

# Juan Mena-Parra

## *Kavli Fellow*

### CONTACT INFORMATION

Massachusetts Institute of Technology  
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, large radio telescope arrays, correlators, instrumentation, calibration, data analysis

### ACADEMIC APPOINTMENTS

<b>Kavli Fellow</b> , MIT Kavli Institute for Astrophysics and Space Research	2018-present
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### EDUCATION

<b>PhD Physics</b> , McGill University (Canada) Thesis: Correlator and calibration for the Canadian Hydrogen Intensity Mapping Experiment (CHIME) Advisor: Matt Dobbs	2013-2018
<b>MSc Physics</b> , McGill University (Canada) Thesis: A Radio-Frequency-over-Fiber link for large-array radio astronomy applications Advisor: Matt Dobbs	2012-2013
<b>BSc Joint Honours Mathematics and Physics</b> , McGill University (Canada)	2009-2012
<b>BEng Electronic Engineering</b> , Universidad de Antioquia (Colombia)	2001-2006

### EXPERIENCE IN INDUSTRY

<b>Field Service Engineer</b> , General Médica de Colombia S.A. (Colombia) Medical Imaging	2007-2009
<b>Engineering Intern</b> , UNE EPM Telecomunicaciones (Colombia) Research and Development, Telecommunications	2005

## RESEARCH COLLABORATION MEMBERSHIPS

<b>Canadian Hydrogen Observatory and Radio-transient Detector (CHORD)</b> Instrument Building Team Leader	2021-present
<b>Canadian Hydrogen Intensity Mapping Experiment (CHIME)</b> <b>CHIME/Fast Radio Burst (CHIME/FRB)</b>	

## HONOURS AND AWARDS

<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 (Declined)</b> , 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>Lorne Trottier Fellowship</b> , McGill University	2013
<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: Highest cumulative GPA in Electronic Engineering program</b> , Universidad de Antioquia	2006

## PUBLICATIONS

### Peer-Reviewed Journal Articles<sup>†</sup>

<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> , Submitted to Astronomical Journal, <a href="#">arXiv:2110.00576</a>	2021
P. Chawla, V. M. Kaspi, S. M. Ransom, et al., <i>Modeling Fast Radio Burst Dispersion and Scattering Properties in the First CHIME/FRB Catalog</i> , Submitted to Astrophysical Journal, <a href="#">arXiv:2107.10858</a>	2021
CHIME/FRB Collaboration, <i>Sub-second periodicity in a fast radio burst</i> , Submitted to Nature, <a href="#">arXiv:2107.08463</a>	2021

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<sup>†</sup> Highlighted publications as first author or primary contributor (mentored students underlined, \* denotes alphabetical authorship order). Citation statistics can be found on the [Astrophysics Data System](#).

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> , Submitted to Astrophysical Journal, <a href="#">arXiv:2107.05659</a>	2021
R. Mckinven, D. Michilli, K. W. Masui, et al., <i>A Polarization Pipeline for Fast Radio Bursts Detected by CHIME/FRB</i> , Astrophysical Journal (in press), <a href="#">arXiv:2107.03491</a>	2021
Z. Pleunis, D. C. Good, V. M. Kaspi, et al., <i>Fast Radio Burst Morphology in the First CHIME/FRB Catalog</i> , Astrophysical Journal (in press), <a href="#">arXiv:2106.04356</a>	2021
M. Rafiei-Ravandi, K. M. Smith, D. Li, et al., <i>CHIME/FRB Catalog 1 results: statistical cross-correlations with large-scale structure</i> , Submitted to Astrophysical Journal, <a href="#">arXiv:2106.04354</a>	2021
A. Josephy, P. Chawla, A. P. Curtin, et al., <i>No Evidence for Galactic Latitude Dependence of the Fast Radio Burst Sky Distribution</i> , Submitted to Astrophysical Journal, <a href="#">arXiv:2106.04353</a>	2021
CHIME/FRB Collaboration, <i>The First CHIME/FRB Fast Radio Burst Catalog</i> , Submitted to Astrophysical Journal Supplement Series, <a href="#">arXiv:2106.04352</a>	2021
D. Michilli, K. W. Masui, R. Mckinven, et al., <i>An analysis pipeline for CHIME/FRB full-array baseband data</i> , <a href="#">Astrophysical Journal</a> , vol. 910, p. 147, <a href="#">arXiv:2010.06748</a>	2021
<u>C. Leung</u> , <b>J. Mena-Parra</b> , K. Masui, et al., <i>A Synoptic VLBI Technique for Localizing Non-Repeating Fast Radio Bursts with CHIME/FRB</i> , <a href="#">Astronomical Journal</a> , vol. 161, p. 81, <a href="#">arXiv:2008.11738</a>	2021
CHIME/Pulsar Collaboration, <i>The CHIME Pulsar Project: System Overview</i> , <a href="#">Astrophysical Journal Supplement Series</a> , vol. 255, p. 5, <a href="#">arXiv:2008.05681</a>	2021
CHIME/FRB Collaboration, <i>Periodic activity from a fast radio burst source</i> , <a href="#">Nature</a> , vol. 582, pp. 351-355, <a href="#">arXiv:2001.10275</a>	2020
P. Chawla, B. C. Andersen, M. Bhardwaj, et al., <i>Detection of Repeating FRB 180916.J0158+65 Down to Frequencies of 300 MHz</i> , <a href="#">Astrophysical Journal Letters</a> , vol. 896, p. L41, <a href="#">arXiv:2004.02862</a>	2020
CHIME/FRB Collaboration, <i>A bright millisecond-duration radio burst from a Galactic magnetar</i> , <a href="#">Nature</a> , vol. 587, pp. 54-58, <a href="#">arXiv:2005.10324</a>	2020
P. Scholz, A. Cook, M. Cruces, et al., <i>Simultaneous X-ray and Radio Observations of the Repeating Fast Radio Burst FRB180916.J0158+65</i> , <a href="#">Astrophysical Journal</a> , vol. 901, p. 165, <a href="#">arXiv:2004.06082</a>	2020
E. Fonseca, B. C. Andersen, M. Bhardwaj, et al., <i>Nine New Repeating Fast Radio Burst Sources from CHIME/FRB</i> , <a href="#">Astrophysical Journal Letters</a> , vol. 891, p. L6, <a href="#">arXiv:2001.03595</a>	2020
B. Marcote, K. Nimmo, J. W. T. Hessels, et al., <i>A repeating fast radio burst source localized to a nearby spiral galaxy</i> , <a href="#">Nature</a> , vol. 577, pp. 190-194, <a href="#">arXiv:2001.02222</a>	2020
CHIME/FRB Collaboration, <i>CHIME/FRB Detection of Eight New Repeating Fast Radio Burst Sources</i> , <a href="#">Astrophysical Journal</a> , vol. 885, p. L24, <a href="#">arXiv:1908.03507</a>	2019

- A. Josephy, P. Chawla, E. Fonseca, 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
- CHIME/FRB Collaboration, *A second source of repeating fast radio bursts*, *Nature*, vol. 566, pp. 235-238, [arXiv:1901.04525](#) 2019
- CHIME/FRB Collaboration, M. Amiri, K. Bandura, ..., **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
- CHIME/FRB Collaboration, *The CHIME Fast Radio Burst project: System overview*, *Astrophysical Journal*, vol. 863, no. 1, p. 48, [arXiv:1803.11235](#) 2018
- 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
- 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
- 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
- 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
- K. Masui, M. Amiri, L. Connor, et al., *A compression scheme for radio data in high performance computing*, *Astronomy and Computing*, vol. 12, pp. 181-190, [arXiv:1503.00638](#) 2015
- 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

## Conference Proceedings

- L. B. Newburgh, K. Bandura, M. A. Bucher, 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
- P. Berger, L. B. Newburgh, M. Amiri, 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
- N. Denman, M. Amiri, K. Bandura, 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

- K. Bandura, G. E. Addison, M. Amiri, 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
- L. B. Newburgh, G. E. Addison, M. Amiri, 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

## White Papers

- K. Vanderlinde, A. Liu, B. Gaensler, 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

## Research Notes

- 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

## TEACHING EXPERIENCE

- 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

### 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