John F. Wu

Bloomberg Center for Physics and Astronomy, Room 366
Johns Hopkins University
3400 N. Charles Street
Baltimore, MD 21218

jfwu@jhu.edu
github.com/jwuphysics
+1 908 410 0317

Education

Rutgers, The State University of New Jersey — **Piscataway, NJ**
Ph.D., Physics and Astronomy — *Sept 2013–Oct 2019*
Insights on galaxy evolution from studies of the multiphase interstellar medium

Carnegie Mellon University — **Pittsburgh, PA**
B.Sc., Physics/Astrophysics, MCS Honors — *Sept 2009–May 2013*

Professional Experience

Johns Hopkins University — **Baltimore, MD**
Postdoctoral fellow, advised by Josh Peek — *Sept 2019–present*

Rutgers, The State University of New Jersey — **Piscataway, NJ**
Graduate research assistant, advised by Andrew Baker — *July 2013–Aug 2019*

- *Investigated how galaxies evolve in massive clusters by observing their star formation, cold gas, and dust properties.*
- *Studied the multi-phase interstellar media of extreme, UV-selected starbursting galaxies in the local Universe.*
- *Trained deep neural networks to predict metallicities of low-z galaxies using only optical imaging.*

McWilliams Center for Cosmology, Carnegie Mellon University — **Pittsburgh, PA**
Undergraduate research assistant, advised by Rachel Mandelbaum — *July 2012–May 2013*

- *Characterized galaxies in rich clusters by using Sloan Digital Sky Survey observations.*

Carnegie Mellon University CyLab — **Pittsburgh, PA**
Research intern — *May 2011–Aug 2011*

- *Developed and tested robust facial recognition software.*
- *Created a proof of concept image manipulation tool for artificial aging.*

Refereed Publications (including submissions)

[5] "Connecting Optical Morphology, Environment, and HI Mass Fraction for Low-Redshift Galaxies Using Deep Learning,"
Wu, J. F., 2020, *ApJ*, submitted, arXiv:2001.00018. [ADS]

[4] "The Star-Forming Interstellar Medium of Lyman Break Galaxy Analogs,"
Wu, J. F., Baker, A. J., Heckman, T. M., Hicks, E. K. S., Lutz, D., Tacconi, L. J., 2019, *ApJ*, 887, 251. [ADS]

[3] "Using convolutional neural networks to predict galaxy metallicity from three-color images,"
Wu, J. F. & Boada, S., 2019, *MNRAS*, 484, 4683. [ADS]

[2] "Herschel and ALMA Observations of Massive SZE-selected Clusters,"
Wu, J. F., Aguirre, P., Baker, A. J., Devlin, M. J., Hilton, M., Hughes, J. P., Infante, L., Lindner R. R., Sifón, C., 2018, *ApJ*, 853, 195. [ADS]

[1] "Galaxy Candidates at z $\sim$ 10 in Archival Data from the Brightest of Reionizing Galaxies (BORG[z8]) Survey,"
Bernard, S. R., Carrasco, D., Trenti, M., Oesch, P. A., **Wu, J. F.**, Bradley, L. D., Schmidt, K. B., Bouwens, R. J., Calvi, V., Mason, C. A., Stiavelli, M., Treu, T., 2016, *ApJ*, 827, 76. [ADS]

Teaching Experience

Rutgers Unversity

Guest Lecturer, Byrne Seminar: The Poetry of Astronomy — *2016,2018*

Teaching Assistant, Physics 343: Observational radio astronomy (lab) — *Spring 2015*

Grader, Physics 342: Principles of astrophysics — *Spring 2015*

Other Experience

USAID Research & Innovation Fellow — **Cape Town, South Africa**

Improving the LADUMA Pipeline Using MeerKAT Early Science Data — *Sept 2016–Nov 2016*

- *Worked with S. Blyth* (UCT) *and B. Frank* (SARAO) *to analyze simulated MeerKAT data using ARCADE (African Research Cloud).*
- *Developed a pipeline to test and benchmark source-finding software.*
- *Attended the* Visualization in Astronomy *and* 3GC4: HI Fidelity conferences.
- *Followed up in Aug 2018 by working with B. Frank on continuum subtraction with MeerKAT commissioning data using IDIA high-performance computing facilities.*

Vatican Observatory Summer School — **Castel Gandolfo, Italy**

VOSS: *Galaxies, Near and Far, Young and Old* — *June 2014*

- *Completed projects with Michele Trenti* (Melbourne), *Jacqueline van Gorkom* (Columbia), *and Chris Carilli* (NRAO), the first of which led to an ApJ publication.

NRAO Synthesis Imaging Workshop — **Socorro, NM**

National Radio Astronomy Observatory 14th Synthesis Imaging Workshop — *May 2014*

- *Reduced ALMA data using Common Astronomy Software Applications (CASA).*

Honors and Awards

Robert A. Schommer Prize, *Rutgers* — *April 2018*
Best astronomy paper by a graduate student

University and Louis Bevier Fellowship Honorable Mention, *Rutgers* — *April 2018*

International Travel Grant, *American Astronomical Society* — *Mar 2017*

TA/GA Professional Development Fund, *Rutgers* — *June 2016–June 2018*
Travel support

Special Study Award, *Rutgers* — *Mar 2014*

Claud Lovelace Fellowship, *Rutgers* — *Sept 2013–June 2014*

Senior Leadership Recognition, *Carnegie Mellon* — *May 2013*

Mellon College of Science College Honors, *Carnegie Mellon* — *May 2013*

Seminars and Conference Talks/Posters

Astronomers Turned Data Scientists (ATDS), *Invited talk* — *Jan 2020*

Johns Hopkins University (JHU), *CAS Wine & Cheese Seminar* — *Oct 2019*

Galaxy Evolution in a New Era of HI Surveys (MIAPP), *Invited deep learning tutorial* — *Aug 2019*

Nine Billion Years of Neutral Gas Evolution (ESO), *Contributed talk* — *July 2019*

Rutgers Statistics, *Foundations of Probability Seminar* — *Apr 2019*

American Astronomical Society (AAS) 233rd meeting, *Dissertation talk* — *Jan 2019*

Center for Computational Astrophysics (CCA), *Galaxies Group Meeting* — *Dec 2018*

Princeton Astronomy, *Galread Seminar* — *Dec 2018*
Princeton Astronomy, *Data Science/COMPASS Seminar* — *Nov 2018*
University of Cape Town (UCT) Astronomy, *Seminar* — *Aug 2018*
Galaxy Evolution Across Time (ENS), *Contributed poster* — *June 2017*
Princeton-Rutgers 3rd annual extragalactic science day, *Contributed talk* — *May 2016*
American Astronomical Society (AAS) 227th meeting, *Contributed talk* — *Jan 2016*
Australian Astronomical Observatory (AAO), *Seminar* — *Dec 2015*

Leadership, Service, and Outreach

Co-organizer, *JHU CAS AstroCoffee* — *Jan 2020–*
Co-leader, *Rutgers Gaia Data Relase 2 Hackathon* — *May 2018*
SIGMA-P, *Seminar In Graduate Mentoring in Astronomy and Physics* — *Apr 2018*
Co-leader, *SPS/RAS Astro Hack Sessions* — *Mar–Apr 2018*
Invited Plenary Talk, *Friends of Rutgers Astronomy* — *Sep 2017*
Studying Galaxy Clusters with Herschel, ALMA, and SALT
Guest Lecturer, *Physics 343: Observational radio astronomy* — *2017, 2019*
TAC member, *SALT 2015-2 Rutgers Time Allocation Committee* — *Sep 2015*
LOC member, *SKA Pathfinders HI Science Coordination Committee (PHISCC)* — *Mar 2015*
Organizer, *Student Seminars in Physics and Astronomy at Rutgers (SSPAR)* — *Oct 2014–May 2015*
Vice President, *Rutgers Physics Graduate Student Organization (GSO)* — *Sep 2014–May 2015*
Webmaster, *Rutgers Physics GSO and SSPAR* — *Sep 2014–May 2017*
Public Talk, *Rutgers Astronomical Society* — *Mar 2014*
Anisotropies in the Cosmic Microwave Background: B-modes and Inflation
DELTA-P, *Developing Educational Leaders among TAs in Physics* — *Dec 2013*

Accepted Telescope Proposals and Observing

Very Large Array (VLA)
CoI, *A high-resolution multi-frequency map of PKS0326-288 [...]* (19A-433) — *2019A*

Anglo-Australian Telescope (AAT)
CoI, *Redshifts in the LADUMA Field to $z \sim 0.6$* (N0331) — *2017B*
- Awarded five nights of AAT/AAOmega to continue campaign of measuring redshifts in the LADUMA field.

CoI, *Redshifts in the LADUMA Field to $z \sim 0.6$* (N0334) — *2015B*
- Awarded four nights of AAT/AAOmega time to measure galaxy redshifts in preparation for studying neutral hydrogen with the LADUMA survey.
- Observed at the AAT and detected ~ 1600 galaxy redshifts.

Atacama Large Millimeter/submillimeter Array (ALMA)
PI, *Star formation and the turbulent ISM of LBG analogs* (2019.1.01423.S) — *Cycle 7*
CoI, *ALMA Lensing Cluster Survey* (2018.1.00035.L) — *Cycles 6 – 7*
CoI, *Galaxies in (and behind) two massive high-redshift clusters* (2013.1.01358.S) — *Cycle 2*
- Obtained Band 6 (230 GHz) mosaic observations to study atomic carbon and molecular CO emission of cluster galaxies, and also to study the dust continuum emission of cluster and background galaxies.
- Reduced data using the NAASC computing facilities at NRAO in Charlottesville.

Southern African Large Telescope (SALT)

CoI, *Preparing for LADUMA: SALT Redshift Measurements* (2017-1-MLT-014) *2017-1 – present*

- Awarded 40770 seconds of P1 (high priority) time to continue measuring redshifts in LADUMA field.
- Continuation of 2016-2-SCI-051.

CoI, *Preparing for LADUMA: SALT Redshift Measurements* (2016-2-SCI-051) *2016-2*

- Awarded 73616 seconds of observing time for pilot project to measure galaxy redshifts at $0.6 < z < 1.1$.

PI, *Fabry-Pérot imaging of two massive galaxy clusters* (2016-1-SCI-040) *2016-1*

- Continuation of 2015-2-SCI-052 (awarded an additional 14000 seconds of P1 time).

PI, *Fabry-Pérot imaging of two massive galaxy clusters* (2015-2-SCI-052) *2015-2*

- Continuation of the 2015-1 DDT proposal (awarded 14000 seconds of P1 time).

PI, *SALT Fabry-Pérot imaging of two massive galaxy clusters* (DDT) *2015-1*

- Awarded 5600 seconds of P2 (medium priority) Rutgers discretionary time to pilot a blind Fabry-Pérot search for [OII] emitting galaxies in two massive, $z \sim 1$ clusters.

Conference Abstracts and Unrefereed Publications

[9] "The morphological indicators of gas mass fraction for low-redshift galaxies," **Wu, J. F.**, Peek, J., *AAS Meeting 235*, 2020, 208.14. [ADS]

[8] "Galaxy Groups at Low and High Redshift with RESOLVE and LADUMA," Hutchens, Z. et al., 2020, *AAS Meeting 235*, 207.40. [ADS]

[7] "Gas and galaxy evolution in extreme $z \sim 1$ clusters and extreme $z \sim 0.2$ starbursts," **Wu, J. F.** 2019, *AAS Meeting 233*, 230.03D. [ADS]

[6] "Probing the Evolution of Galaxies by Stacking Stellar Mass Selected Samples" Howard, M., Baker, A. J., **Wu, J. F.**, 2019, *AAS Meeting 233*, *AAS Meeting 233*, 145.08. [ADS]

[5] "Using Convolutional Neural Networks to predict Galaxy Metallicity from Three-Color Images," Boada, S. & **Wu, J. F.**, 2019, *AAS Meeting 233*, 144.30. [ADS]

[4] "Herschel And ALMA Observations Of The ISM In Massive High-Redshift Galaxy Clusters," **Wu, J. F.** et al. 2017, *Galaxy Evolution Across Time*, 51. [ADS]

[3] "Characterizing and Cataloguing Star-Forming Galaxies in Preparation for the LADUMA Survey," Perez, M. J., Baker, A. J., **Wu, J. F.** 2017. *AAS Meeting 229*, 347.30. [ADS]

[2] "LADUMA: Looking at the Distant Universe with the MeerKAT Array," Blyth, S. et al. 2016, *Proceedings of MeerKAT Science: On the Pathway to the SKA*, 4. [ADS]

[1] "Investigating star formation properties of galaxies in massive clusters with Herschel and ALMA," **Wu, J. F.** et al. 2016, *AAS Meeting 227*, 202.02. [ADS]

Skills

Programming: Python, MATLAB/Octave, IDL, SQL, HTML5/CSS, bash, LaTeX

Software: SciPy/matplotlib/pandas/seaborn, AstroPy, scikit-learn, fastai/Pytorch, Source Extractor, Miriad, CASA/MPICASA, Slurm, Docker, Singularity

Data reduction: ALMA, MeerKAT, SALT Fabry-Pérot