

# Bingjie Wang

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## RESEARCH INTERESTS

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Galaxy formation and evolution, stellar populations, reionization, statistics, and machine learning

## EDUCATION

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**Johns Hopkins University** Baltimore, MD  
Ph.D. in Astronomy & Astrophysics 2016–2021  
– Thesis: “Implications for the Epoch of Reionization in the Local Universe”  
– Advisor: Prof. Timothy Heckman

**University of Pittsburgh** Pittsburgh, PA  
B.A. in Philosophy, B.Phil. in Physics with honors, *Magna Cum Laude* 2012–2016  
– Thesis: “Evaluating the Standard Model of Cosmology in Light of Large-scale Anomalies in the Cosmic Microwave Background”  
– Advisor: Prof. Arthur Kosowsky

## PROFESSIONAL POSITION

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**Postdoctoral Scholar** 2022–present  
The Pennsylvania State University  
– Main focus: spectral energy distribution modeling for various populations discovered by JWST at high redshift  
– Mentor: Prof. Joel Leja

## PUBLICATIONS

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11 as first author, 55 in total (as of 06/2024).  
For first-author only: h-index = 10, citations > 250; [ADS](#).  
For all publications: h-index = 26, citations > 2000; these are listed in a separate section at the end; [ADS](#).

### First Author

- <sup>1</sup>**B. Wang**, J. Leja, et al., “RUBIES: Evolved Stellar Populations with Extended Formation Histories at  $z \sim 7 - 8$  in Candidate Massive Galaxies Identified with JWST/NIRSpec”, *ApJL* **969**, L13 (2024).
- <sup>2</sup>**B. Wang**, A. de Graaff, et al., “RUBIES: JWST/NIRSpec Confirmation of an Infrared-luminous, Broad-line Little Red Dot with an Ionized Outflow”, arXiv e-prints, arXiv:2403.02304 (2024).
- <sup>3</sup>**B. Wang**, J. Leja, et al., “Quantifying the Effects of Known Unknowns on Inferred High-redshift Galaxy Properties: Burstiness, IMF, and Nebular Physics”, *ApJ* **963**, 74 (2024).
- <sup>4</sup>**B. Wang**, J. Leja, et al., “The UNCOVER Survey: A First-look HST+JWST Catalog of Galaxy Redshifts and Stellar Population Properties Spanning  $0.2 \lesssim z \lesssim 15$ ”, *ApJS* **270**, 12 (2024).

- <sup>5</sup>**B. Wang**, S. Fujimoto, et al., “UNCOVER: Illuminating the Early Universe—JWST/NIRSpec Confirmation of  $z > 12$  Galaxies”, *ApJL* **957**, L34 (2023).
- <sup>6</sup>**B. Wang**, J. Leja, V. A. Villar, and J. S. Speagle, “SBI<sup>++</sup>: Flexible, Ultra-fast Likelihood-free Inference Customized for Astronomical Applications”, *ApJL* **952**, L10 (2023).
- <sup>7</sup>**B. Wang**, J. Leja, et al., “Inferring More from Less: Prospector as a Photometric Redshift Engine in the Era of JWST”, *ApJL* **944**, L58 (2023).
- <sup>8</sup>**B. Wang**, J. Leja, A. Villar, and J. S. Speagle, “Monte Carlo Techniques for Addressing Large Errors and Missing Data in Simulation-based Inference”, *ML4PS, NeurIPS* (2022).
- <sup>9</sup>**B. Wang**, T. M. Heckman, et al., “The Low-redshift Lyman-continuum Survey: [S II] Deficiency and the Leakage of Ionizing Radiation”, *ApJ* **916**, 3 (2021).
- <sup>10</sup>**B. Wang**, T. M. Heckman, G. Zhu, and C. A. Norman, “A Systematic Study of Galactic Outflows via Fluorescence Emission: Implications for Their Size and Structure”, *ApJ* **894**, 149 (2020).
- <sup>11</sup>**B. Wang**, T. M. Heckman, et al., “A New Technique for Finding Galaxies Leaking Lyman-continuum Radiation: [S II] Deficiency”, *ApJ* **885**, 57 (2019).

## Second/Third Author

- <sup>12</sup>P. van Dokkum, G. Brammer, **B. Wang**, J. Leja, and C. Conroy, “A Massive Compact Quiescent Galaxy at  $z = 2$  with a Complete Einstein Ring in JWST Imaging”, *Nature Astronomy* **8**, 119–125 (2024).
- <sup>13</sup>S. Fujimoto, **B. Wang**, et al., “UNCOVER: A NIRSpec Census of Lensed Galaxies at  $z = 8.50 - 13.08$  Probing a High AGN Fraction and Ionized Bubbles in the Shadow”, *arXiv e-prints*, arXiv:2308.11609 (2023).
- <sup>14</sup>H. Atek, I. Chemerynska, **B. Wang**, et al., “JWST UNCOVER: Discovery of  $z > 9$  Galaxy Candidates Behind the Lensing Cluster Abell 2744”, *MNRAS* **524**, 5486–5496 (2023).
- <sup>15</sup>D. J. Watts, **B. Wang**, et al., “A Projected Estimate of the Reionization Optical Depth Using the CLASS Experiment’s Sample Variance Limited E-mode Measurement”, *ApJ* **863**, 121 (2018).
- <sup>16</sup>S. Aiola, **B. Wang**, et al., “Microwave Background Correlations from Dipole Anisotropy Modulation”, *PRD* **92**, 063008 (2015).
- <sup>17</sup>S. Aiola, A. Kosowsky, and **B. Wang**, “Gaussian Approximation of Peak Values in the Integrated Sachs-Wolfe Effect”, *PRD* **91**, 043510 (2015).

## SCIENCE TALKS (SELECTED)

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PHYSTAT—Simulation Based Inference in Fundamental Physics, Max Planck Institute for Physics ( <b>invited focus talk</b> , declined due to a temporary visa issue)	05/24
SED fitting for JWST data, Pan-survey SED-fitting Forum ( <b>invited</b> )	01/24
ELT science in light of JWST, University of California at Los Angeles	12/23
Statistical challenges in modern astronomy VIII, Pennsylvania State University	06/23
Modern statistics of galaxies, Ludwig-Maximilians-Universität ( <b>invited</b> )	06/23
Cosmic connections: a ML $\times$ astrophysics symposium, Simons Foundation	05/23
Astronomy seminar, University of Pittsburgh ( <b>invited</b> )	03/23
Astrostatistics seminar, University of Toronto ( <b>invited</b> )	03/23
Astronomy seminar, University of Connecticut ( <b>invited</b> )	03/22
Dissertation talk, 237th Meeting of the American Astronomical Society	01/21

Lunch talk, University of California at Berkeley	10/20
First light, University of São Paulo	08/19
Annual Sanielevici lecture, University of Pittsburgh	02/15
Workshop on large-scale anomalies, Case Western Reserve University	09/14
DAAD RISE scholarship holder meeting, Heidelberg, Germany	07/14
Neighborhood workshop, Pennsylvania State University	04/14

## PRESS

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Based on lead-author works:

“Trio of early galaxies test our ideas of cosmic evolution”; Sky & Telescope	2024
“Too many stars, too fast?”; AAS NOVA research highlights see also the PSU release (Space.com, The Independent, ...)	2024
“JWST discovery of the second- and fourth-most distant galaxies”; PSU release (Space.com, Newsweek, Daily Mail, ...)	2023
“JWST uncovers new details in Pandora’s Cluster”; NASA/STScI/PSU release	2023
“[S II] deficiency and the leakage of ionizing radiation”; AAS journal author series	2021
“Tracing gas flows out of star-forming galaxies”; AAS NOVA research highlights	2020

Expert comments for:

BBC, New Scientist, Sky & Telescope

Selected other press releases:

“NASA telescopes discover record-breaking black hole”; NASA release (CNN, ...)	2023
“Massive early galaxies defy prior understanding of the universe”; NASA/Nature/ANU/PSU release (CNN, The Guardian, NPR, ...)	2023

## PROFESSIONAL EXPERIENCE

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JWST Director’s Discretionary proposal reviewer	2024
NASA proposal review: panelist	2023
Reviewer for <i>The Astrophysical Journal</i> , <i>The Astrophysical Journal Letters</i>	2021–

## HONORS AND AWARDS

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Rodger Doxsey Travel Prize, American Astronomical Society	2020
First-prize poster, First Light at University of São Paulo	2019
ΣΠΣ physics honors society initiate	2016
Thompson award for excellence in scientific writing, Physics & Astronomy, UPitt	2016
Halliday award for excellence in undergraduate research, Physics & Astronomy, UPitt	2015
Thomas-Lain fund scholarship, Physics & Astronomy, UPitt	2015
Research Internship in Science & Engineering, Deutschen Akademischen Austauschdienstes	2014
Sanielevici undergraduate research scholarship, Physics & Astronomy, UPitt	2014



## TEACHING & MENTORING EXPERIENCE

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Co-advising Kanishk Pandey, Penn State graduate student	2024–
Primary advisor for Emilie Burnham, Penn State graduate student	2023–
Co-advising Nathan Cristello, Penn State undergraduate	2023
Guest Lecturer, Penn State University	2023–
Graduate level: extragalactic astronomy	
Undergraduate level: introduction to astronomy for non-majors	
Graduate Teaching Assistant, Johns Hopkins University	2016–2018
Graduate level: astrophysical dynamics, radiative astrophysics	
Undergraduate level: cosmology, general physics for biological science majors, general physics for physical science majors, general physics labs	

## OPEN-SOURCE SOFTWARE

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- sbi\_pp: simulation-based inference customized for astronomical applications 
- Prospector: Bayesian inference of stellar population properties from photometric and/or spectroscopic data (contributor) 

## PROPOSALS

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- HST GO Cycle 32 (Co-I): Fulfilling the UV Legacy of the Hubble and Webb Deep Public Frontier Field
- HST GO Cycle 32 (Co-I): Mg II Maps to Reveal How Ionizing Photons Escape Local LyC-emitting Galaxies
- JWST GO Cycle 3 (Co-I): Clumpy Relics: The First Spectroscopic Confirmation of Globular Clusters at  $z \sim 3$
- HST GO Cycle 31 (Co-I): The Optical Emission of the Highest Redshift Lens System
- JWST GO Cycle 2 (Co-I): Medium Bands, Mega Science: Spatially-resolved Spectrophotometry of 50,000 sources at  $z = 0.3 - 12$
- JWST GO Cycle 2 (Co-I): Extremely Massive Galaxies in the Early Universe: A Challenge to  $\Lambda$ CDM?
- HST GO Cycle 30 (Co-I): Are There Two Classes of Lyman-leaky Galaxies?
- HST GO Cycle 30 (Co-I): Resolving Lyman Alpha Emission in a Complete Sample of Lyman Continuum Leakers and Non-leakers
- HST GO Cycle 30 (Co-I): The Lyman-alpha and Continuum Origins Survey
- JWST GO Cycle 1 (Co-I): LyC22—Deep Spectroscopic Insights on Star-forming Galaxies 2.2 Gyr After the Big Bang

## CO-AUTHORED PUBLICATIONS

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- <sup>18</sup>K. A. Suess, J. R. Weaver, et al., “Medium Bands, Mega Science: a JWST/NIRCam Medium-Band Imaging Survey of Abell 2744”, arXiv e-prints, arXiv:2404.13132 (2024).
- <sup>19</sup>A. de Graaff, D. J. Setton, et al., “Efficient Formation of a Massive Quiescent Galaxy at Redshift 4.9”, arXiv e-prints, arXiv:2404.05683 (2024).
- <sup>20</sup>D. J. Setton, G. Khullar, et al., “UNCOVER NIRSpec/PRISM Spectroscopy Unveils Evidence of Early Core Formation in a Massive, Centrally Dusty Quiescent Galaxy at  $z_{spec} = 3.97$ ”, arXiv e-prints, arXiv:2402.05664 (2024).

- <sup>21</sup>F. Leclercq, J. Chisholm, et al., “Linking Mg II and [O II] Spatial Distribution to Ionizing Photon Escape in Confirmed LyC Leakers and Non-leakers”, *A&A* **687**, A73 (2024).
- <sup>22</sup>I. Chemerynska, H. Atek, et al., “JWST UNCOVER: The Overabundance of Ultraviolet-luminous Galaxies at  $z > 9$ ”, *MNRAS* **531**, 2615–2625 (2024).
- <sup>23</sup>S. E. Cutler, K. E. Whitaker, et al., “Two Distinct Classes of Quiescent Galaxies at Cosmic Noon Revealed by JWST PRIMER and UNCOVER”, *ApJL* **967**, L23 (2024).
- <sup>24</sup>L. J. Furtak, I. Labbé, et al., “A High Black-hole-to-host Mass Ratio in a Lensed AGN in the Early Universe”, *Nature* **628**, 57–61 (2024).
- <sup>25</sup>L. Wright, K. E. Whitaker, et al., “Remarkably Compact Quiescent Candidates at  $3 < z < 5$  in JWST-CEERS”, *ApJL* **964**, L10 (2024).
- <sup>26</sup>J. E. Greene, I. Labbé, et al., “UNCOVER Spectroscopy Confirms the Surprising Ubiquity of Active Galactic Nuclei in Red Sources at  $z > 5$ ”, *ApJ* **964**, 39 (2024).
- <sup>27</sup>H. Atek, I. Labbé, et al., “Most of the Photons that Reionized the Universe Came from Dwarf Galaxies”, *Nature* **626**, 975–978 (2024).
- <sup>28</sup>A. J. Burgasser, R. Bezanson, et al., “UNCOVER: JWST Spectroscopy of Three Cold Brown Dwarfs at Kiloparsec-scale Distances”, *ApJ* **962**, 177 (2024).
- <sup>29</sup>R. O. Amorín, M. Rodríguez-Henríquez, et al., “Ubiquitous Broad-line Emission and the Relation between Ionized Gas Outflows and Lyman Continuum Escape in Green Pea Galaxies”, *A&A* **682**, L25 (2024).
- <sup>30</sup>J. R. Weaver, S. E. Cutler, et al., “The UNCOVER Survey: A First-look HST + JWST Catalog of 60,000 Galaxies near A2744 and beyond”, *ApJS* **270**, 7 (2024).
- <sup>31</sup>O. Bait, S. Borthakur, et al., “The Low-redshift Lyman Continuum Survey: Radio Continuum Properties of Low- $z$  Lyman Continuum Emitters”, arXiv e-prints, arXiv:2310.18817 (2023).
- <sup>32</sup>S. H. Price, K. A. Suess, et al., “UNCOVER: The Rest Ultraviolet to Near Infrared Multiwavelength Structures and Dust Distributions of Sub-millimeter-Detected Galaxies in Abell 2744”, arXiv e-prints, arXiv:2310.02500 (2023).
- <sup>33</sup>S. Fujimoto, R. Bezanson, et al., “DUALZ: Deep UNCOVER-ALMA Legacy High-Z Survey”, arXiv e-prints, arXiv:2309.07834 (2023).
- <sup>34</sup>A. D. Goulding, J. E. Greene, et al., “UNCOVER: The Growth of the First Massive Black Holes from JWST/NIRSpec – Spectroscopic Redshift Confirmation of an X-Ray Luminous AGN at  $z = 10.1$ ”, *ApJL* **955**, L24 (2023).
- <sup>35</sup>J. F. W. Baggen, P. van Dokkum, et al., “Sizes and Mass Profiles of Candidate Massive Galaxies Discovered by JWST at  $7 < z < 9$ : Evidence for Very Early Formation of the Central 100 pc of Present-day Ellipticals”, *ApJL* **955**, L12 (2023).
- <sup>36</sup>E. P. Mathews, J. Leja, et al., “As Simple as Possible but No Simpler: Optimizing the Performance of Neural Net Emulators for Galaxy SED Fitting”, *ApJ* **954**, 132 (2023).
- <sup>37</sup>V. Kokorev, S. Fujimoto, et al., “UNCOVER: A NIRSpec Identification of a Broad-line AGN at  $z = 8.50$ ”, *ApJL* **957**, L7 (2023).
- <sup>38</sup>L. J. Furtak, A. Zitrin, et al., “UNCOVERing the Extended Strong Lensing Structures of Abell 2744 with the Deepest JWST Imaging”, *MNRAS* **523**, 4568–4582 (2023).
- <sup>39</sup>L. J. Furtak, A. Zitrin, et al., “JWST UNCOVER: Extremely Red and Compact Object at  $z_{\text{phot}} \sim 7.6$  Triply Imaged by A2744”, *ApJ* **952**, 142 (2023).
- <sup>40</sup>I. Labbé, J. E. Greene, et al., “UNCOVER: Candidate Red Active Galactic Nuclei at  $3 < z < 7$  with JWST and ALMA”, arXiv e-prints, arXiv:2306.07320 (2023).

- <sup>41</sup>E. J. Nelson, K. A. Suess, et al., “JWST Reveals a Population of Ultrared, Flattened Galaxies at  $2 \lesssim z \lesssim 6$  Previously Missed by HST”, *ApJL* **948**, L18 (2023).
- <sup>42</sup>I. Labbé, P. van Dokkum, et al., “A Population of Red Candidate Massive Galaxies  $\sim 600$  Myr after the Big Bang”, *Nature* **616**, 266–269 (2023).
- <sup>43</sup>M. Trebitsch, P. Dayal, et al., “Reionization with Star-forming Galaxies: Insights from the Low- $z$  Lyman Continuum Survey”, arXiv e-prints, arXiv:2212.06177 (2022).
- <sup>44</sup>R. Bezanson, I. Labbe, et al., “The JWST UNCOVER Treasury Survey: Ultradeep NIRSpec and NIRCам Observations before the Epoch of Reionization”, arXiv e-prints, arXiv:2212.04026 (2022).
- <sup>45</sup>J. Chisholm, A. Saldana-Lopez, et al., “The Far-ultraviolet Continuum Slope as a Lyman Continuum Escape Estimator at High Redshift”, *MNRAS* **517**, 5104–5120 (2022).
- <sup>46</sup>X. Xu, A. Henry, et al., “Tracing Ly $\alpha$  and LyC Escape in Galaxies with Mg II Emission”, *ApJ* **933**, 202 (2022).
- <sup>47</sup>R. Marques-Chaves, D. Schaerer, et al., “No Correlation of the Lyman Continuum Escape Fraction with Spectral Hardness”, *A&A* **663**, L1 (2022).
- <sup>48</sup>S. R. Flury, A. E. Jaskot, et al., “The Low-redshift Lyman Continuum Survey. I. New, Diverse Local Lyman Continuum Emitters”, *ApJS* **260**, 1 (2022).
- <sup>49</sup>W. Wang, S. A. Kassim, et al., “The Baltimore Oriole’s Nest: Cool Winds from the Inner and Outer Parts of a Star-forming Galaxy at  $z = 1.3$ ”, *ApJ* **930**, 146 (2022).
- <sup>50</sup>S. R. Flury, A. E. Jaskot, et al., “The Low-redshift Lyman Continuum Survey. II. New Insights into LyC Diagnostics”, *ApJ* **930**, 126 (2022).
- <sup>51</sup>J. W. Appel, Z. Xu, et al., “On-sky Performance of the CLASS Q-band Telescope”, *ApJ* **876**, 126 (2019).
- <sup>52</sup>F. Krauß, K. Deoskar, et al., “Fermi/LAT Counterparts of IceCube Neutrinos Above 100 TeV”, *A&A* **620**, A174 (2018).
- <sup>53</sup>K. Harrington, J. Eimer, et al., “Variable-delay Polarization Modulators for the CLASS Telescopes”, *SPIE*, 107082M (2018).
- <sup>54</sup>J. Iuliano, J. Eimer, et al., “The Cosmology Large Angular Scale Surveyor Receiver Design”, *SPIE*, 1070828 (2018).
- <sup>55</sup>S. Dahal, A. Ali, et al., “Design and Characterization of the Cosmology Large Angular Scale Surveyor 93 GHz Focal Plane”, *SPIE*, 107081Y (2018).