2012

**Other Invited Colloquia, Seminars, and Presentations**

13. Space Telescope Science Institute Colloquium 2020
14. Charles University, Prague, The Czech Republic; Institute of Theoretical Physics Seminar 2019
15. Joint National Optical Astronomical Observatory and University of Arizona Astronomy Department Colloquium 2019
16. American Museum of Natural History Astrophysics Seminar 2018
17. Joint National Radio Astronomical Observatory and University of Virginia Astronomy Department Colloquium 2017
18. The Ohio State University Astronomy Colloquium 2016
19. University of Maryland Astronomy Colloquium 2016
20. University of Pennsylvania Astrophysics Colloquium 2016
21. Pennsylvania State University; Astronomy and Astrophysics Colloquium 2014

**Other Invited Colloquia, Seminars, and Presentations, continued**

22. Carnegie Observatories; Seminar	2014
23. Rutgers, The State University of New Jersey; Astrophysics Colloquium	2014
24. Goddard Space Flight Center; Stellar & Extragalactic Astronomy Lunch	2014
25. New Mexico State University; Astronomy Seminar	2013
26. Australia National University; Research School of Astronomy & Astrophysics Colloquium	2013
27. Swinburne University; Astrophysics Colloquium	2013
28. University of Michigan; Astronomy Colloquium	2013
29. Michigan State University; Astrophysics Seminar	2013
30. University of Notre Dame; Astrophysics Seminar	2013
31. UC Santa Cruz; Astrophysics Seminar	2012
32. UC San Diego; Center for Astrophysics and Space Sciences Seminar	2012

**Outreach and Public Engagement**

Career Panel Member for the Broadcom MASTERS finals, a national-level middle school STEM research competition	2019
Weekly Space Hangout Guest, <a href="https://www.youtube.com/watch?v=pIQ59x6wkWo">https://www.youtube.com/watch?v=pIQ59x6wkWo</a>	2019
Charles University, Prague, The Czech Republic; Invited Public Talk	2019
Hanselminutes Technology Podcast guest <a href="https://www.hanselminutes.com/674/how-galaxies-evolve-with-dr-molly-peeples">https://www.hanselminutes.com/674/how-galaxies-evolve-with-dr-molly-peeples</a>	2019
Guest Lecturer at the Research Science Institute, a pre-eminent international summer research program for high school students held at the Massachusetts Institute of Technology	2018
Story Collider storyteller <a href="https://www.storycollider.org/shows/2018/4/25/washington-dc">https://www.storycollider.org/shows/2018/4/25/washington-dc</a>	2018
People Behind The Science podcast interview <a href="http://www.peoplebehindthescience.com/dr-molly-peeples/">http://www.peoplebehindthescience.com/dr-molly-peeples/</a>	2017
Helped staff the STScI exhibit at Artscape, a weekend-long free art festival in Baltimore, MD	2016
Participated in three “Hubble Hangouts”, live-streamed interactive discussions on: “Mocking the Universe” and the importance of synthetic data; on how “Most Earth-like Planets Have Yet To Be Born”, a press release based on the Behroozi & Peeples (2015) paper; and on the Hubble Spectroscopic Legacy Archive and the importance of public data	2015–2016
Center for Excellence in Education Teacher Enrichment Program Bite of Science presentation, <a href="https://www.youtube.com/watch?v=MXz_6SEGIMg">https://www.youtube.com/watch?v=MXz_6SEGIMg</a>	2015



## Outreach and Public Engagement, continued

Public Talk at The South Carolina State Museum on the occasion of the Grand Opening of their new astronomy wing, planetarium, and telescope collection	2014
Family Night Public Talk at STScI	2014
Helped staff the STScI booth at the May 2014 USA Science and Engineering Festival	2014