Juan Mena-Parra

MIT Kavli Fellow

CONTACT INFORMATION

MIT Kavli Institute for Astrophysics and Space Research
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Cambridge, MA, 02139 USA

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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

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)
Outrigger 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. **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
2. 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
3. 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
4. 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
5. **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

[†] Mentored students underlined, * denotes alphabetical authorship order. I am an author on 36 papers that have over 2351 citations (h-index 19). Detailed citation statistics can be found on the Astrophysics Data System.

6. 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

7. 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

8. **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 1 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 — 2021-present
Massachusetts Institute of Technology, Department of Physics

Teaching Assistant, Signal Processing — 2012-2017
McGill University, Department of Physics

Teaching Assistant, Electronics — 2012-2017
McGill University, Department of Physics

MENTORSHIP AND SUPERVISION

Savannah Cary, undergraduate research — 2020-present
Wellesley College

Haochen Wang, graduate research (PhD) — 2019-present
Massachusetts Institute of Technology

Calvin Leung, graduate research (PhD) — 2018-present
Massachusetts Institute of Technology

Honggeun Kim, graduate research (PhD) — 2018-2019
Massachusetts Institute of Technology

Mohit Bhardwaj, graduate research (PhD) — 2017-2018
McGill University

Paula Boubel, graduate research (MSc) — 2017-2018
McGill University

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

TALKS AND PRESENTATIONS

The CHIME/FRB Outriggers program for localization of fast radio bursts, International Union of Radio Science (URSI), XXXIV General Assembly and Scientific Symposium, Rome, Italy — 2021

CHIME/FRB Outriggers and CHORD: new instruments for localization of Fast Radio Bursts, FRB 2021 virtual conference — 2021

A pathfinder for VLBI with the CHIME/FRB telescope, IEEE International Symposium on Antennas and Propagation and North American Radio Science Meeting — 2020

Systematics-hardened foreground subtraction, Packed Ultra-wideband Mapping Array (PUMA) virtual workshop — 2020

Radio data recorders for precise localization of Fast Radio Bursts, Dominion Radio Astrophysical Observatory, Penticton, Canada — 2019

The Canadian Hydrogen Intensity Mapping Experiment (CHIME): Status and Update, Science at Low Frequencies (SALF) V, Nagoya, Japan — 2018

Measuring the expansion of the universe with the Canadian Hydrogen Intensity Mapping Experiment, Massachusetts Institute of Technology (MIT) Haystack Observatory, Westford, USA — 2018

Measuring the expansion of the universe with the Canadian Hydrogen Intensity Mapping Experiment, International Astronomical Union (IAU) Welcome Event, McGill University, Montreal, Canada — 2018

Calibrating the CHIME pathfinder, International Union of Radio Science (URSI), XXXII General Assembly and Scientific Symposium, Montreal, Canada — 2017

ICE: The digitizer, F-engine and networking engine for the CHIME radio telescope, (Poster) Square Kilometer Array (SKA) Science Annual Meet, Goa, India — 2016

A Radio-Frequency-over-Fiber link for large-array radio astronomy applications, Canadian Association of Physicists (CAP) Congress, Université de Montréal, Montreal, Canada — 2013

A Radio-Frequency-over-Fiber link for large-array radio astronomy applications, (Poster) Telescopes of the Future and Astrophysics of Today symposium, McGill University, Montreal, Canada — 2013

RELEVANT EXPERIENCE IN INDUSTRY

Field Service Engineer, General Médica de Colombia S.A. (Colombia) — 2007-2009‡
Medical Imaging

Engineering Intern, UNE EPM Telecomunicaciones (Colombia) — 2005
Research and Development, Telecommunications

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