

Curriculum Vitae

Dr. Joshua Shane Dillon

| | | |
|--|---|---|
| CONTACT INFORMATION | Department of Astronomy University of California, Berkeley 501 Campbell Hall #3411 Berkeley, CA 94720 | <i>Email:</i> jsdillon@berkeley.edu <i>Website:</i> www.joshdillon.net |
| ACADEMIC APPOINTMENTS | University of California, Berkeley , Berkeley, California, USA NSF Astronomy & Astrophysics Postdoctoral Fellow Berkeley Center for Cosmological Physics Postdoctoral Fellow | 2017 – Present 2015 – 2017 |
| EDUCATION | Massachusetts Institute of Technology , Cambridge, Massachusetts, USA Ph.D., Physics <ul style="list-style-type: none">• Advisor: Max Tegmark• GPA: 5.0 (out of 5.0)• Rossi Fellow Stanford University , Stanford, California, USA B.S. with Distinction in Physics , Minor in History | 2009 – 2015 2005 – 2009 |
| COLLABORATION MEMBERSHIPS | <ul style="list-style-type: none">• Hydrogen Epoch of Reionization Array (HERA)<ul style="list-style-type: none">– HERA Analysis Team Leader– HERA Undergraduate Summer Bootcamp Curriculum Lead• Donald C. Backer Precision Array for Probing the Epoch of Reionization (PAPER)• Murchison Widefield Array (MWA) Epoch of Reionization Collaboration | |
| GRANTS | NSF Astronomy and Astrophysics Postdoctoral Fellowship \$300,000, Principal Investigator <i>Data Analysis Techniques for the Epoch of Reionization and Beyond</i> NSF Special Programs in Astronomy \$22,911, Co-Investigator <i>17th Annual Symposium of the NSF Astronomy & Astrophysics Postdoctoral Fellows</i> | 2017 – 2020 2018 – 2019 |
| PEER-REVIEWED PUBLICATIONS AS FIRST AUTHOR, STUDENT ADVISOR (DENOTED AS **), OR MAJOR CONTRIBUTOR (<i>h</i> -INDEX: 21) | 19. Orosz, N., ** J.S. Dillon , A. Ewall-Wice, A.R. Parsons, N. Thyagarajan. <i>Mitigating the Effects of Antenna-to-Antenna Variation on Redundant-Baseline Calibration for 21 cm Cosmology</i> . Submitted to MNRAS (2018) 18. Dillon, J.S. , S.A. Kohn, A.R. Parsons, J.E. Aguirre, Z.S. Ali, G. Bernardi, N.S. Kern, W. Li, A. Liu, C.D. Nunhokee, J.C. Pober. <i>Polarized Redundant-Baseline Calibration for 21 cm Cosmology Without Adding Spectral Structure</i> . MNRAS 477, 4 (2018) | |

17. Ewall-Wice, A.,** **J.S. Dillon**, A. Liu, J.N. Hewitt. *The Impact of Modeling Errors on Interferometer Calibration for 21 cm Power Spectra*. MNRAS 470, 2 (2017)
16. DeBoer, D., A.R. Parsons, et al. (including **J.S. Dillon**). *Hydrogen Epoch of Reionization Array (HERA)*. PASP 129, 974 (2017)
15. Jacobs, D.C., B.J. Hazelton, C.M. Trott, **J.S. Dillon**, et al. *The Murchison Widefield Array 21 cm Power Spectrum Analysis Methodology*. ApJ. 825, 2 (2016)
14. Zheng, H.,** M. Tegmark, **J.S. Dillon**, et al. *An Improved Model of Diffuse Galactic Radio Emission from 10 MHz to 5 THz*. MNRAS 464, 3 (2016)
13. Zheng, H.,** M. Tegmark, **J.S. Dillon**, et al. *Brute-Force Mapmaking with Compact Interferometers: A MITEoR Northern Sky Map from 128 MHz to 175 MHz*. MNRAS 465, 3 (2016)
12. Ewall-Wice,** A., **J.S. Dillon**, J.N. Hewitt, et al. *First Limits on the 21 cm Power Spectrum during the Epoch of X-ray heating*. MNRAS 460, 4 (2016)
11. **Dillon, J.S.**, A.R. Parsons. *Redundant Array Configurations for 21 cm Cosmology*. ApJ. 826, 2 (2016)
10. Ewall-Wice, A., J. Hewitt, A. Mesinger, **J.S. Dillon**, A. Liu, J. Pober. *Constraining High Redshift X-ray Sources with Next Generation 21 cm Power Spectrum Measurements*. MNRAS 458, 3 (2016)
9. Neben, A.R., J. Hewitt, R.F. Bradley, **J.S. Dillon**, et al. *Beamforming Errors in Murchison Widefield Array Phased Array Antennas and their effects on Epoch of Reionization Science*. ApJ. 820, 1 (2016)
8. **Dillon, J.S.** *It's Always Darkest Before the Cosmic Dawn: Early Results from Novel Tools and Telescopes for 21 cm Cosmology*. MIT Ph.D. Thesis. (2015)
7. **Dillon, J.S.**, A.R. Neben,** J.N. Hewitt, M. Tegmark, et al. *Empirical Covariance Modeling for 21 cm Power Spectrum Estimation: A Method Demonstration and New Limits from Early Murchison Widefield Array 128-Tile Data*. Phys. Rev. D 91, 123011 (2015)
6. **Dillon, J.S.**, M. Tegmark, A. Liu, A. Ewall-Wice, J.N. Hewitt, M. Morales, A.R. Neben, A.R. Parsons, H. Zheng. *Mapmaking for Precision 21 cm Cosmology*. Phys. Rev. D 91, 023002 (2015)
5. Zheng, H., M. Tegmark, V. Buza, **J.S. Dillon**, et al. *MITEoR: A Scalable Interferometer for Precision 21 cm Cosmology*. MNRAS 445, 2 (2014)
4. Ewall-Wice, A.,** **J.S. Dillon**, A. Mesinger, and J. Hewitt. *Detecting the 21 cm Forest in the 21 cm Power Spectrum*. MNRAS 441, 3 (2014)
3. Pober, J.C., A. Liu, **J.S. Dillon**, et al. *What Next-Generation 21 cm Power Spectrum Measurements Can Teach Us About the Epoch of Reionization*. ApJ. 782, 66 (2014)
2. **Dillon, J.S.**, A. Liu, C.L. Williams, J.N. Hewitt, M. Tegmark, et al. *Overcoming real-world obstacles in 21 cm power spectrum estimation: A demonstration and results from early Murchison Widefield Array data*. Phys. Rev. D 89, 023002 (2014)

1. **Dillon, J.S.**, A. Liu, M. Tegmark. *A fast method for power spectrum and foreground analysis for 21 cm cosmology*. Phys. Rev. D 87, 043005 (2013)
19. Cheng, C., A.R. Parsons, M. Kolopanis, et al. (including **J.S. Dillon**). *Characterizing Signal Loss in the 21 cm Reionization Power Spectrum: A Revised Study of PAPER-64*. ApJ. *in press* (2018)
18. Kohn, S.A., P.M. Chichura, A.S. Igarashi, et al. (including **J.S. Dillon**). *Polarized Foreground Power Spectra from the HERA-19 Commissioning Array*. Submitted to ApJ. (2018)
17. Li, W., J.C. Pober, B.J. Hazelton, et al. (including **J.S. Dillon**). *Comparing Redundant and Sky Model Based Interferometric Calibration: A First Look with Phase II of the MWA*. ApJ. 863, 2 (2018)
16. Carilli, C.L., B. Nikolic, N. Thyagarajan, et al. (including **J.S. Dillon**). *HI 21cm Cosmology and the Bi-spectrum: Closure Diagnostics in Massively Redundant Interferometric Arrays*. Radio Science 53, 6 (2018)
15. Patra, N., A.R. Parsons, D.R. DeBoer, et al. (including **J.S. Dillon**). *The Hydrogen Epoch of Reionization Array Dish III: Measuring Chromaticity of Prototype Element with Reflectometry*. Experimental Astronomy, 45, 2 (2018)
14. Nunhokee, C.D., G. Bernardi, S.A. Kohn, et al. (including **J.S. Dillon**). *Constraining Polarized Foregrounds for EOR Experiments II: Polarization Leakage Simulations in the Avoidance Scheme*. ApJ. 848, 1 (2017)
13. Kapinska, A.D., L. Staveley-Smith, R. Crocker, et al. (including **J.S. Dillon**). *Spectral energy distribution and radio halo of NGC 253 at low radio frequencies*. ApJ. 838, 1 (2017)
12. Paul, S., S.K. Sethi, M.F. Morales, et al. (including **J.S. Dillon**). *Delay Spectrum with Phase-Tracking Arrays: Extracting the HI power spectrum from the Epoch of Reionization*. ApJ. 833, 1 (2016)
11. Beardsley, A.P., B.J. Hazelton, I.S. Sullivan, et al. (including **J.S. Dillon**). *First Season MWA EoR Power Spectrum Results at Redshift 7*. ApJ. 833, 1 (2016)
10. Lenc, E., B.M. Gaensler, X.H. Sun, et al. (including **J.S. Dillon**). *Low frequency observations of linearly polarized structures in the interstellar medium near the south Galactic pole*. ApJ. 830, 1 (2016)
9. Carroll, P.A., J. Line, M.F. Morales, et al. (including **J.S. Dillon**). *A High Reliability Survey of Discrete Epoch of Reionization Foreground Sources in the MWA EoR0 Field*. MNRAS 461, 4 (2016)
8. Ewall-Wice, A., R.F. Bradley, D. DeBoer, et al. (including **J.S. Dillon**). *The Hydrogen Epoch of Reionization Array Dish II: Characterization of Spectral Structure with Electromagnetic Simulations and its science Implications*. ApJ. 831, 2 (2016)
7. Neben, A.R., R.F. Bradley, J.N. Hewitt, et al. (including **J.S. Dillon**). *The Hydrogen Epoch of Reionization Array Dish I: Beam Pattern Measurements and Science Implications*. ApJ. 826, 2 (2016)

6. Offringa, A.R., C.M. Trott, N. Hurley-Walker, et al. (including **J.S. Dillon**). *Parametrizing Epoch of Reionization foregrounds: a deep survey of low-frequency point-source spectra with the Murchison Widefield Array*. MNRAS 458, 1 (2016)
5. Pober, J.C., B.J. Hazelton, A.P. Beardsley, et al. (including **J.S. Dillon**). *The Importance of Wide-field Foreground Removal for 21 cm Cosmology: A Demonstration With Early MWA Epoch of Reionization Observations*. ApJ. 819, 1 (2016)
4. Trott, C.M., B. Pindor, P. Procopio, et al. (including **J.S. Dillon**). *CHIPS: The Cosmological HI Power Spectrum Estimator*. ApJ. 818, 2 (2016)
3. Thyagarajan, N., D.C. Jacobs, J.D. Bowman, et al. (including **J.S. Dillon**). *Confirmation of Wide-Field Signatures in Redshifted 21 cm Power Spectra*. ApJ. Letters 807, L28 (2015)
2. Thyagarajan, N., D.C. Jacobs, J.D. Bowman, et al. (including **J.S. Dillon**). *Foregrounds in Wide-Field Redshifted 21 cm Power Spectra*. ApJ. 804, 1 (2015)
1. Offringa, A.R., R.B. Wayth, N. Hurley-Walker, et al. (including **J.S. Dillon**). *The low-frequency environment of the Murchison Widefield Array: radio-frequency interference analysis and mitigation*. PASA 32, e008 (2015)

PROFESSIONAL
TALKS AND
PRESENTATIONS

Slides for all talks are available at JoshDillon.net/Talks.

Special Astrophysics Seminar. Columbia University, New York, NY. February 7, 2019.

233rd Meeting of the American Astronomical Society. Seattle, WA, January 10, 2019.

17th Annual Symposium of the NSF Astronomy & Astrophysics Postdoctoral Fellows.
Invited talk. Seattle, WA, January 5, 2019.

Nuclear, Particle, and Astrophysics Seminar. Invited talk. Yale University, New Haven, CT. December 13, 2018.

Future by the Future: Workshop on the Vision for the Next Decades in Astrophysics with Gravitational Waves and Other Cosmic Messengers. Invited talk. Columbia University, New York City, NY. November 30, 2018.

Thirteenth Conference on the Intersections of Particle and Nuclear Physics. Invited talk. Indian Wells, CA. May 30, 2018.

Cosmological Signals from Cosmic Dawn to the Present. Aspen Center for Physics, Aspen, CO. February 8, 2018.

16th Annual Symposium of the NSF Astronomy & Astrophysics Postdoctoral Fellows.
Invited talk. National Harbor, MD, January 8, 2018.

IAU Symposium 333: Peering towards Cosmic Dawn. Dubrovnik, Croatia, October 3, 2017.

Cosmology on Safari. KwaZulu-Natal, South Africa, February 13, 2017.

Cosmology with Neutral Hydrogen. Berkeley Center for Cosmological Physics, University of California, Berkeley, January 11, 2017.

URSI National Radio Sciences Meeting. Boulder, CO, January 4, 2017.

McWilliams Center for Cosmology Coffee Talk. Carnegie Mellon University, Pittsburgh, PA. October 14, 2016.

U.S. Radio/Millimeter/Submillimeter Science Futures II. Invited Talk. Baltimore, MD. August 4, 2016.

HI 21 cm Cosmology Workshop. Invited talk. SOC member. Kavli Institute for Cosmology, Cambridge, UK. June 29, 2016.

University of California, Santa Cruz CosmoClub. Invited talk. Santa Cruz, CA. April 25, 2016.

Institute for Nuclear and Particle Astrophysics Seminar. Invited talk. Lawrence Berkeley National Laboratory, Berkeley, CA. April 1, 2016.

The Reionization Epoch: New Insights and Future Prospects. Aspen Center for Physics, Aspen, CO. March 8, 2016.

Cosmology and First Light. Institut d'Astrophysique de Paris. Paris, France. December 9, 2015.

The Olympian Symposium. Mount Olympus, Greece, May 22, 2015.

MIT Department of Physics Thesis Defense. Cambridge, MA, April 17, 2015.

CCAPP Seminar. Invited talk. The Ohio State University, Columbus, OH. March 17, 2015.

225th Meeting of the American Astronomical Society. Dissertation Talk. Seattle, WA, January 8, 2015.

Early Science from Low Frequency Radio Telescopes. Tempe, AZ, December 10, 2014.

CfA ITC Luncheon. Cambridge, MA, October 30, 2014.

KIPAC Tea Talk. Stanford, CA, October 24, 2014.

Berkeley Cosmology Seminar Series. Invited talk. Berkeley, CA, October 21, 2014.

University of Washington Dark Universe Science Center Seminar. Invited talk. Seattle, WA, August 27, 2014.

Brown Astrophysics Seminar Series. Invited talk. Providence, RI, February 26, 2014.

University of Chicago Kavli Institute Friday noon seminar. Invited talk. Chicago, IL, February 21, 2014.

MIT Physics Graduate Student Council "Kaleidoscope" lunch series. Invited talk. Cambridge, MA, February 12, 2014.

URSI National Radio Sciences Meeting. Boulder, CO, January 9, 2014.

Reionization in the Red Centre: New windows on the high redshift Universe (CAASTRO). Ayers Rock Resort, Australia, July 17, 2013.

Innovative Techniques in 21 cm Analysis. Invited talk. Ohio State University, April 18, 2013.

62nd Lindau Nobel Laureate Meeting. Lindau, Germany, July 5, 2012.

218th Meeting of the American Astronomical Society. Boston, MA, May 24, 2011.

- PUBLIC TALKS**
- San Francisco Amateur Astronomers Monthly Lecture Series. San Francisco, CA, October 17, 2018.
 - Adler After Dark. Invited public talk. Adler Planetarium, Chicago, IL, March 15, 2018.
 - Science@Cal Lecture Series. Invited public talk. Berkeley, CA, December 16, 2017.
 - MIT Kavli Institute Frontiers of Astronomy, Astrophysics, and Space Science lecture series. Invited public talk. Cambridge, MA, January 16, 2014.
- TEACHING ASSISTANTSHIPS AT MIT**
- 8.02 TEAL: *Electricity and Magnetism* (Rated 5.7/7.0) **Spring 2015**
 - 8.942 *Graduate Cosmology* **Fall 2013**
 - 8.021 *Electricity and Magnetism* (Rated 6.2/7.0) **Fall 2013**
 - 8.901 *Graduate Astrophysics I* (Rated 6.4/7.0) **Spring 2013**
 - 8.01L *Classical Mechanics* (Rated 6.8/7.0) **Fall 2012**
 - 8.02 TEAL: *Electricity and Magnetism* (Rated 6.1/7.0) **Spring 2012**
 - 8.033: *Relativity* **Fall 2011**
 - 8.01 TEAL: *Classical Mechanics* **Fall 2010**
 - Completed *MIT Graduate Student Teaching Certificate Program* **Spring 2012**
- SERVICE**
- To the Astrophysics Community:**
- NASA FINESST Future Investigators Grant Program Reviewer **2019**
 - Co-organizer of 2019 NSF AAPF Symposium at AAS 233 in Seattle, WA **2019**
 - NASA Astrophysics Data Analysis Program (ADAP) Panelist **2016**
 - SOC member for the HI 21cm Cosmology Workshop in Cambridge, UK **2016**
 - Referee, Monthly Notices of the Royal Astronomical Society **2014 – Present**
- To the Public:**
- Chair of the Board of the Science Ambassador Scholarship. **2015 – Present**
 - The Science Ambassador Scholarship is a full-ride undergraduate scholarship for women in STEM fields and funded by the Cards Against Humanity “Science Pack.”
 - Our panel of over 60 women with advanced degrees in STEM fields have selected three scholarship winners.
 - So far, we have raised over \$1,250,000.
 - Co-moderator and astrophysics panelist of Reddit’s AskScience **2011 – Present**
 - AskScience is an online community with over 16,000,000 subscribers dedicated to answering laypeople’s scientific questions and promoting public understanding and appreciation of science.
- At the University of California, Berkeley:**
- Postdoctoral Representative to the Astronomy Department **2018 – Present**
 - Volunteer at Astro Night public talk series and rooftop observing **2016 – Present**
 - Member of the “AstroJustice” social justice discussion group **2015 – Present**
- At the Massachusetts Institute of Technology:**
- Volunteer tutor for the MIT Office of Minority Education **2010 – 2015**
 - Astro representative to the Physics Graduate Student Council **2010 – 2012**
 - MIT Kavli Institute weekly journal club organizer **2010 – 2012**
 - Weekly physics department colloquium speaker lunch organizer **2010 – 2012**
- At Stanford University:**
- Resident tutor in a freshman dorm **2007 – 2008**
 - Representative to the physics undergraduate studies committee **2007 – 2008**