Dr. Sarah Wellons — Curriculum Vitae

Contact Information

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Current Position

NSF Postdoctoral Fellow

Northwestern University, Center for Interdisciplinary Exploration and Research in Astrophysics
September 2020 –

Previous Positions

CIERA Postdoctoral Fellow

Northwestern University, Center for Interdisciplinary Exploration and Research in Astrophysics
September 2017 – August 2020

Education

Ph.D. Harvard University, Cambridge, MA, 2017
Astronomy and Astrophysics
Secondary Field: Computational Science and Engineering
Thesis Advisor: Lars Hernquist

A.M. Harvard University, Cambridge, MA, 2013
Astronomy and Astrophysics

A.B. Princeton University, *magna cum laude*, Princeton, NJ, 2011
Astrophysical Sciences
Certificate: Applications of Computing

Current Research Interests

Galaxy evolution theory and simulation, including:
- The formation of the most massive galaxies at high redshift
- The impact of stellar and black hole feedback models on predictions for galaxy growth
- The assembly history, evolution, and properties of massive compact elliptical galaxies
- Methods for connecting galaxy populations across time

Honors and Awards

AAS Rodger Doxsey Travel Prize, Honorable Mention (January 2017)

National Science Foundation Graduate Research Fellow (2011 - 2016)

Harvard Horizons semifinalist (Fall 2015)

Harvard University Certificate of Distinction in Teaching (Spring 2013, Spring 2014)

Elected to the Society of Sigma Xi (May 2011)

Submitted Publications

1. *Gurvich, A., Faucher-Giguère, C., Richings, A., Hopkins, P., Grudiç, M., Hafen, Z., **Wellons, S.**, Stern, J., Quataert, E., Chan, T.K., Orr, M., Kereš, D., Wetzel, A., and Murray, N., *Vertical pressure balance in the multiphase ISM of simulated disk galaxies*, Submitted to MNRAS, arXiv:2005.12916

Refereed Publications

11. **Wellons, S.**, Faucher-Giguère, C., Angles-Alcázar, D., Hayward, C., Feldmann, R., Hopkins, P., and Kereš, D. "*Measuring dynamical masses from gas kinematics in simulated high-redshift galaxies*," MNRAS, in press, arXiv:1908.05274
10. Akhshik, M., Whitaker, K., Brammer, G., Mahler, G., Sharon, K., Leja, J., Bayliss, M., Bezanson, R., Gladders, M., Man, A., Nelson, E., Rigby, J., Rizzo, F., Toft, S., **Wellons, S.**, and Williams, C. "*REQUIEM-2D Methodology: Spatially Resolved Stellar Populations of Massive Lensed Quiescent Galaxies from Hubble Space Telescope 2D Grism Spectroscopy*," ApJ, in press
9. **Wellons, S.** and Torrey, P., 2017, "*An improved probabilistic approach for linking progenitor and descendant galaxy populations using comoving number density*," MNRAS, 467, 3887

8. Torrey, P., **Wellons, S.**, Ma, C., Hopkins, P., Vogelsberger, M., 2017, "*Forward and backward galaxy evolution in comoving number density space*," MNRAS, 467, 4872
7. Rodriguez-Gomez, V., Pillepich, A., Sales, L., Genel, S., Vogelsberger, M., Zhu, Q., **Wellons, S.**, Nelson, D., Torrey, P., Springel, V., Ma, C., Hernquist, L., 2016, "*The stellar mass assembly of galaxies in the Illustris simulation: growth by mergers and the spatial distribution of accreted stars*," MNRAS, 458, 2371
6. **Wellons, S.**, Torrey, P., Ma, C., Rodriguez-Gomez, V., Pillepich, A., Nelson, D., Genel, S., Vogelsberger, M., & Hernquist, L. 2016, "*The diverse evolutionary paths of simulated high-z massive, compact galaxies to $z = 0$*," MNRAS, 456, 1030 [53 citations]
5. Torrey, P., **Wellons, S.**, Machado, F., Griffen, B., Nelson, D., Rodriguez-Gomez, V., McKinnon, R., Pillepich, A., Ma., C., Vogelsberger, M., Springel, V., & Hernquist, L. 2015, "*An analysis of the evolving comoving number density of galaxies in hydrodynamical simulations*," MNRAS, 454, 2270
4. **Wellons, S.**, Torrey, P., Ma, C., Rodriguez-Gomez, V., Vogelsberger, M., Kriek, M., van Dokkum, P., Nelson, E., Genel, S., Pillepich, A., Springel, V., Sijacki, D., Snyder, G., Nelson, D., Sales, L., & Hernquist, L. 2015, "*The Formation of Massive, Compact Galaxies at z=2 in the Illustris Simulation*," MNRAS, 449, 361
3. **Wellons, S.**, Zhu, Y., Psaltis, D., Narayan, R., & McClintock, J. E. 2014, "*A High-Frequency Doppler Feature in the Power Spectra of Simulated GRMHD Black Hole Accretion Disks*," ApJ, 785, 142
2. **Wellons, S.**, Soderberg, A. M., & Chevalier, R. A. 2012, "*Radio Observations Reveal Unusual Circumstellar Environments for Some Type Ibc Supernova Progenitors*," ApJ, 752, 17
1. Nordhaus, J., **Wellons, S.**, Spiegel, D. S., & Metzger, B. D. 2011, "*Formation of high-field magnetic white dwarfs from common envelopes*," PNAS, 108, 3135

Publications in Preparation

3. **Wellons, S.** and the FIRE collaboration.
Quenching from active galactic nuclei in zoom-in simulations of galaxy formation
2. **Wellons, S.** and the IllustrisTNG collaboration.
The shifting demographics of massive galaxies in IllustrisTNG: compactness, stellar populations, gas content, and rotation
1. *Tillman, M., **Wellons, S.**, Faucher-Giguère, C., and the FIRE collaboration
Testing Models of Supermassive Black Hole Evolution with the Quasar Luminosity Function

*Denotes work with students

Proposals

Co-I NASA HST Cycle 28 Award: 259 Orbits 2020
3D-DASH: A Wide Field WFC3/IR Survey of COSMOS
PI: Ivalina Momcheva

Co-I NOAO Gemini Award: 170 Hours 2019
ZF2K: The First Systematic Exploration of the K-band Window and a Census of Massive Galaxies at $4 < z < 6$
PI: Casey Papovich

Co-I NASA HST Cycle 26 Award: 60 Orbits 2018
REsolving QUIEscent Magnified (REQUIEM) Galaxies: Uncovering Formation Pathways via Spatially Resolved Gradients at z=1.6-2.9
PI: Mohammad Akhshik

Co-I NOAO Gemini Award: 15 Hours 2018
A Split K-band Observation of the Most Extreme High-z Massive Galaxy for the ZF2K Survey
PI: Cemile Marsan

Co-I NASA HST Cycle 24 Award: 12 Orbits 2016
A Chance Alignment: Resolving a Massive Compact Galaxy Actively Quenching at z=1.8
PI: Katherine Whitaker

Teaching Experience

Tutor with the Northwestern Prison Education Program (2019-present)
Lecturer for the Banneker/Aztlán summer programs (Summer 2016, Summer 2017)
Teaching Fellow for Astronomy 202a: Galaxies and Dynamics (Harvard University, fall 2015)
Head Teaching Fellow for SPU 19: The Energetic Universe (Harvard University, spring 2014)
Teaching Fellow for Astronomy 120: Stellar Physics (Harvard University, spring 2013)
Teaching Assistant for Astronomy 203: The Universe (Princeton University, spring 2011)

Invited Talks

Colloquium (February 2020)
Boise State University

Colloquium (February 2020)
University of Florida Physics

Colloquium (January 2020)
University of Notre Dame

KICP Seminar (October 2019)
University of Chicago

Colloquium (September 2019)
University of Illinois Urbana-Champaign

Astronomy Seminar (April 2019)
University of Connecticut

Colloquium (April 2019)
University of Massachusetts at Amherst

Astronomy Seminar (February 2019)
University of Pittsburgh

Colloquium (February 2019)
University of Colorado Boulder

Conference talk (June 2017)
"Advances in Galaxy Evolution," Ringberg Castle, Germany

Conference discussion leader (August 2016)
"Deconstructing Galaxies at Cosmic Noon," Lorentz Center workshop

TAC seminar (September 2016)
University of California at Berkeley

Astronomy Seminar (February 2016)
Texas A&M University

Conference talk (November 2015)
"3D-HST meeting: Census, Evolution, Physics," New Haven, CT

Contributed Conference Talks

Galaxy Quenching and Transformation Throughout Cosmic Time
Aspen Center for Physics, February 2020

The Art of Measuring Galaxy Physical Properties (Discussion Leader)
Milan, Italy, November 2019

IllustrisTNG collaboration workshop
Garching, Germany, October 2018

The Physics of Galaxy Scaling Relations and the Nature of Dark Matter
Kingston, ON, Canada, July 2018

229$^{\text{th}}$ meeting of the American Astronomical Society
Grapevine, TX, January 2017

Massive Beasts of the Cosmos
Kruger National Park, South Africa, July 2016

What Shapes Galaxies?
Baltimore, MD, April 2016

In the Footsteps of Galaxies: Tracing the Evolution of Environmental Effects
Soverato, Italy, September 2015

The Most Massive Galaxies and their Precursors
Sydney, Australia, February 2015

UCSC Galaxy Workshop
Santa Cruz, CA, August 2014

Departmental Seminars

Space Telescope Science Institute galaxy group meeting, May 2018
University of Arizona galaxy group meeting, Oct. 2016
Northwestern University theory seminar, Sept. 2016
Carnegie Observatories lunch talk, Sept. 2016
UT Austin extragalactic seminar, Feb. 2016
Center for Astrophysics ITC lunch talk, Dec. 2015
University of Massachusetts Amherst astronomy seminar, Nov. 2015
Max Planck Institute for Astronomy galaxy coffee, Sep. 2015
Leiden Observatory lunch talk, Aug. 2015
Center for Astrophysics summer colloquium, Jun. 2015
Princeton University galaxy journal club, May 2015
Center for Astrophysics ITC lunch talk, Mar. 2015
Carnegie Observatories galaxy group meeting, Feb. 2015
UC Riverside astronomy seminar, Feb. 2015
California Institute of Technology tea talk, Feb. 2015
University of Hawaii WEDGE talk, Feb. 2015
University of Arizona NOAO FLASH talk, Jan. 2015
Tufts University astronomy seminar, Nov. 2014

Mentoring / Advising

Postdoc-grad mentoring program (2018-present)
Founded and organized a program that establishes mentoring relationships between graduate students and postdocs in the Physics & Astronomy department and holds group discussions of "meta-science" professional development and mental health topics.

CIERA REU (Summer 2018, 2019)
Advised an undergraduate summer research project

Banneker program (Summer 2016 and 2017)
Mentored undergraduate students from underrepresented backgrounds

Aztlán program (Summer 2016)
Co-advised an undergraduate summer research project

Peer mentoring program (2014-2016)
Mentored first-year graduate students

Service

Science Organizing Committee member (2019)
For November 2019 conference "The Art of Measuring Galaxy Physical Properties"

NASA (2019)
Review panelist for fellowship and grant proposals

Conference for Undergraduate Women in Physics (2018-January 2019)
Co-organizer – chair of the Adler subcommittee (organizing a program at the planetarium) and co-chair of the programming subcommittee (organizing panels and workshops)

Referee for ApJ (2018)

Astronomy seminar organizing committee (2017-2018)

Referee for MNRAS (2017)

National Science Foundation (2017)
Served on a grant proposal review panel

Graduate admissions committee (Spring 2016)

Website redesign committee (Spring 2015)

Outreach

Northwestern Prison Education Program (2019-present)
Tutor for math and chemistry study halls at Stateville Correctional Center

Astronomy on Tap (2017-present)
Speaker and organizer for local events featuring science trivia, short talks, and beer

"Astronomy Conversations" at the Adler Planetarium (2017-present)
Lecture and discuss astronomy research with members of the public on a monthly basis

Letters to a Pre-Scientist (2017-2018)
Corresponded by mail with a 5th grade student about what it's like to do physics every day

We Teach Science (2015-16)
Remotely mentored a high school student in mathematics

Adopt-a-Physicist (Fall 2013, Fall 2014, Spring 2015)
Engaged online with middle/high school students about what it's like to study and have a career in physics

Citywide Senior Center (2012-2014)
Developed a monthly public lecture series, "Mysteries of the Cosmos"

Science in the News (2011-12)
Served on school outreach committee