C.V. for Steven Murray

CONTACT INFORMATION

Cosmology Group
Scuola Normale Superiore,
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ACADEMIC REFERENCES

Prof. Judd Bowman	judd.bowman@asu.edu	(+1)480 965-8880
Dr. Cathryn Trott	cathryn.trott@curtin.edu.au	(+61)8 9266 1306
Prof. Andrei Mesinger	andrei.mesinger@sns.it	(+39) 050 509 688

RESEARCH INTERESTS

21cm Cosmology: validation, parameter inference, statistical foreground modelling, connecting instruments to theoretical predictions, simulations.
Large-scale structure: halo mass function, halo model, warm dark matter, fast synthetic catalogues.
Astrostatistics: hierarchical Bayesian models, non-parametric statistics, count distributions, PCA.
Software and computing: high-standard development practices, accessible web-applications for the community, robust mathematical tools in Python.

EDUCATION

University of Western Australia, Perth, Western Australia • •

PhD, Physics (2012–2015)

- Thesis Title: Next-generation tools for next-generation surveys
- Supervisors: Prof. Chris Power, Dr. Aaron Robotham
- Area of Study: Cosmology/Structure formation
- Courses Taken:
  - General Relativity (HD)
  - Computer Intensive Methods in Statistics (D)
  - Bayesian Astronomy in R

Honours, Physics (2011)

- Graduated: First Class
- Thesis Topic: Large-Scale Structure in the SDSS and GAMA surveys
- Supervisor: Prof. John Hartnett
- Courses Taken:
  - Differential Geometry (HD)
  - Mathematical Methods (HD)
  - Computational Quantum Mechanics (D)
  - Astrophysics (D)

University of Queensland, Brisbane, Queensland, Australia • •

Bachelor of Science in Mathematics (2007-2009)

- Graduated: GPA of 6.583/7

PROFESSIONAL EXPERIENCE

Arizona State University, Tempe, Arizona
HERA/EDGES Postdoc, (2018 –)

Curtin University, Perth, Western Australia
CAASTRO Postdoc, (2015 – 2018)

University of Western Australia, Perth, Western Australia
APA funded PhD student, (2012 – 2015)

ICRAR/Pawsey, Perth, Western Australia
ICRAR/Pawsey Summer Internship, (2011 – 2012)

University of Western Australia, Perth, Western Australia
First-year Physics Lab Demonstration Tutor, (2011)

University of Queensland, Brisbane, Queensland
First-year Mathematics Tutor, (2009)

Software

Complete information at github.com/steven-murray.

Organizations

Most of my software development occurs within teams, which are listed here (only organizations in which I've been active in the last year and are a member are listed). Each column gives the total number of my contributions made to the organization, and then shows the relative contribution (percentage) of the contributions in the form of **C**ommits, **P**Rs, **I**ssues and **R**eviews.

Github Org	Description	Contr. [C|P|I|R]
HERA-Team	Collection of software used for the HERA radio telescope	1102 [890|25|85|102]
edges-collab	Collection of codes for working with EDGES data	298 [245|00|26|27]
21cmfast	Core team that develops 21cmFAST and associated packages	266 [164|02|20|80]
RadioAstronomySoftwareGroup	Foundational software tools for radio astronomy	168 [124|04|12|28]
halomod	Halo Model calculations	81 [069|01|07|04]

Original Codes

Here I list notable codes that I originally authored and maintain. Much of my current development work occurs in collaborative software, which is listed below.
Key: ☆ GH Stars | ⑂ Forks

Repo	Description	☆	⑂
halomod/hmf	Python halo mass function calculator	67	34
steven-murray/hankel	Implementation of Ogata's (2005) method for Hankel transforms.	42	05
halomod/halomod	Python package for dealing with the Halo Model	23	12
steven-murray/powerbox	A python package for making arbitrarily structured, arbitrary-dimension boxes	21	09
halomod/TheHaloMod-SPA	Single-page app for TheHaloMod	04	00
steven-murray/mrpy	A Python package for calculations with the MRP parameterisation of the Halo Mass Function.	01	01

Collaborative Codes

Here I list notable codes that I contribute to collaboratively. They are listed in descending order of my total number of contributions.
Key: ☆ GH Stars | Forks | My Rank as Contributor | My Contributions

Repo	Description	☆			
21cmFAST	Official repository for 21cmFAST: a code for generating fast simulations of the cosmological 21cm signal	51	30	999 (60%)	1/12
hera_sim	Simple simulation code for HERA-like redundant interferometric arrays	15	8	698 (35%)	2/21
edges-analysis	Analysis pipeline for EDGES field data.	1	0	631 (79%)	1/4
edges-cal	Code to calibrate EDGES data	0	1	563 (91%)	1/5
edges-io	Module for reading EDGES data and working with EDGES databases	0	0	449 (91%)	1/5
21CMMC	Constrain 21cmFAST parameters using MCMC	7	9	444 (46%)	1/8
hera_cal	Library for HERA data reduction, including redundant calibration, absolute calibration, and LST-binning.	9	8	400 (8%)	4/24
matvis	Fast matrix-based visibility simulator	1	1	316 (70%)	1/11
edges-estimate	Analysis code for fitting EDGES data with foregrounds and 21 cm signatures	0	1	186 (77%)	1/4
read_acq	Read EDGES ACQ files with Python	2	0	183 (82%)	1/5

Academic Experience

Grants **2012 – Present**

- S. Furlanetto, J. Mirocha, P. La Plante, D. Jacobs, S. G. Murray, 2022, '*A new window into galaxy physics and environments during cosmic dawn through cross-correlations*', NASA ATP.
- S. G. Murray, A. Mesinger, 2022, '*FORWARD: Forward-Models of Cosmic Dawn: connecting 21cm simulations to the real world*', Marie Curie Fellowship.
- S. G. Murray, J. D. Bowman, D. C. Jacobs, 2022, '*Probing Cosmic Dawn with End-to-End Forward Models*', NSF AAG.
- P. La Plante, S. Furlanetto, S. G. Murray, 2022, '*Collaborative Research: Exploring Reionization and the Cosmic Dawn through Cross-Correlations*', NSF AAG.
- S. G. Murray et. al., 2022, '*Unveiling Cosmic Dawn with HERA*', XSEDE Allocation.
- S. G. Murray et. al., 2021, '*Unveiling Cosmic Dawn with HERA*', XSEDE Allocation.
- S. G. Murray et. al., 2020, '*Unveiling Cosmic Dawn with HERA*', XSEDE Startup Allocation.
- Lisa Kewley et al. (Murray listed as Ass. Investigator), 2017, '*ASTRO 3D*', ARC CoE.
- Chris Power et. al., 2013, '*Fast, approximate synthetic universes for the SKA*', UWA Research Collaboration Awards.
- Chris Power, S. G. Murray, 2012, '*Building model universes for the Square Kilometre Array and its pathfinders*', UWA Research Collaboration Awards.
- Aaron Robotham et al., 2012, '*Building galaxies with trees*', UWA Research Collaboration Awards.

Collaborations **2013 – Present**

- Network for Exploration and Space Science [CI Jack Burns], (2020 –)
- EDGES [CI Judd Bowman], (2019 –)
- 21cmFAST [CI Andrei Mesinger], (2019 –)
- HERA [CI Dave DeBoer], (2018 –)
- GENESIS Project (Primary Liaison between MWA EoR and GENESIS) [CI Chris Power & Cath Trott], (2017 – 2018)
- ASTRO 3D (Affiliate Investigator, Listed as Associate Investigator on Proposal) [CI Lisa Kewley], (2017 –)

– SKA CD/EoR SWG [CI Leon Koopmans], (2017 –)
– MWA EoR Team, ICRAR/Curtin [CI Cathryn Trott], (2015 – 2018)
– Computational Theory Group, ICRAR/UWA [CI Chris Power], (2013 – 2018)
– UAM, Madrid [CI Alexander Knebe], (2013 – 2014)

Memberships and Committees **2012 – Present**
– HERA DE&I Committee [Chair], (2022 – 2022)
– HERA Ombudsperson [Ombudsperson], (2021 –)
– SKA CD/EoR SWG [Member], (2017 –)
– ASA [Member], (2017 –)
– CAASTRO Postdoc Committee [Member], (2016 – 2018)
– CAASTRO Student Committee [Chair], (2014 – 2015)
– CAASTRO [Member], (2012 – 2018)

Journal Referee **2017 – Present**
– Referee for PASA (2022 –)
– Referee for A&A (2021 –)
– Referee for JOSS (2019 –)
– Referee for MNRAS (2017 –)

Supervision **2017 – Present**
– Supervised Undergraduate : Naomi Carl (2023 – 2023)
– Supervised Undergraduate : Haina Huang (2022 – 2022)
– Supervised Undergraduate : Dhanush Giriyan (2021 – 2021)
– Co-supervised Undergraduate : ASU Soft. Eng. Capstone Team (2021 – 2022)
– Supervised Undergraduate : ASU Soft. Eng. Capstone Team (2020 – 2021)
– Supervised Undergraduate : Lily Whitler (2019 – 2020)
– Co-supervised PhD student: Bella Nasirudin (2017 – 2020)

Teaching **2004 – Present**
– First-Year Undergraduate Physics: *Lab Demonstration; Report Grading* (UWA, 2011 – 2011)
– First-Year Undergraduate Mathematics: *Class Tutor; Assignment Grading* (UQ, 2009 – 2009)
– Yr 10-12 Mathematics: *Private Tutor* (Private, 2006 – 2010)
– Yr 10-12 Chemistry: *Private Tutor* (Private, 2006 – 2010)
– Yr 10-12 Physics: *Private Tutor* (Private, 2006 – 2010)
– Grades Pre-2 Piano: *Private Tutor* (Private, 2004 – 2020)

Outreach **2016 – Present**
– Outreach video for ASU Open Door (Arizona State University, 2021)
– Outreach stall at ASU Open Door (Arizona State University, 2020)
– Elementary School Presentation: "Deserts and Radio Astronomy" (Eagleridge Enrichment Center, 2019)
– Outreach Stall at Perth Science Festival (Claremont Showgrounds, 2018)
– Q and A Session (Pilgrim Primary school SA via Skype, 2017)
– Q and A Session (Penguin District School, TAS via Skype, 2017)
– School Science Club Presentation: "From Plasma to Planets: How the Universe formed Structures out of Soup" (Perth Modern School, 2017)
– CAASTRO in the Classroom Lecture: "Special Relativity" (Aurora College, NSW via Skype, 2017)
– CAASTRO in the Classroom Lecture: "Special Relativity" (NSW Schools via Skype, 2016)

Industry and Inter-disciplinary Engagement **2016 – Present**

– **ASU:** 21cmSense: A web-app for computing 21cm array sensitivities (2021 – 2022). *Successful proposal for and supervision of Software Engineering Capstone project team to work on web development of 21cmSense.*
– **ASU:** TheHaloMod: An Online Calculator for the halo model (2020 – 2021). *Successful proposal for and supervision of Software Engineering Capstone project team to work on web development of my site TheHaloMod.*
– **WesCEF:** Spectroscopy for soil nutrient analysis (17/04/2018 – 17/04/2018). *Consulting on data analysis of spectroscopic measurements of crops to diagnose soil nutrient issues.*
– **Atlassian:** Atlassian ShipIT Hackathon (08/09/2016 – 09/09/2016). *Hackathon dedicated to shipping new and novel ideas in 24 hours.*

Professional Training **2013 – Present**
– Laboratory Safety Training (ASU) (Oct 2018)
– HDR Supervisor Induction (Feb 2017)
– MWA Data Reduction Workshop (May 2016)
– Code Testing for HPC (ASA Webinar Series) (Jul 2014)
– Bayesian Astronomy with R (Jul 2013)

Personal Training **2015 – Present**
– Visual Communication for Scientists (Jul 2017)
– Stress Management and Resilience (Nov 2017)
– The Perfect Pitch (Nov 2017)
– Atlassian ShipIt Hackathon (5th place) (Jul 2016)
– Conversations at the Right Wavelength (Dec 2015)
– How to benefit from and contribute to Open Science (Dec 2015)
– Building Strong Leaders (Dec 2015)
– Creative Thinking in the Workplace (Dec 2015)
– ICRAR Media Training Workshop (Jul 2015)

Awards And Scholarships

Scuola Normale Superiore
– Marie Curie Fellowship (2022, for 2 years)

ASU
– Accepted Proposal for ASU Soft. Eng. Capstone Project (2020, for 1 year)
– Accepted Proposal for ASU Soft. Eng. Capstone Project (2021, for 1 year)

Curtin
– Most Entertaining Talk at ICRAR-CON (2017)
– Most Scientifically Challenging Talk at ICRAR-CON (2017)
– Best Overall Talk, CAASTRO Retreat (2017)

UWA
– Ernest and Evelyn Shacklock Scholarship (2012, for 3 years)
– CAASTRO Student Talk Prize (2012)
– Most Exciting Talk at ICRAR-CON (2014)

ICRAR
– ICRAR/Pawsey Summer Internship (2011, for 10 weeks)

UQ
– UQ Excellence Scholarship (2007, for 3 years)
– Dean's Commendation for High Achievement (2007, for 3 years)

Technical Skills

Proficiency with Linux (Ubuntu and Arch) operating systems. Working knowledge of Windows and MacOS operating systems

Intimate knowledge of a variety of programming languages, in particular Python, Fortran and C, and to varying extents R, HTML, CSS, Javascript and SQL.

In-depth experience with matplotlib, numpy, scipy, emcee, emacs, git, GitHub, astropy, pyyaml and h5py programs and frameworks, and to varying extents django, plotly-dash, bokeh, pandas and regex.

Presentations

Invited Talks

1. "Overview of new 21cmFAST and 21cmMC" at Inaugural 21cmFAST Developers Workshop, Pisa, Italy (Sep 2019)
2. "Improved Constraints on the X-Ray Heating of the IGM from HERA Phase I" at Understanding the Epoch of Cosmic Reionization, Sesto, Italy (Oct 2023)
3. "EDGES3" at Global 21cm Workshop, Trieste, Italy (Sep 2023)
4. "Bayesian Insights for EDGES data" at URSI AT-AP-RASC, Gran Canaria, Canary Islands (May 2022)
5. "An Update on the Progress of EDGES" at URSI GASS, Rome, Italy (Aug 2021)

Seminars

1. "Improved constraints on X-Ray Heating of the IGM From HERA", Scuola Normale Superiore (14/03/2023)
2. "Forward Modelling Interferometric Observations of the EoR", Yale NPA Seminar (Virtual) (24/02/2022)
3. "Building Confidence in Next-Generation 21cm Cosmology: A Forward-Model Approach", University of Melbourne (Virtual) (04/05/2021)
4. "Building Confidence in Next-Generation 21cm Cosmology: A Forward-Model Approach", Imperial College London (Virtual) (19/05/2021)
5. "Building Confidence in Next-Generation 21cm Cosmology: A Forward-Model Approach", Curtin University (Virtual) (22/09/2021)
6. "An Update on the Progress of EDGES: The Hunt for Cosmic Dawn", Colorado University (Virtual) (24/09/2021)

Contributed Talks

1. "Making EDGES Bayesian" at Global 21cm Workshop, Montreal, Canada (Oct 2019)
2. "Getting the Edge on the Wedge" at ANITA Theory Workshop, Perth, Australia (Feb 2018)
3. "Bridging the Great Divide: Connecting Physical Foregrounds with Interferometric Instruments" at Rise and Shine, Strasbourg, France (Jun 2018)
4. "Realistic Visibility Covariance for the EoR in the presence of... well, just about everything." at ANITA Theory Workshop, Hobart, Australia (Feb 2017)
5. "Between Wedge and Window: An Improved Statistical Point-Source Foreground Model for the EoR" at Fundamental Physics with the SKA, Flic-en-Flac, Mauritius (May 2017)

6. "The Wedge and the Window" at ICRAR CON, Mandurah, Australia (Sep 2017) **[Prize for Most scientifically challenging talk and Most entertaining talk]**
7. "Between Wedge and Window: An Improved Statistical Point-Source Foreground Model for the EoR" at Peering Towards Cosmic Dawn, Dubrovnik, Croatia (Oct 2017)
8. "The Wedge and the Window" at CAASTRO Annual Retreat, Adelaide, Australia (Nov 2017) **[Prize for Best overall talk]**
9. "Eddington Bias vs. Hierarchical Bayes in the Halo Mass Function" at Statistical Challenges in 21st Century Cosmology, Chania, Greece (May 2016)
10. "A Simple Halo Mass Function Distribution" at Diving into the Dark, Cairns, Australia (Jul 2016)
11. "An Improved Statistical Foreground Model for the EoR" at CAASTRO Annual Retreat, Busselton, Australia (Nov 2016)
12. "Simplifying the Halo Mass Function" at ICRAR CON, Rottnest Island, Australia (Sep 2015)
13. "Tools and Statistics with Dark Matter Halos" at ANITA Theory Workshop, Sydney, Australia (Feb 2014)
14. "HALOgen" at nIFTy Cosmology, Madrid, Spain (Jun 2014)
15. "HALOgen: A Fast Approximate Halo Generator" at ICRAR CON, Rottnest Island, Australia (Sep 2014) **[Prize for Most Exciting Talk]**
16. "Dark Matters" at CAASTRO Annual Retreat, Twin Waters, Australia (Nov 2014)
17. "The Generalised 2-Point Correlation Function" at ANITA Theory Workshop, Brisbane, Australia (Feb 2013)
18. "The Generalised 2-Point Correlation Function" at CAASTRO Annual Retreat, Pinnacles, Australia (Sep 2012) **[Prize for Best Student Talk]**
19. "A Bayesian Calibration Framework for EDGES" at Global 21cm Workshop, Berkeley, USA (Oct 2022)
20. "An Update on the Progress of EDGES" at Global 21cm Workshop, Boulder, USA (Oct 2021)
21. "Current Status and Future Plans for EDGES" at Next-Generation Cosmology with Next-Generation Radio Telescopes: II, Sesto, Italy (Jan 2020)
22. "EDGES Calibration Pipeline" at Global 21cm Workshop, Cambridge, UK (Oct 2020)

Publications

To see a configurable list of all my publications, see my ADS list[1]. Information correct as of 13 Dec 2023. Any arxiv e-prints displayed have been accepted.Papers in each category listed in reverse chronological order. Papers with more than 5 citations per year highlighted in orange.

At a Glance

Key: Papers, Citations, Reads (on NASA ADS)

[1] https://ui.adsabs.harvard.edu/public-libraries/qfT0ZuGSRCWBI5sG0rl5hw

Total Papers	62	**M-index**	1.9
Normalized Papers	8.3	**G-index**	41
Total Citations	1792	**I10-index**	36
Total Norm. Citations	239.5	**I100-index**	3
H-index	21	**Tori-index**	3.2

First author papers

10 470 175

1. **Murray, Steven G.**, Bowman, Judd D., Sims, Peter H. et. al. (2022), *A Bayesian calibration framework for EDGES*, MNRAS, 517, 2264 6 16
2. **Murray, S. G.**, Diemer, B., Chen, Z. et. al. (2021), *THEHALOMOD: An online calculator for the halo model*, A&C, 36, 100487 20 35
3. **Murray, Steven**, Greig, Bradley, Mesinger, Andrei et. al. (2020), *21cmFAST v3: A Python-integrated C code for generating 3D realizations of the cosmic 21cm signal.*, JOSS, 5, 2582 63 34
4. **Murray, Steven**, Poulin, Francis (2019), *hankel: A Python library for performing simple and accurate Hankel transformations*, JOSS, 4, 1397 14 10
5. **Murray, Steven G.**, Trott, C. M. (2018), *The Effect of Baseline Layouts on the Epoch of Reionization Foreground Wedge: A Semianalytical Approach*, ApJ, 869, 25 13 3
6. **Murray, Steven G.** (2018), *powerbox: A Python package for creating structured fields with isotropic power spectra*, JOSS, 3, 850 21 8
7. **Murray, S. G.**, Robotham, A. S. G., Power, C. (2018), *An Empirical Mass Function Distribution*, ApJ, 855, 5 2 8
8. **Murray, S. G.**, Trott, C. M., Jordan, C. H. (2017), *An Improved Statistical Point-source Foreground Model for the Epoch of Reionization*, ApJ, 845, 7 21 7
9. **Murray, S. G.**, Power, C., Robotham, A. S. G. (2013), *HMFcalc: An online tool for calculating dark matter halo mass functions*, A&C, 3, 23 264 49
10. **Murray, S. G.**, Power, C., Robotham, A. S. G. (2013), *How well do we know the halo mass function ?*, MNRAS, 434, L61 46 5

Supervised papers by my students

2 11 29

11. Nasirudin, Ainulnabilah, Prelogovic, David, **Murray, Steven G.** et. al. (2022), *Characterizing beam errors for radio interferometric observations of reionization*, MNRAS, 514, 4655 1 18
12. Nasirudin, A., **Murray, S. G.**, Trott, C. M. et. al. (2020), *The Impact of Realistic Foreground and Instrument Models on 21 cm Epoch of Reionization Experiments*, ApJ, 893, 118 10 11

Papers with significant contribution to analysis

21 367 332

13. Gorce, Adélie, Ganjam, Samskruthi, Liu, Adrian et. al. (2023), *Impact of instrument and data characteristics in the interferometric reconstruction of the 21 cm power spectrum*, MNRAS, 520, 375 5 22
14. Sims, Peter H., Bowman, Judd D., Mahesh, Nivedita et. al. (2023), *A Bayesian approach to modelling spectrometer data chromaticity corrected using beam factors - I. Mathematical formalism*, MNRAS, 521, 3273 7 21
15. Muñoz, Julian B., Qin, Yuxiang, Mesinger, Andrei et. al. (2022), *The impact of the first galaxies on cosmic dawn and reionization*, MNRAS, 511, 3657 53 55

16. Aguirre, James E., **Murray, Steven G.**, Pascua, Robert et. al. (2022), *Validation of the HERA Phase I Epoch of Reionization 21 cm Power Spectrum Software Pipeline*, ApJ, 924, 85 18 22

17. Prelogović, David, Mesinger, Andrei, **Murray, Steven** et. al. (2022), *Machine learning astrophysics from 21 cm lightcones: impact of network architectures and signal contamination*, MNRAS, 509, 3852 26 30

18. Trott, Cathryn M., Mondal, Rajesh, Mellema, Garrelt et. al. (2022), *Multi-frequency angular power spectrum of the 21 cm signal from the Epoch of Reionisation using the Murchison Widefield Array*, Astronomy and Astrophysics, 666, A106 3 22

19. Greig, Bradley, Wyithe, J. Stuart B., **Murray, Steven G.** et. al. (2022), *Generating extremely large-volume reionization simulations*, MNRAS, 516, 5588 6 11

20. Mondal, Rajesh, Mellema, Garrelt, **Murray, Steven G.**, Greig, Bradley (2022), *The multifrequency angular power spectrum in parameter studies of the cosmic 21-cm signal*, MNRAS, 514, L31 10 17

21. Cox, Tyler A., Jacobs, Daniel C., **Murray, Steven G.** (2022), *Estimating the feasibility of 21cm-Ly synergies using the hydrogen Epoch of Reionization array*, MNRAS, 512, 792 5 13

22. Kittiwisit, Piyanat, Bowman, Judd D., **Murray, Steven G.** et. al. (2022), *Measurements of one-point statistics in 21-cm intensity maps via foreground avoidance strategy*, MNRAS, 517, 2138 1 17

23. Lanman, Adam E., **Murray, Steven G.**, Jacobs, Daniel C. (2022), *Validation Solutions to the Full-sky Radio Interferometry Measurement Equation for Diffuse Emission*, The Astrophysical Journal Supplement Series, 259, 22 2 11

24. Gehlot, Bharat K., Jacobs, Daniel C., Bowman, Judd D. et. al. (2021), *Effects of model incompleteness on the drift-scan calibration of radio telescopes*, MNRAS, 506, 4578 3 20

25. Chen, Zhaoting, Wolz, Laura, Spinelli, Marta, **Murray, Steven G.** (2021), *Extracting H I astrophysics from interferometric intensity mapping*, MNRAS, 502, 5259 11 11

26. Wolz, L., **Murray, S. G.**, Blake, C., Wyithe, J. S. (2019), *Intensity mapping cross-correlations II: HI halo models including shot noise*, MNRAS, 484, 1007 27 12

27. Trott, Cathryn M., Watkinson, Catherine A., Jordan, Christopher H. et. al. (2019), *Gridded and direct Epoch of Reionisation bispectrum estimates using the Murchison Widefield Array*, PASA, 36, e023 22 6

28. Trott, Cathryn M., Fu, Shih Ching, **Murray, S. G.** et. al. (2019), *Robust statistics towards detection of the 21 cm signal from the Epoch of Reionization*, MNRAS, 486, 5766 6 6

29. Meyers, B. W., Tremblay, S. E., Bhat, N. D. R. et. al. (2018), *Hunting for Radio Emission from the Intermittent Pulsar J1107-5907 at Low Frequencies*, ApJ, 869, 134 18 10

30. Trott, Cathryn M., Jordan, C. H., **Murray, S. G.** et. al. (2018), *Assessment of Ionospheric Activity Tolerances for Epoch of Reionization Science with the Murchison Widefield Array*, ApJ, 867, 15 22 0

31. Obreschkow, D., **Murray, S. G.**, Robotham, A. S. G., Westmeier, T. (2018), *Eddington's demon: inferring galaxy mass functions and other distributions from uncertain data*, MNRAS, 474, 5500 18 7

32. Jordan, C. H., **Murray, S.**, Trott, C. M. et. al. (2017), *Characterization of the ionosphere above the Murchison Radio Observatory using the Murchison Widefield Array*, MNRAS, 471, 3974 51 11

33. Avila, Santiago, **Murray, Steven G.**, Knebe, Alexander et. al. (2015), *HALOGEN: a tool for fast generation of mock halo catalogues*, MNRAS, 450, 1856 53 8

Collaboration papers (contr. to analysis and/or writing) 29 944 542

34. Vydula, Akshatha K., Bowman, Judd D., Lewis, David et. al. (2024), *Low-frequency Radio Recombination Lines Away from the Inner Galactic Plane*, The Astronomical Journal, 167, 2 0 25

35. Keller, Pascal M., Nikolic, Bojan, Thyagarajan, Nithyanandan et. al. (2023), *Search for the Epoch of Reionization with HERA: upper limits on the closure phase delay power spectrum*, MNRAS, 524, 583 0 33

36. Wilensky, Michael J., Kennedy, Fraser, Bull, Philip et. al. (2023), *Bayesian jackknife tests with a small number of subsets: application to HERA 21 cm power spectrum upper limits*, MNRAS, 518, 6041 2 28

37. Abdurashidova, Zara, Aguirre, James E., Alexander, Paul et. al. (2022), *HERA Phase I Limits on the Cosmic 21 cm Signal: Constraints on Astrophysics and Cosmology during the Epoch of Reionization*, ApJ, 924, 51 74 61

38. Abdurashidova, Zara, Aguirre, James E., Alexander, Paul et. al. (2022), *First Results from HERA Phase I: Upper Limits on the Epoch of Reionization 21 cm Power Spectrum*, ApJ, 925, 221 105 50

39. Xu, Zhilei, Hewitt, Jacqueline N., Chen, Kai-Feng et. al. (2022), *Direct Optimal Mapping for 21 cm Cosmology: A Demonstration with the Hydrogen Epoch of Reionization Array*, ApJ, 938, 128 6 21

40. Storer, Dara, Dillon, Joshua S., Jacobs, Daniel C. et. al. (2022), *Automated Detection of Antenna Malfunctions in Large-N Interferometers: A Case Study With the Hydrogen Epoch of Reionization Array*, Radio Science, 57, e2021RS007376 3 18

41. Rogers, Alan E. E., Barrett, John P., Bowman, Judd D. et. al. (2022), *Analytic Approximations of Scattering Effects on Beam Chromaticity in 21-cm Global Experiments*, Radio Science, 57, e2022RS007558 4 15

42. Rahimi, M., Pindor, B., Line, J. L. B. et. al. (2021), *Epoch of reionization power spectrum limits from Murchison Widefield Array data targeted at EoR1 field*, MNRAS, 508, 5954 21 16

43. Yoshiura, S., Pindor, B., Line, J. L. B. et. al. (2021), *A new MWA limit on the 21 cm power spectrum at redshifts 13-17*, MNRAS, 505, 4775 32 17

44. Trott, C. M., Jordan, C. H., Line, J. L. B. et. al. (2021), *Constraining the 21 cm brightness temperature of the IGM at $z = 6.6$ around LAEs with the murchison widefield array*, MNRAS, 507, 772 3 11

45. Tan, Jianrong, Liu, Adrian, Kern, Nicholas S. et. al. (2021), *Methods of Error Estimation for Delay Power Spectra in 21 cm Cosmology*, The Astrophysical Journal Supplement Series, 255, 26 11 21

46. Mahesh, Nivedita, Bowman, Judd D., Mozdzen, Thomas J. et. al. (2021), *Validation of the EDGES Low-band Antenna Beam Model*, The Astronomical Journal, 162, 38 21 10

47. Monsalve, Raul A., Rogers, Alan E. E., Bowman, Judd D. et. al. (2021), *Absolute Calibration of Diffuse Radio Surveys at 45 and 150 MHz*, ApJ, 908, 145 18 7

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