

# Juan Mena-Parra

## *MIT Kavli Fellow*

### CONTACT INFORMATION

MIT Kavli Institute for Astrophysics and Space Research  
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### PERSONAL INFORMATION

Citizenship: Colombia, Canada  
Languages: Spanish, English, French

### RESEARCH INTERESTS

Observational cosmology, dark energy, hydrogen intensity mapping, fast radio bursts, radio astronomy, very-long-baseline interferometry, large telescope arrays, instrumentation, calibration, data analysis

### RESEARCH APPOINTMENTS

**Kavli Fellow**, MIT Kavli Institute for Astrophysics and Space Research 2018-present

### EDUCATION

**PhD Physics**, McGill University (Canada) 2013-2018  
Thesis: Correlator and calibration for the Canadian Hydrogen Intensity Mapping Experiment (CHIME)  
Advisor: Matt Dobbs

**MSc Physics**, McGill University (Canada) 2012-2013  
Thesis: A Radio-Frequency-over-Fiber link for large-array radio astronomy applications  
Advisor: Matt Dobbs

**BSc Joint Honours Mathematics and Physics**, McGill University (Canada) 2009-2012

**BEng Electronic Engineering**, Universidad de Antioquia (Colombia) 2001-2006

### NON-RESEARCH APPOINTMENTS

**Medical Imaging Engineer**, General Médica (Colombia) 2007-2009

### COLLABORATION MEMBERSHIPS

**Canadian Hydrogen Observatory and Radio-transient Detector (CHORD)** 2019-present  
Project architect (2021)  
Analog signal transport team leader (2021-present)

<b>CHIME/Fast Radio Burst (CHIME/FRB)</b>	2018-present
Outrigger station: instrument team leader (2021-present)	
F-engine team leader (2019-present)	
<b>Canadian Hydrogen Intensity Mapping Experiment (CHIME)</b>	2011-present
Corresponding author for instrument overview paper (2022)	

## SELECTED HONOURS AND AWARDS

<b>Governor General's Innovation Award</b> , (as member of the CHIME collaboration), Governor General of Canada	2020
<b>Kavli Postdoctoral Fellowship in Astrophysics</b> , MIT Kavli Institute for Astrophysics and Space Research	2018-2022
<b>FRQNT Postdoctoral Research Fellowship</b> , Fonds de Recherche du Québec - Nature et Technologies	2018-2020
<b>NSERC Alexander Graham Bell Canada Graduate Scholarship-Doctoral</b> , Natural Sciences and Engineering Research Council of Canada	2014-2017
<b>FRQNT Doctoral Research Scholarship</b> (Declined), Fonds de Recherche du Québec - Nature et Technologies	2014-2017
<b>FRQNT Master's Research Scholarship</b> , Fonds de Recherche du Québec - Nature et Technologies	2013-2014
<b>David Stewart Fellowship</b> , McGill University	2012-2013
<b>Graduation Honours: High distinction and First Class</b> , Joint Honours Mathematics and Physics, McGill University	2012
<b>NSERC Undergraduate Student Research Award (USRA)</b> , Natural Sciences and Engineering Research Council of Canada	2011
<b>Graduation Honours: Ranked 1st student</b> , Electronic Engineering, Universidad de Antioquia	2006

## PUBLICATIONS<sup>†</sup>

### Peer-reviewed publications as first author, student mentor, or major contributor

1. CHIME Collaboration, ..., <b>J. Mena-Parra (Corresponding Author)*</b> , et al., <i>An Overview of CHIME, the Canadian Hydrogen Intensity Mapping Experiment</i> , Submitted to Astrophysical Journal, <a href="https://arxiv.org/abs/2201.07869">arXiv:2201.07869</a>	2022
2. <b>J. Mena-Parra</b> , <u>C. Leung</u> , <u>S. Cary</u> , et al., <i>A clock stabilization system for CHIME/FRB Outriggers</i> , <i>Astronomical Journal</i> , vol. 163, p. 48, <a href="https://arxiv.org/abs/2110.00576">arXiv:2110.00576</a>	2022
3. T. Cassanelli, <u>C. Leung</u> , M. Rahman, K. Vanderlinde, <b>J. Mena-Parra</b> , <u>S. Cary</u> , et al., <i>Localizing FRBs through VLBI with the Algonquin Radio Observatory 10-m Telescope</i> , <i>Astronomical Journal</i> , vol. 163, p. 65, <a href="https://arxiv.org/abs/2107.05659">arXiv:2107.05659</a>	2022

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<sup>†</sup> Mentored students underlined, \* denotes alphabetical authorship order. I am an author on 37 papers that have over 2351 citations (h-index 19). Detailed citation statistics can be found on the [Astrophysics Data System](https://arxiv.org/abs/2110.00576).

4. C. Leung, **J. Mena-Parra**, K. Masui, et al., *A Synoptic VLBI Technique for Localizing Non-Repeating Fast Radio Bursts with CHIME/FRB*, *Astronomical Journal*, vol. 161, p. 81, [arXiv:2008.11738](#) 2021
5. CHIME/FRB Collaboration, ..., **J. Mena-Parra\***, et al., *Observations of Fast Radio Bursts at frequencies down to 400 Megahertz*, *Nature*, vol. 566, pp. 230-234, [arXiv:1901.04524](#) 2019
6. **J. Mena-Parra**, K. Bandura, M. A. Dobbs, J. R. Shaw, and S. Siegel, *Quantization bias for digital correlators*, *Journal of Astronomical Instrumentation*, vol. 07, no. 02n03, p. 1850008, [arXiv:1803.04296](#) 2018
7. K. Bandura, A. N. Bender, ..., **J. Mena-Parra (Corresponding Author)\***, et al., *ICE: A Scalable, Low-Cost FPGA-Based Telescope Signal Processing and Networking System*, *Journal of Astronomical Instrumentation*, vol. 5, p. 1641005, [arXiv:1608.06262](#) 2016
8. K. Bandura, J. F. Cliche, M. A. Dobbs, A. J. Gilbert, D. Ittah, **J. Mena-Parra\***, and G. Smecher, *ICE-Based Custom Full-Mesh Network for the CHIME High Bandwidth Radio Astronomy Correlator*, *Journal of Astronomical Instrumentation*, vol. 5, p. 1641004, [arXiv:1608.04347](#) 2016
9. **J. Mena-Parra**, K. Bandura, J.-F. Cliche, M. Dobbs, A. Gilbert, and Q. Y. Tang, *A Radio-Frequency-over-Fiber link for large-array radio astronomy applications*, *Journal of Instrumentation*, vol. 8, p. T10003, [arXiv:1308.5481](#) 2013

**Peer-reviewed collaboration publications as member of the main science and instrument teams**

1. CHIME/FRB Collaboration, *Sub-second periodicity in a fast radio burst*, Submitted to *Nature*, [arXiv:2107.08463](#) 2021
2. CHIME/FRB Collaboration, *The First CHIME/FRB Fast Radio Burst Catalog*, *Astrophysical Journal Supplement Series*, vol. 257, p. 59, [arXiv:2106.04352](#) 2021
3. CHIME/Pulsar Collaboration, *The CHIME Pulsar Project: System Overview*, *Astrophysical Journal Supplement Series*, vol. 255, p. 5, [arXiv:2008.05681](#) 2021
4. CHIME/FRB Collaboration, *Periodic activity from a fast radio burst source*, *Nature*, vol. 582, pp. 351-355, [arXiv:2001.10275](#) 2020
5. CHIME/FRB Collaboration, *A bright millisecond-duration radio burst from a Galactic magnetar*, *Nature*, vol. 587, pp. 54-58, [arXiv:2005.10324](#) 2020
6. CHIME/FRB Collaboration, *CHIME/FRB Detection of Eight New Repeating Fast Radio Burst Sources*, *Astrophysical Journal*, vol. 885, p. L24, [arXiv:1908.03507](#) 2019
7. CHIME/FRB Collaboration, *A second source of repeating fast radio bursts*, *Nature*, vol. 566, pp. 235-238, [arXiv:1901.04525](#) 2019
8. CHIME/FRB Collaboration, *The CHIME Fast Radio Burst project: System overview*, *Astrophysical Journal*, vol. 863, no. 1, p. 48, [arXiv:1803.11235](#) 2018
9. CHIME Scientific Collaboration, *Limits on the ultra-bright fast radio burst population from the CHIME pathfinder*, *Astrophysical Journal*, vol. 844, no. 2, p. 161, [arXiv:1702.08040](#) 2017

### Other peer-reviewed publications as contributing author

1. P. Chawla, V. M. Kaspi, ..., **J. Mena-Parra**, et al., *Modeling Fast Radio Burst Dispersion and Scattering Properties in the First CHIME/FRB Catalog*, *Astrophysical Journal* (in press), [arXiv:2107.10858](#) 2021
2. R. Mckinven, D. Michilli, ..., **J. Mena-Parra**, et al., *Polarization Pipeline for Fast Radio Bursts Detected by CHIME/FRB*, *Astrophysical Journal*, vol. 920, p. 138, [arXiv:2107.03491](#) 2021
3. Z. Pleunis, D. C. Good, ..., **J. Mena-Parra**, et al., *Fast Radio Burst Morphology in the First CHIME/FRB Catalog*, *Astrophysical Journal*, vol. 923, p. 1, [arXiv:2106.04356](#) 2021
4. M. Rafiei-Ravandi, K. M. Smith, ..., **J. Mena-Parra**, et al., *CHIME/FRB Catalog I results: statistical cross-correlations with large-scale structure*, *Astrophysical Journal*, vol. 922, p. 42, [arXiv:2106.04354](#) 2021
5. A. Josephy, P. Chawla, ..., **J. Mena-Parra**, et al., *No Evidence for Galactic Latitude Dependence of the Fast Radio Burst Sky Distribution*, *Astrophysical Journal*, vol. 923, p. 2, [arXiv:2106.04353](#) 2021
6. D. Michilli, K. W. Masui, ..., **J. Mena-Parra**, et al., *An analysis pipeline for CHIME/FRB full-array baseband data*, *Astrophysical Journal*, vol. 910, p. 147, [arXiv:2010.06748](#) 2021
7. P. Chawla, B. C. Andersen, ..., **J. Mena-Parra**, et al., *Detection of Repeating FRB 180916.J0158+65 Down to Frequencies of 300 MHz*, *Astrophysical Journal Letters*, vol. 896, p. L41, [arXiv:2004.02862](#) 2020
8. P. Scholz, A. Cook, ..., **J. Mena-Parra**, et al., *Simultaneous X-ray and Radio Observations of the Repeating Fast Radio Burst FRB180916.J0158+65*, *Astrophysical Journal*, vol. 901, p. 165, [arXiv:2004.06082](#) 2020
9. E. Fonseca, B. C. Andersen, ..., **J. Mena-Parra**, et al., *Nine New Repeating Fast Radio Burst Sources from CHIME/FRB*, *Astrophysical Journal Letters*, vol. 891, p. L6, [arXiv:2001.03595](#) 2020
10. B. Marcote, K. Nimmo, ..., **J. Mena-Parra**, et al., *A repeating fast radio burst source localized to a nearby spiral galaxy*, *Nature*, vol. 577, pp. 190-194, [arXiv:2001.02222](#) 2020
11. A. Josephy, P. Chawla, ..., **J. Mena-Parra**, et al., *“CHIME/FRB Detection of the Original Repeating Fast Radio Burst Source FRB 121102,”* *Astrophysical Journal Letters*, vol. 882, p. L18, [arXiv:1906.11305](#) 2019
12. K. Masui, M. Amiri, ..., **J. Mena-Parra**, et al., *A compression scheme for radio data in high performance computing*, *Astronomy and Computing*, vol. 12, pp. 181-190, [arXiv:1503.00638](#) 2015

### Conference proceedings, white papers, and research notes

1. S. Cary, **J. Mena-Parra**, C. Leung, et al., *Evaluating and Enhancing Candidate Clocking Systems for CHIME/FRB VLBI Outriggers*, in *Research Notes of the American Astronomical Society*, vol. 5, p. 216, [arXiv:2109.05044](#) 2021
2. K. Vanderlinde, A. Liu, ..., **J. Mena-Parra**, et al., *The Canadian Hydrogen Observatory and Radio-transient Detector (CHORD)*, in *Canadian Long Range Plan for Astronomy and Astrophysics White Papers*, vol. 2020, p. 28, [arXiv:1911.01777](#) 2019

3. L. B. Newburgh, K. Bandura, ..., **J. Mena-Parra**, et al., *HIRAX: A Probe of Dark Energy and Radio Transients*, in [Ground-based and Airborne Telescopes VI](#), vol. 9906, p. 99065X, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, [arXiv:1607.02059](#) 2016
4. P. Berger, L. B. Newburgh, ..., **J. Mena-Parra**, et al., *Holographic Beam Mapping of the CHIME Pathfinder Array*, in [Ground-based and Airborne Telescopes VI](#), vol. 9906, p. 99060D, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, [arXiv:1607.01473](#) 2016
5. N. Denman, M. Amiri, ..., **J. Mena-Parra**, et al., *A GPU-based correlator X-engine implemented on the CHIME Pathfinder*, 2015 IEEE 26th International Conference on Application-specific Systems, Architectures and Processors (ASAP), pp. 35-40, [arXiv:1503.06202](#) 2015
6. K. Bandura, G. E. Addison, ..., **J. Mena-Parra**, et al., *Canadian Hydrogen Intensity Mapping Experiment (CHIME) pathfinder*, in [Ground-based and Airborne Telescopes V](#), p. 914522, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, [arXiv:1406.2288](#) 2014
7. L. B. Newburgh, G. E. Addison, ..., **J. Mena-Parra**, et al., *Calibrating CHIME: a new radio interferometer to probe dark energy*, in [Ground-based and Airborne Telescopes V](#), p. 91454V, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, [arXiv:1406.2267](#) 2014

## TEACHING EXPERIENCE

Co-instructor, Computational Data Science in Physics Massachusetts Institute of Technology, Department of Physics	2021-present
Teaching Assistant, Signal Processing McGill University, Department of Physics	2012-2017
Teaching Assistant, Electronics McGill University, Department of Physics	2012-2017

## MENTORSHIP AND SUPERVISION

Savannah Cary, undergraduate research Wellesley College	2020-present
Haochen Wang, graduate research (PhD) Massachusetts Institute of Technology	2019-present
Calvin Leung, graduate research (PhD) Massachusetts Institute of Technology	2018-present
Honggeun Kim, graduate research (PhD) Massachusetts Institute of Technology	2018-2019
Mohit Bhardwaj, graduate research (PhD) McGill University	2017-2018

Paula Boubel, graduate research (MSc) McGill University	2017-2018
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## ACADEMIC SERVICE

### To the Astrophysics Community

Referee, Journal of Astronomical Telescopes, Instruments, and Systems (JATIS)	2021-present
Scientific Organizing Committee, DSA/CHORD workshop series	2021-present

### At McGill University

Lab tour guide and volunteer, Astro Night public talk series	2015
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## TALKS AND PRESENTATIONS

<i>The CHIME/FRB Outriggers program for localization of fast radio bursts</i> , International Union of Radio Science (URSI), XXXIV General Assembly and Scientific Symposium, Rome, Italy	2021
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<i>CHIME/FRB Outriggers and CHORD: new instruments for localization of Fast Radio Bursts</i> , FRB 2021 virtual conference	2021
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<i>A pathfinder for VLBI with the CHIME/FRB telescope</i> , IEEE International Symposium on Antennas and Propagation and North American Radio Science Meeting	2020
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<i>Systematics-hardened foreground subtraction</i> , Packed Ultra-wideband Mapping Array (PUMA) virtual workshop	2020
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<i>Radio data recorders for precise localization of Fast Radio Bursts</i> , Dominion Radio Astrophysical Observatory, Penticton, Canada	2019
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<i>The Canadian Hydrogen Intensity Mapping Experiment (CHIME): Status and Update</i> , Science at Low Frequencies (SALF) V, Nagoya, Japan	2018
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<i>Measuring the expansion of the universe with the Canadian Hydrogen Intensity Mapping Experiment</i> , Massachusetts Institute of Technology (MIT) Haystack Observatory, Westford, USA	2018
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<i>Measuring the expansion of the universe with the Canadian Hydrogen Intensity Mapping Experiment</i> , International Astronomical Union (IAU) Welcome Event, McGill University, Montreal, Canada	2018
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<i>Calibrating the CHIME pathfinder</i> , International Union of Radio Science (URSI), XXXII General Assembly and Scientific Symposium, Montreal, Canada	2017
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<i>ICE: The digitizer, F-engine and networking engine for the CHIME radio telescope</i> , (Poster) Square Kilometer Array (SKA) Science Annual Meet, Goa, India	2016
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<i>A Radio-Frequency-over-Fiber link for large-array radio astronomy applications</i> , Canadian Association of Physicists (CAP) Congress, Université de Montréal, Montreal, Canada	2013
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<i>A Radio-Frequency-over-Fiber link for large-array radio astronomy applications</i> , (Poster) Telescopes of the Future and Astrophysics of Today symposium, McGill University, Montreal, Canada	2013
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