

TRISTAN PINSONNEAULT-MAROTTE

 [webpage](#) |  tristpm@stanford.edu |  [github](#)

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Research Interests

Observational cosmology, dark energy, large-scale structure, cosmic microwave background, hydrogen intensity mapping, Lyman- α forest, radio cosmology, software development, instrumentation.

Education

PhD Physics	University of British Columbia Supervised by Gary Hinshaw	9/2018 - 11/2023
MSc Physics	University of British Columbia Supervised by Gary Hinshaw	9/2016 - 9/2018
BSc Honours Physics	McGill University	9/2013 - 5/2016

Positions Held

Postdoctoral Fellow	Kavli Institute for Partical Astrophysics and Cosmology, SLAC	10/2023 - present
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PhD Thesis

Title A Detection of Cosmological 21 cm Emission from CHIME in Cross-correlation with the eBOSS Lyman- α Forest

Summary My contributions to the commissioning, operation and calibration of the Canadian Hydrogen Intensity Mapping Experiment (CHIME) leading up to the highest redshift detection of cosmological 21 cm emission to date. Cross-correlating with measurements of the Lyman- α forest from eBOSS made it possible to overcome residual foreground contamination in the CHIME data.

Awards

The Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering (as member of the CHIME Collaboration), <i>National Sciences and Engineering Research Council of Canada</i>	2022
Lancelot M. Berkeley – New York Community Trust Prize for Meritorious Work in Astronomy (as member of the CHIME/FRB Collaboration), <i>American Astronomical Society</i>	2022
Governor General’s Innovation Award, (as member of the CHIME collaboration), <i>Governor General of Canada</i>	2020
Four Year Doctoral Fellowship, <i>University of British Columbia</i>	2018-2022
Walter C. Sumner Memorial Fellowship, <i>Walter C. Sumner Foundation</i>	2018-2020
Donald A. Chant Graduate Scholarship (Declined), <i>University of Toronto</i>	2016
McGill Physics Graduate Scholarship (Declined), <i>McGill University</i>	2016
Canada Graduate Scholarships – Master’s (Declined), <i>National Sciences and Engineering Research Council of Canada (via UofT)</i>	2016
Undergraduate Student Research Awards, <i>National Sciences and Engineering Research Council of Canada</i>	2015
Undergraduate Student Research Awards, <i>National Sciences and Engineering Research Council of Canada</i>	2014
J.W. McConnell Scholarship, <i>McGill University</i>	2013

Publications

- CHIME Collaboration, Mandana Amiri, Kevin Bandura, Arnab Chakraborty, et al. (Sept. 2023). “A Detection of Cosmological 21 cm Emission from CHIME in Cross-correlation with eBOSS Measurements of the Lyman- α Forest”. In: *arXiv e-prints*, arXiv:2309.04404, arXiv:2309.04404. DOI: [10.48550/arXiv.2309.04404](https://doi.org/10.48550/arXiv.2309.04404). arXiv: [2309.04404](https://arxiv.org/abs/2309.04404) [[astro-ph.CO](#)].
- Amiri, Mandana et al. (June 2022). “Using the Sun to Measure the Primary Beam Response of the Canadian Hydrogen Intensity Mapping Experiment”. In: *ApJ* 932.2, 100, p. 100. DOI: [10.3847/1538-4357/ac6b9f](https://doi.org/10.3847/1538-4357/ac6b9f). arXiv: [2201.11822](https://arxiv.org/abs/2201.11822) [[astro-ph.IM](#)].
- CHIME Collaboration, Mandana Amiri, Kevin Bandura, Anja Boskovic, et al. (Aug. 2022). “An Overview of CHIME, the Canadian Hydrogen Intensity Mapping Experiment”. In: *ApJS* 261.2, 29, p. 29. DOI: [10.3847/1538-4365/ac6fd9](https://doi.org/10.3847/1538-4365/ac6fd9). arXiv: [2201.07869](https://arxiv.org/abs/2201.07869) [[astro-ph.IM](#)].
- CHIME Collaboration, Mandana Amiri, Kevin Bandura, Tianyue Chen, et al. (Feb. 2022). “Detection of Cosmological 21 cm Emission with the Canadian Hydrogen Intensity Mapping Experiment”. In: *arXiv e-prints*, arXiv:2202.01242, arXiv:2202.01242. arXiv: [2202.01242](https://arxiv.org/abs/2202.01242) [[astro-ph.CO](#)].
- Reda, Alex et al. (Aug. 2022). “Characterization of the John A. Galt Telescope for radio holography with CHIME”. In: *Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumen-*

- tation for Astronomy XI*. Ed. by Jonas Zmuidzinas and Jian-Rong Gao. Vol. 12190. Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 121902V, p. 121902V. DOI: [10.1117/12.2629429](https://doi.org/10.1117/12.2629429). arXiv: [2207.13876](https://arxiv.org/abs/2207.13876) [[astro-ph.IM](#)].
- CHIME/FRB Collaboration, Mandana Amiri, et al. (Dec. 2021). “The First CHIME/FRB Fast Radio Burst Catalog”. In: *ApJS* 257.2, 59, p. 59. DOI: [10.3847/1538-4365/ac33ab](https://doi.org/10.3847/1538-4365/ac33ab). arXiv: [2106.04352](https://arxiv.org/abs/2106.04352) [[astro-ph.HE](#)].
- CHIME/Pulsar Collaboration et al. (July 2021). “The CHIME Pulsar Project: System Overview”. In: *ApJS* 255.1, 5, p. 5. DOI: [10.3847/1538-4365/abfdcb](https://doi.org/10.3847/1538-4365/abfdcb). arXiv: [2008.05681](https://arxiv.org/abs/2008.05681) [[astro-ph.IM](#)].
- CHIME/FRB Collaboration, B. C. Andersen, K. M. Bandura, et al. (Nov. 2020). “A bright millisecond-duration radio burst from a Galactic magnetar”. In: *Nature* 587.7832, pp. 54–58. DOI: [10.1038/s41586-020-2863-y](https://doi.org/10.1038/s41586-020-2863-y). arXiv: [2005.10324](https://arxiv.org/abs/2005.10324) [[astro-ph.HE](#)].
- Chime/Frb Collaboration et al. (June 2020). “Periodic activity from a fast radio burst source”. In: *Nature* 582.7812, pp. 351–355. DOI: [10.1038/s41586-020-2398-2](https://doi.org/10.1038/s41586-020-2398-2). arXiv: [2001.10275](https://arxiv.org/abs/2001.10275) [[astro-ph.HE](#)].
- CHIME/FRB Collaboration, M. Amiri, K. Bandura, M. Bhardwaj, P. Boubel, M. M. Boyce, P. J. Boyle, et al. (Jan. 2019a). “A second source of repeating fast radio bursts”. In: *Nature* 566.7743, pp. 235–238. DOI: [10.1038/s41586-018-0864-x](https://doi.org/10.1038/s41586-018-0864-x). arXiv: [1901.04525](https://arxiv.org/abs/1901.04525) [[astro-ph.HE](#)].
- CHIME/FRB Collaboration, M. Amiri, K. Bandura, M. Bhardwaj, P. Boubel, M. M. Boyce, P. J. Boyle, et al. (Jan. 2019b). “Observations of fast radio bursts at frequencies down to 400 megahertz”. In: *Nature* 566.7743, pp. 230–234. DOI: [10.1038/s41586-018-0867-7](https://doi.org/10.1038/s41586-018-0867-7). arXiv: [1901.04524](https://arxiv.org/abs/1901.04524) [[astro-ph.HE](#)].
- CHIME/FRB Collaboration, B. C. Andersen, K. Bandura, et al. (Nov. 2019). “CHIME/FRB Discovery of Eight New Repeating Fast Radio Burst Sources”. In: *ApJ* 885.1, L24, p. L24. DOI: [10.3847/2041-8213/ab4a80](https://doi.org/10.3847/2041-8213/ab4a80). arXiv: [1908.03507](https://arxiv.org/abs/1908.03507) [[astro-ph.HE](#)].
- CHIME/FRB Collaboration, M. Amiri, K. Bandura, P. Berger, et al. (Aug. 2018). “The CHIME Fast Radio Burst Project: System Overview”. In: *ApJ* 863.1, 48, p. 48. DOI: [10.3847/1538-4357/aad188](https://doi.org/10.3847/1538-4357/aad188). arXiv: [1803.11235](https://arxiv.org/abs/1803.11235) [[astro-ph.IM](#)].
- Amiri, M. et al. (Aug. 2017). “Limits on the Ultra-bright Fast Radio Burst Population from the CHIME Pathfinder”. In: *ApJ* 844.2, 161, p. 161. DOI: [10.3847/1538-4357/aa713f](https://doi.org/10.3847/1538-4357/aa713f). arXiv: [1702.08040](https://arxiv.org/abs/1702.08040) [[astro-ph.HE](#)].
- Bandura, K. et al. (Dec. 2016). “ICE: A Scalable, Low-Cost FPGA-Based Telescope Signal Processing and Networking System”. In: *Journal of Astronomical Instrumentation* 5.4, 1641005, p. 1641005. DOI: [10.1142/S2251171716410051](https://doi.org/10.1142/S2251171716410051). arXiv: [1608.06262](https://arxiv.org/abs/1608.06262) [[astro-ph.IM](#)].

Talks and Posters

- (2019) Calibrating the CHIME Telescope Response. *Poster presented at the 23rd edition of the COSMO conference.*
- (2019) Calibrating the CHIME Array Beam. *Contributed talk at the 50th Annual Meeting of The Canadian Astronomical Society.*
- (2018) Cosmological Parameter Sensitivity Forecasts for CHIME. *Contributed talk at the 49th Annual Meeting of The Canadian Astronomical Society.*

Software

Public packages I made significant contributions to

- Renard, Andre et al. (Nov. 2021). *Kotekan: A framework for high-performance radiometric data pipelines*. Zenodo. Version 2021.11. DOI: [10.5281/zenodo.5842660](https://doi.org/10.5281/zenodo.5842660).
- Shaw, J. Richard, Kiyoshi Masui, Adam D. Hincks, et al. (Oct. 2020). *chime-experiment/ch_pipeline: 20.10.0*. Zenodo. Version v20.10.0. DOI: [10.5281/zenodo.5846379](https://doi.org/10.5281/zenodo.5846379).
- Shaw, J. Richard, Kiyoshi Masui, Rick Nitsche, et al. (Oct. 2020). *radiocosmology/caput: 20.10.0*. Zenodo. Version v20.10.0. DOI: [10.5281/zenodo.5846375](https://doi.org/10.5281/zenodo.5846375).
- Shaw, Richard et al. (Oct. 2020). *radiocosmology/draco: 20.10.0*. Zenodo. Version v20.10.0. DOI: [10.5281/zenodo.5828373](https://doi.org/10.5281/zenodo.5828373).

Computer skills

- Linux** git, bash, etc.
- Languages** python, C, C++
- HPC** Compute Canada clusters, slurm, MPI

Teaching Experience

Courses for which I was a teaching assistant

PHYS 571: Cosmology	2022
PHYS 312: Mathematical physics	2021, 2022
DISCI 572/554/541: Master of Data Science	2021
PHYS 118: Electricity, light and radiation	2017
PHYS 117: Dynamics and waves	2017
ASTR 101: Introduction to the solar system	2016

Languages

- English
- French

Citizenship

- Canada