

Juan Mena-Parra

MIT Kavli Fellow

CONTACT INFORMATION

MIT Kavli Institute for Astrophysics and Space Research
77 Massachusetts Avenue, 37-621
Cambridge, MA, 02139 USA

Email: jdmjena@mit.edu
Web: jdmjena.github.io

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

ACADEMIC 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

COLLABORATION MEMBERSHIPS

Canadian Hydrogen Observatory and Radio-transient Detector (CHORD)

Project architect 2021
Analog signal transport team leader 2021-present

CHIME/Fast Radio Burst (CHIME/FRB)

Outtrigger instrument team leader 2021-present
F-engine team leader 2019-present

Canadian Hydrogen Intensity Mapping Experiment (CHIME)

HONOURS AND AWARDS

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

PUBLICATIONS[†]

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

1. CHIME Collaboration, ..., **J. Mena-Parra (Corresponding Author)***, et al., *An Overview of CHIME, the Canadian Hydrogen Intensity Mapping Experiment*, Submitted to Astrophysical Journal, [arXiv:2201.07869](#) 2022
2. **J. Mena-Parra**, C. Leung, S. Cary, et al., *A clock stabilization system for CHIME/FRB Outriggers*, Astronomical Journal (in press), [arXiv:2110.00576](#) 2021
3. T. Cassanelli, C. Leung, M. Rahman, K. Vanderlinde, **J. Mena-Parra**, S. Cary, et al., *Localizing FRBs through VLBI with the Algonquin Radio Observatory 10-m Telescope*, Submitted to Astrophysical Journal, [arXiv:2107.05659](#) 2021
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

[†] 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](#).

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* (in press), [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*, Submitted to *Astrophysical Journal*, [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* (in press), [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* (in press), [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* (in press), [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 |

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
<i>CHIME/FRB Outriggers and CHORD: new instruments for localization of Fast Radio Bursts</i> , FRB 2021 virtual conference	2021
<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
<i>Systematics-hardened foreground subtraction</i> , Packed Ultra-wideband Mapping Array (PUMA) virtual workshop	2020
<i>Radio data recorders for precise localization of Fast Radio Bursts</i> , Dominion Radio Astrophysical Observatory, Penticton, Canada	2019
<i>The Canadian Hydrogen Intensity Mapping Experiment (CHIME): Status and Update</i> , Science at Low Frequencies (SALF) V, Nagoya, Japan	2018
<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
<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
<i>Calibrating the CHIME pathfinder</i> , International Union of Radio Science (URSI), XXXII General Assembly and Scientific Symposium, Montreal, Canada	2017
<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
<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
<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

EXPERIENCE IN INDUSTRY

Field Service Engineer, General Médica de Colombia S.A. (Colombia)
Medical Imaging

2007-2009[‡]

Engineering Intern, UNE EPM Telecomunicaciones (Colombia)
Research and Development, Telecommunications

2005

[‡] This period also corresponds to my process of immigration to Canada.