

# Joshua S. Dillon

## Curriculum Vitae

Department of Astronomy  
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📖 GScholar: *h*-index 39 (5,484 citations)

## Academic Appointments

University of California, Berkeley, Berkeley, California.

- 2023 – Present **Assistant Research Scientist**, *Radio Astronomy Laboratory*.
- 2020 – 2023 **Assistant Project Scientist**, *Radio Astronomy Laboratory*.
- 2017 – 2020 **NSF Astronomy & Astrophysics Postdoctoral Fellow**.
- 2015 – 2017 **Berkeley Center for Cosmological Physics Postdoctoral Fellow**.

## Education

- 2009 – 2015 **Ph.D. in Physics**, *Massachusetts Institute of Technology*, Cambridge, Massachusetts.  
Advisor: Max Tegmark  
GPA: 5.0 (out of 5.0)  
Bruno Rossi Fellow
- 2005 – 2009 **B.S. with Distinction in Physics**, *Stanford University*, Stanford, California.  
Advisor: Steven Kahn  
Physics GPA: 4.03, Overall GPA: 3.96 (out of 4.0), Phi Beta Kappa  
Jeffery Willick Memorial Award for Outstanding Scholarship in Astrophysics

## Collaboration Memberships

### Hydrogen Epoch of Reionization Array (HERA)

- 2017 – Present HERA Analysis Team Leader
- 2020 – Present HERA Data Quality Metrics Team Leader
- 2021 – 2022 HERA Diversity, Equity, and Inclusion Team Leader
- 2017 – 2020 HERA Undergraduate Summer Bootcamp Curriculum Lead

### Packed Ultra-wideband Mapping Array (PUMA)

### Precision Array for Probing the Epoch of Reionization (PAPER)

### Murchison Widefield Array (MWA) Phase I Epoch of Reionization Collaboration

## Grants

- 2017 – 2020 **NSF Astronomy and Astrophysics Postdoctoral Fellowship**.  
\$300,000, Principal Investigator.  
*Data Analysis Techniques for the Epoch of Reionization and Beyond*
- 2018 – 2019 **NSF Special Programs in Astronomy**.  
\$22,911, Co-Investigator.  
*17th Annual Symposium of the NSF Astronomy & Astrophysics Postdoctoral Fellows*

# Peer-Reviewed Publications as First Author, Student Mentor, or Major Contributor

*Students mentored denoted with \*\*. h-index: 39 (5,484 citations).*

34. Cox, T.A.,\*\* A.R. Parsons, **J.S. Dillon**, et al. Spectral Redundancy for Calibrating Interferometers and Suppressing the Foreground Wedge in 21 cm Cosmology. MNRAS *in press*.
33. The HERA Collaboration: Z. Abdurashidova, T. Adams, J.E. Aguirre, et al. (**Lead Author: J.S. Dillon**). Improved Constraints on the 21 cm EoR Power Spectrum and the X-Ray Heating of the IGM with HERA Phase I Observations. ApJ. 945, 124 (2023)
32. Kim, H., B.D. Nhan, J.N. Hewitt, et al. (including **J.S. Dillon**). The Impact of Beam Variations on Power Spectrum Estimation for 21-cm Cosmology I: Simulations of Foreground Contamination for HERA. ApJ. 941, 207 (2022)
31. Ewall-Wice, A., **J.S. Dillon**, B.K. Gehlot, et al. Precision Calibration of Radio Interferometers for 21 cm Cosmology with No Redundancy and Little Knowledge of Antenna Beams and the Radio Sky. ApJ. 938, 151 (2022)
30. Xu, Z., J.N. Hewitt, K.-F. Chen, et al. (including **J.S. Dillon**). Direct Optimal Mapping for 21cm Cosmology: A Demonstration with the Hydrogen Epoch of Reionization Array. ApJ. 938, 128 (2022)
29. The HERA Collaboration: Z. Abdurashidova, J.E. Aguirre, P. Alexander, et al. (including **J.S. Dillon**). HERA Phase I Limits on the Cosmic 21cm Signal: Constraints on Astrophysics and Cosmology. ApJ. 924, 51 (2022)
28. The HERA Collaboration: Z. Abdurashidova, J.E. Aguirre, P. Alexander, et al. (including **J.S. Dillon**). HERA Phase I Limits on the Epoch of Reionization 21 cm Power Spectrum. ApJ. 925, 221 (2022)
27. Aguirre, J.E., S.G. Murray, R. Pascua,\*\* et al. (including **J.S. Dillon**). Validation of the HERA Phase I Epoch of Reionization 21 cm Power Spectrum Pipeline. ApJ. 924, 85 (2022)
26. Storer, D.,\*\* **J.S. Dillon**, D.C. Jacobs, et al. Automated Detection of Antenna Malfunctions in Large-N Interferometers: A Case Study with the Hydrogen Epoch of Reionization Array. Radio Science, 57 (2022)
25. Ewall-Wice, A., N. Kern,\*\* **J.S. Dillon**, et al. DAYENU: A Simple Filter of Smooth Foregrounds for Intensity Mapping Power Spectra. MNRAS 500, 4 (2021).
24. Gorthi, D.,\*\* A.R. Parsons, and **J.S. Dillon**. Calibration Schemes with  $\mathcal{O}(N \log_2 N)$  Scaling for Large-N Radio Interferometers built on a Regular Grid. MNRAS 500, 1 (2021)
23. La Plante, P., P.K.G. Williams, and **J.S. Dillon**. Developing a Real Time Processing System for HERA. URSI Radio Science Letters, 2 (2020).
22. **Dillon, J.S.**, M. Lee,\*\* Z.S. Ali,\*\* et al. Redundant-Baseline Calibration of the Hydrogen Epoch of Reionization Array. MNRAS 499, 4 (2020)
21. Kern, N.,\*\* **J.S. Dillon**, A.R. Parsons, et al. Absolute Calibration for the Hydrogen Epoch of Reionization Array and its Impact on Power Spectrum Performance. ApJ. 890, 2 (2020)
20. Kern, N.,\*\* A.R. Parsons, **J.S. Dillon**, et al. Mitigating Internal Instrument Coupling for 21 cm Cosmology II: A Method Demonstration with the Hydrogen Epoch of Reionization Array. ApJ. 888, 2 (2020)
19. Kern, N.,\*\* A.R. Parsons, **J.S. Dillon**, et al. Mitigating Internal Instrument Coupling for 21 cm Cosmology I: Temporal and Spectral Modeling in Simulations. ApJ. 884, 2 (2019)

18. Orosz, N.,\*\* **J.S. Dillon**, A. Ewall-Wice, et al. *Mitigating the Effects of Antenna-to-Antenna Variation on Redundant-Baseline Calibration for 21 cm Cosmology*. MNRAS 487, 1 (2019)
17. **Dillon, J.S.**, S.A. Kohn, A.R. Parsons, et al. *Polarized Redundant-Baseline Calibration for 21 cm Cosmology Without Adding Spectral Structure*. MNRAS 477, 4 (2018)
16. Ewall-Wice, A.,\*\* **J.S. Dillon**, A. Liu, and J.N. Hewitt. *The Impact of Modeling Errors on Interferometer Calibration for 21 cm Power Spectra*. MNRAS 470, 2 (2017)
15. DeBoer, D., A.R. Parsons, et al. (including **J.S. Dillon**). *Hydrogen Epoch of Reionization Array (HERA)*. PASP 129, 974 (2017)
14. 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)
13. 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)
12. 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)
11. 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)
10. **Dillon, J.S.** and A.R. Parsons. *Redundant Array Configurations for 21 cm Cosmology*. ApJ. 826, 2 (2016)
9. Ewall-Wice, A., J. Hewitt, A. Mesinger, **J.S. Dillon**, et al. *Constraining High Redshift X-ray Sources with Next Generation 21 cm Power Spectrum Measurements*. MNRAS 458, 3 (2016)
8. 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)
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, 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, and M. Tegmark. *A fast method for power spectrum and foreground analysis for 21 cm cosmology*. Phys. Rev. D 87, 043005 (2013)

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## Peer-Reviewed Collaboration Publications

41. Charles, N., N.S. Kern, R. Pascua, et al. (including **J.S. Dillon**). *Mitigating calibration errors from mutual coupling with time-domain filtering of 21 cm cosmological radio observations.* *MNRAS in press.*
40. Rath, E., R. Pascua, A.T. Josaitis, et al. (including **J.S. Dillon**). *Investigating Mutual Coupling in the Hydrogen Epoch of Reionization Array and Mitigating its Effects on the 21-cm Power Spectrum.* *MNRAS in review.*
39. Garsden, H., P. Bull, M. Wilensky, et al. (including **J.S. Dillon**). *A demonstration of the effect of fringe-rate filtering in the Hydrogen Epoch of Reionization Array delay power spectrum pipeline .* *MNRAS in review.*
38. Berkhout, L.M., D.C. Jacobs, Z. Abdurashidova, et al. (including **J.S. Dillon**). *Hydrogen Epoch of Reionization Array (HERA) Phase II Deployment and Commissioning .* *PASP 136, 045002 (2024)*
37. Kittiwisit, P., S.G. Murray, H. Garsden, et al. (including **J.S. Dillon**). *matvis: A matrix-based visibility simulator for fast forward modelling of many-element 21 cm arrays .* *RASTI in review.*
36. Murphy, G.G., P. Bull, M.G. Santos, et al. (including **J.S. Dillon**). *Bayesian estimation of cross-coupling and reflection systematics in 21cm array visibility data .* *MNRAS in review.*
35. Xu, Z., H. Kim, J.N. Hewitt, et al. (including **J.S. Dillon**). *Direct Optimal Mapping Image Power Spectrum and its Window Functions .* *ApJ. in press.*
34. Kim, H., N.S. Kern, J.N. Hewitt, et al. (including **J.S. Dillon**). *The Impact of Beam Variations on Power Spectrum Estimation for 21 cm Cosmology II: Mitigation of Foreground Systematics for HERA.* *ApJ. in press.*
33. Keller, P., B. Nikolic, N. Thyagarajan, et al. (including **J.S. Dillon**). *Search for the Epoch of Reionisation with HERA: Upper Limits on the Closure Phase Delay Power Spectrum.* *MNRAS in press.*
32. Pagano, M., J. Liu, A. Liu, et al. (including **J.S. Dillon**). *Characterization Of Inpaint Residuals In Interferometric Measurements of the Epoch Of Reionization.* *MNRAS 520, 4 (2023)*
31. Gorce, A., S. Ganjam, A. Liu, et al. (including **J.S. Dillon**). *Impact of instrument and data characteristics in the interferometric reconstruction of the 21 cm power spectrum .* *MNRAS 520, 1 (2023)*
30. Wilensky, M., F. Kennedy, P. Bull, **J.S. Dillon**, et al. *Bayesian jackknife tests with a small number of subsets: Application to HERA 21cm power spectrum upper limits.* *MNRAS 518, 4 (2023)*
29. Gogo, T.G., Y.-Z. Ma, P. Kittiwisit, et al. (including **J.S. Dillon**). *The Correlation Calibration of PAPER-64 data.* *MNRAS 510, 2 (2022)*
28. Gehlot, B.K., D.C. Jacobs, J.D. Bowman, et al. (including **J.S. Dillon**). *Effects of model incompleteness on the drift-scan calibration of radio telescopes.* *MNRAS 506, 3 (2021)*
27. La Plante, P., P.K.G. Williams, M. Kolopanis, **J.S. Dillon**, et al. *A Real Time Processing System for Big Data in Astronomy: Applications to HERA.* *Astronomy and Computing, 36 (2021)*
26. Tan, J., A. Liu, N.S. Kern, et al. (including **J.S. Dillon**). *Methods of Error Estimation for Delay Power Spectra in 21 cm Cosmology.* *ApJS. 255, 26 (2021)*
25. Fagnoni, N., E. de Lera Acedo, D.R. DeBoer, et al. (including **J.S. Dillon**). *Understanding the HERA Phase I receiver system with simulations and its impact on the detectability of the EoR delay power spectrum.* *MNRAS 500, 1 (2021)*
24. Nunhokee, C.D., A.R. Parsons, N.S. Kern, et al. (including **J.S. Dillon**). *In-situ measurements of HERA primary beam patterns: methodology and first results.* *ApJ. 897, 1 (2020)*

23. Thyagarajan, N., C.L. Carilli, B. Nikolic, et al. (including **J.S. Dillon**). *Detection of Cosmic Structures using the Bispectrum Phase. II. First Results from Application to Cosmic Reionization Using the Hydrogen Epoch of Reionization Array*. Phys. Rev. D 102, 022002 (2020)
22. Ghosh, A., F. Mertens, G. Bernardi, et al. (including **J.S. Dillon**). *Foreground modelling via Gaussian process regression: an application to HERA data*. MNRAS 495, 3 (2020)
21. Kolopanis, M., D.C. Jacobs, C. Cheng, et al. (including **J.S. Dillon**). *A simplified, lossless re-analysis of PAPER-64*. ApJ. 883, 2 (2019)
20. Kerrigan, J., P. La Plante, S. Kohn, et al. (including **J.S. Dillon**). *Optimizing Sparse RFI Prediction using Deep Learning*. MNRAS 488, 2 (2019)
19. 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*. ApJ. 881, 1 (2019)
18. 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. 868, 1 (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)

## Unrefereed Publications and White Papers

32. **Dillon, J.S.** and S.G. Murray. *H6C Internal Data Release 2.2.* HERA Memo Series #125 (2023)
31. **Dillon, J.S.**, S.G. Murray, and Z.E. Martinot. *H6C Internal Data Release 2.1.* HERA Memo Series #124 (2023)
30. Murray, S.G. and **J.S. Dillon**. *LST-Binning Statistics.* HERA Memo Series #123 (2023)
29. Murray, S.G. and **J.S. Dillon**. *Summary of Season Flags.* HERA Memo Series #122 (2023)
28. Nagpal, V.\*\* and **J.S. Dillon**. *The Detectability of FRBs with HERA.* HERA Memo Series #112 (2022)
27. **Dillon, J.S.** *H1C IDR 3.2 Power Spectrum Analysis Updates and Choices.* HERA Memo Series #107 (2021)
26. **Dillon, J.S.**, A.R. Parsons, and N.S. Kern. *A Physical Model for the H1C Cross-Talk Systematic.* HERA Memo Series #104 (2021)
25. **Dillon, J.S.** *H1C Internal Data Release 3.2.* HERA Memo Series #97 (2021)
24. Ansari, R., K. Bandura, E. Castorina, et al. (including **J.S. Dillon**). *Packed Ultra-wideband Mapping Array (PUMA): Next generation facility for Sky Survey in Radio.* Letter of Interest submitted to the Snowmass2021 Proceedings (2020)
23. Ansari, R., K. Bandura, E. Castorina, et al. (including **J.S. Dillon**). *Packed Ultra-wideband Mapping Array (PUMA): Science Opportunities.* Letter of Interest submitted to the Snowmass2021 Proceedings (2020)
22. Munoz, J.B., A. Liu, Y./ Ali-Haimoud, et al. (including **J.S. Dillon**). *A 21-cm based standard ruler at  $z \sim 20$ .* Letter of Interest submitted to the Snowmass2021 Proceedings (2020)
21. Munoz, J.B., A. Liu, F.-Y. Cyr-Racine, Y./ Ali-Haimoud, et al. (including **J.S. Dillon**). *Cosmic dawn: A probe of dark matter at small scales.* Letter of Interest submitted to the Snowmass2021 Proceedings (2020)
20. **Dillon, J.S.** and Z.E. Martinot.\*\* *Absolute Calibration of H1C Data with RIMEz Simulations.* HERA Memo Series #78 (2020)
19. Ahmed, Z., D. Alonso, M. Amin, et al. (including **J.S. Dillon**). *Research and Development for HI Intensity Mapping.* APC white paper submitted to the Astro2020 Decadal Survey (2019)

18. The Hydrogen Epoch of Reionization Array (HERA) Collaboration, et al. (including **J.S. Dillon**). *A Roadmap for Astrophysics and Cosmology with High-Redshift 21 cm Intensity Mapping*. APC white paper submitted to the Astro2020 Decadal Survey (2019)
17. Lee, M.\*\* and **J.S. Dillon** *Explaining and Mitigating the Temporal Structure of Calibration Solutions*. HERA Memo Series #72 (2019)
16. **Dillon, J.S.** *H1C IDR 2.2: Calibrated, Flagged, and LST-Binned HERA Internal Data Release*. HERA Memo Series #69 (2019)
15. **Dillon, J.S.** *Properly Normalized  $\chi^2$ /DoF in Redundant-Baseline Calibration*. HERA Memo Series #61 (2019)
14. Liu, A., J. Aguirre, Y. Ali-Haimoud, et al. (including **J.S. Dillon**). *Cosmology with the Highly Redshifted 21cm Line*. Submitted for the Astro2020 Decadal Survey Science white paper call (2019)
13. Mirocha, J., D. Jacobs, **J.S. Dillon**, et al. *Astro2020 Science White Paper: First Stars and Black Holes at Cosmic Dawn with Redshifted 21-cm Observations*. Submitted for the Astro2020 Decadal Survey Science white paper call (2019)
12. Furlanetto, S., J. Bowman, J. Mirocha, et al. (including **J.S. Dillon**). *Astro 2020 Science White Paper: Fundamental Cosmology in the Dark Ages with 21-cm Line Fluctuations*. Submitted for the Astro2020 Decadal Survey Science white paper call (2019)
11. Furlanetto, S., C. Carilli, J. Mirocha, et al. (including **J.S. Dillon**). *Astro2020 Science White Paper: Insights Into the Epoch of Reionization with the Highly-Redshifted 21-cm Line*. Submitted for the Astro2020 Decadal Survey Science white paper call (2019)
10. Furlanetto, S., A. Beardsley, C. Carilli, et al. (including **J.S. Dillon**). *Astro2020 Science White Paper: Synergies Between Galaxy Surveys and Reionization Measurements*. Submitted for the Astro2020 Decadal Survey Science white paper call (2019)
9. Alvarez, M.A., A. Fialkov, P. La Plante, et al. (including **J.S. Dillon**). *Mapping Cosmic Dawn and Reionization: Challenges and Synergies*. Submitted for the Astro2020 Decadal Survey Science white paper call (2019)
8. Parsons, A.R. and **J.S. Dillon**. *Omnical Convergence*. HERA Memo Series #50 (2018)
7. **Dillon, J.S.** *H1C IDR 2.1: Calibrated, Flagged, and LST-Binned HERA Internal Data Release*. HERA Memo Series #45 (2018)
6. Kern, N.S., C. Carilli, S. Kohn, **J.S. Dillon**, et al. *Sky-Based Antenna Delays as a Starting Point for Redundant Calibration*. HERA Memo Series #41 (2017)
5. **Dillon, J.S.**, A. Liu, S. Kohn, et al. *Redundant Calibration Degeneracies with Four Polarizations*. HERA Memo Series #30 (2017)
4. **Dillon, J.S.** and A.R. Parsons. *Omnical Degeneracy Removal*. HERA Memo Series #24 (2017)
3. **Dillon, J.S.** and D.C. Jacobs. *The HERA Observing Season*. HERA Memo Series #8 (2015)
2. **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)
1. Zheng, H., M. Tegmark, V. Buza, **J.S. Dillon**, et al. *Mapping our Universe in 3D with MITEoR*. 2013 IEEE International Symposium on Phased Array Systems and Technology (2013)

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# Professional Talks and Presentations

Slides for all talks are available at [JoshDillon.com/Talks](https://JoshDillon.com/Talks).

- Jun. 13, 2024 **Line Intensity Mapping 2024**, University of Illinois, Urbana-Champaign, Urbana, IL.
- Feb. 22, 2024 **KICP Seminar, *Invited Talk***. University of Chicago, Chicago, IL.
- Jul. 3, 2023 **Shedding New Light on the First Billion Years of the Universe, *Invited Talk***. 16th Edition of the GECO Team Conference Cycle, Marseille, France (delivered remotely).
- April. 19, 2023 **University of Waterloo Special Physics and Astronomy Seminar, *Invited Talk***. Waterloo, ON, Canada.
- Feb. 21, 2023 **Frontiers in Cosmology, *Invited Talk***. Raman Research Institute, Bengaluru, Karnataka, India (delivered remotely).
- Feb. 17, 2023 **York University Special Astrophysics Seminar, *Invited Talk***. Toronto, ON, Canada.
- Jan. 12, 2023 **241st Meeting of the American Astronomical Society**, Seattle, WA.
- Dec. 13, 2022 **PUMA Collaboration Meeting, *Invited talk***. Held online.
- Dec. 2, 2022 **McWilliams Center for Cosmology Astrolunch, *Invited Talk***. Carnegie Mellon University, Pittsburgh, PA.
- Oct. 17, 2022 **5th Global 21-cm Workshop**, Berkeley, CA.
- Jul. 6, 2022 **Cosmology from Home, Held Online ([video link](#)), *Invited plenary talk***.
- Mar. 22, 2022 **Reionization and Cosmic Dawn: Looking Forward To the Past**, Berkeley Center for Cosmological Physics Workshop. ***Invited overview talk***. Berkeley, CA.
- Mar. 14, 2022 **SAZERAC 21cm 2022**, Held online.
- Dec. 10, 2021 **First Results from the Hydrogen Epoch of Reionization Array, Specialist Discussion Meeting at the Royal Astronomical Society, *Invited talk***. Held online.
- Dec. 7, 2021 **Science at Low Frequencies VIII**, Held online.
- Aug. 12, 2021 **CMB-S4 Summer Workshop, *Invited talk***. Held online.
- Jun. 17, 2021 **SAZERAC 2.0**, Held online.
- Apr. 22, 2021 **Washington University in St. Louis, Department of Physics Special Research Seminar, *Invited talk***. Held online.
- Apr. 21, 2021 **Washington University in St. Louis, Department of Physics Colloquium, *Invited talk***. Held online.
- Jan. 29, 2021 **SAZERAC: The 21-cm Signal from Cosmic Dawn and the Epoch of Reionisation**, Held online.
- Jan. 8, 2021 **URSI National Radio Sciences Meeting**, Held online.
- Oct. 5, 2020 **Harvard-Smithsonian CfA Galaxies & Cosmology Seminar, *Invited talk***. Held online.
- Sep. 3, 2020 **Cosmology from Home**, Held online ([video link](#)).
- Aug. 13, 2020 **PUMA Collaboration Meeting, *Invited talk***. Held online.
- Jan. 17, 2020 **KIPAC Tea Talk, *Invited Talk***. Menlo Park, CA.
- Jan. 16, 2020 **Stanford Astrophysics Colloquium, *Invited Talk***. Stanford, CA.
- Jan. 5, 2020 **235th Meeting of the American Astronomical Society**, Honolulu, HI.
- Jan. 3, 2020 **18th Annual Symposium of the NSF Astronomy & Astrophysics Postdoctoral Fellows, *Invited talk***. Honolulu, HI.
- Dec. 11, 2019 **Science at Low Frequencies VI**, Arizona State University, Tempe, AZ.
- Nov. 14, 2019 **ObsCos Seminar, *Invited Talk***. Caltech, Pasadena, CA.
- Jul. 10, 2019 **Lines in the Large-Scale Structure**, Marseille, France.



- Feb. 7, 2019 **Special Astrophysics Seminar, *Invited talk.*** *Columbia University, New York, NY.*
- Jan. 10, 2019 **233rd Meeting of the American Astronomical Society, *Seattle, WA.***
- Jan. 5, 2019 **17th Annual Symposium of the NSF Astronomy & Astrophysics Postdoctoral Fellows, *Invited talk.*** *Seattle, WA.*
- Dec. 13, 2018 **Nuclear, Particle, and Astrophysics Seminar, *Invited talk.*** *Yale University, New Haven, CT.*
- Nov. 30, 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.*
- May. 30, 2018 **Thirteenth Conference on the Intersections of Particle and Nuclear Physics, *Invited talk.*** *Indian Wells, CA.*
- Feb. 8, 2018 **Cosmological Signals from Cosmic Dawn to the Present, *Aspen Center for Physics, Aspen, CO.***
- Jan. 8, 2018 **16th Annual Symposium of the NSF Astronomy & Astrophysics Postdoctoral Fellows, *Invited talk.*** *National Harbor, MD.*
- Oct. 3, 2017 **IAU Symposium 333: Peering towards Cosmic Dawn, *Dubrovnik, Croatia.***
- Feb. 13, 2017 **Cosmology on Safari, *KwaZulu-Natal, South Africa.***
- Jan. 11, 2017 **Cosmology with Neutral Hydrogen, *Berkeley Center for Cosmological Physics, University of California, Berkeley.***
- Jan. 4, 2017 **URSI National Radio Sciences Meeting, *Boulder, CO.***
- Oct. 14, 2016 **McWilliams Center for Cosmology Coffee Talk, *Carnegie Mellon University, Pittsburgh, PA.***
- Aug. 4, 2016 **U.S. Radio/Millimeter/Submillimeter Science Futures II, *Invited Talk.*** *Baltimore, MD.*
- Jun. 29, 2016 **HI 21 cm Cosmology Workshop, *Invited talk.*** *SOC member. Kavli Institute for Cosmology, Cambridge, UK.*
- Apr. 25, 2016 **University of California, Santa Cruz CosmoClub, *Invited talk.*** *Santa Cruz, CA.*
- Apr. 1, 2016 **Institute for Nuclear and Particle Astrophysics Seminar, *Invited talk.*** *Lawrence Berkeley National Laboratory, Berkeley, CA.*
- Mar. 8, 2016 **The Reionization Epoch: New Insights and Future Prospects, *Aspen Center for Physics, Aspen, CO.***
- Dec. 9, 2015 **Cosmology and First Light, *Institut d'Astrophysique de Paris. Paris, France.***
- May. 22, 2015 **The Olympian Symposium, *Mount Olympus, Greece.***
- Apr. 17, 2015 **MIT Department of Physics Thesis Defense, *Cambridge, MA.***
- Mar. 17, 2015 **CCAPP Seminar, *Invited talk.*** *The Ohio State University, Columbus, OH.*
- Jan. 8, 2015 **225th Meeting of the American Astronomical Society, *Dissertation Talk.*** *Seattle, WA.*
- Dec. 10, 2014 **Early Science from Low Frequency Radio Telescopes, *Tempe, AZ.***
- Oct. 30, 2014 **CfA ITC Luncheon, *Cambridge, MA.***
- Oct. 24, 2014 **KIPAC Tea Talk, *Menlo Park, CA.***
- Oct. 21, 2014 **Berkeley Cosmology Seminar Series, *Invited talk.*** *Berkeley, CA.*
- Aug. 27, 2014 **University of Washington Dark Universe Science Center Seminar, *Invited talk.*** *Seattle, WA.*
- Feb. 26, 2014 **Brown Astrophysics Seminar Series, *Invited talk.*** *Providence, RI.*

- Feb. 21, 2014 **University of Chicago Kavli Institute Friday noon seminar, *Invited talk*.** *Chicago, IL.*
- Feb. 12, 2014 **MIT Physics Graduate Student Council “Kaleidoscope” lunch series, *Invited talk*.** *Cambridge, MA.*
- Jan. 9, 2014 **URSI National Radio Sciences Meeting, *Boulder, CO.***
- Jul. 17, 2013 **Reionization in the Red Centre: New windows on the high redshift Universe (CAASTRO), *Ayers Rock Resort, Australia.***
- Apr. 18, 2013 **Innovative Techniques in 21 cm Analysis, *Invited talk*.** *Ohio State University.*
- Jul. 5, 2012 **62nd Lindau Nobel Laureate Meeting, *Lindau, Germany.***
- May. 24, 2011 **218th Meeting of the American Astronomical Society, *Boston, MA.***

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## Public Talks

- Aug. 1, 2019 **Berkeley Astronomy Department Astro Night, *Berkeley, CA.***
- May. 11, 2019 **Mount Tam Astronomy Program, part of Wonderfest: The Bay Area Beacon of Science, *Invited public talk*.** *Mill Valley, CA.*
- Oct. 17, 2018 **San Francisco Amateur Astronomers Monthly Lecture Series, *Invited public talk*.** *San Francisco, CA.*
- Mar. 15, 2018 **Adler After Dark, *Invited public talk*.** *Adler Planetarium, Chicago, IL.*
- Dec. 16, 2017 **Science@Cal Lecture Series, *Invited public talk*.** *Berkeley, CA.*
- Jan. 16, 2014 **MIT Kavli Institute Frontiers of Astronomy, Astrophysics, and Space Science lecture series, *Invited public talk*.** *Cambridge, MA.*

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## Teaching Assistantships at MIT

- Spring 2015 **8.02 TEAL: *Electricity and Magnetism*** (Rated 5.7/7.0)
- Fall 2013 **8.942 *Graduate Cosmology***
- Fall 2013 **8.021 *Electricity and Magnetism*** (Rated 6.2/7.0)
- Spring 2013 **8.901 *Graduate Astrophysics I*** (Rated 6.4/7.0)
- Fall 2012 **8.01L *Classical Mechanics*** (Rated 6.8/7.0)
- Spring 2012 **8.02 TEAL: *Electricity and Magnetism*** (Rated 6.1/7.0)
- Fall 2011 **8.033: *Relativity***
- Fall 2010 **8.01 TEAL: *Classical Mechanics***
- Spring 2012 Completed *MIT Graduate Student Teaching Certificate Program.*

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## Service

### To the Public:

- 2015 – Present **Chair of the Board of the [Science Ambassador Scholarship](#)**
- 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 50 women](#) with advanced degrees in STEM fields have selected [seven annual scholarship winners](#).
  - We have raised raised over \$1,400,000 so far.
- 2011 – Present **Co-moderator and astrophysics panelist of [Reddit’s AskScience](#)**

- AskScience is an online community with over 22,000,000 subscribers dedicated to answering laypeople's scientific questions and promoting public understanding and appreciation of science.

### To the Astrophysics Community:

- 2024 – Present **Referee, Publications of the Astronomical Society of Australia**
- 2022 **SOC/LOC member for Reionization and Cosmic Dawn in Berkeley, CA**
- 2021 – 2022 **HERA Diversity, Equity, and Inclusion Team Leader**
- 2021 – Present **Referee, Physical Review D**
- 2019 – Present **Referee, Physical Review Letters**
- 2019 – Present **AAS Chambliss Astronomy Achievement Student Award Judge**
- 2019 **NASA FINESST Future Investigators Grant Program Reviewer**
- 2019 **Co-organizer of 2019 NSF AAPF Symposium at AAS 233 in Seattle, WA**
- 2016 **NASA Astrophysics Data Analysis Program (ADAP) Panelist**
- 2016 **SOC member for the HI 21cm Cosmology Workshop in Cambridge, UK**
- 2014 – Present **Referee, Monthly Notices of the Royal Astronomical Society**

### At the University of California, Berkeley:

- 2018 – 2020 **Postdoctoral Representative to the Astronomy Department**
- 2016 – Present **Volunteer at Astro Night public talk series and rooftop observing**
- 2015 – Present **Member of the “AstroJustice” social justice discussion group**

### At the Massachusetts Institute of Technology:

- 2010 – 2015 **Volunteer tutor for the MIT Office of Minority Education**
- 2010 – 2012 **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**

### At Stanford University:

- 2007 – 2008 **Resident tutor in a freshman dorm**
- 2007 – 2008 **Representative to the physics undergraduate studies committee**