

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: Canada, Colombia
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

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

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

EXPERIENCE IN INDUSTRY

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

RESEARCH COLLABORATION MEMBERSHIPS

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

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
Grad Excellence Award , McGill University	2013-2015
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: Highest cumulative GPA in Electronic Engineering program , Universidad de Antioquia	2006

PUBLICATIONS[†]

Journal Articles

J. Mena-Parra , <u>C. Leung</u> , <u>S. Cary</u> , et al., <i>A clock stabilization system for CHIME/FRB Outriggers</i> , Submitted to Astronomical Journal, arXiv:2110.00576	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, arXiv:2107.10858	2021
CHIME/FRB Collaboration, <i>Sub-second periodicity in a fast radio burst</i> , Submitted to Nature, arXiv:2107.08463	2021

[†] Highlighted publications as first author or primary contributor (mentored students underlined, * denotes alphabetical authorship order).

T. Cassanelli, <u>C. Leung</u> , M. Rahman, K. Vanderlinde, J. Mena-Parra , <u>S. Cary</u> , et al., <i>Localizing FRBs through VLBI with the Algonquin Radio Observatory 10-m Telescope</i> , Submitted to Astrophysical Journal, arXiv:2107.05659	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), arXiv:2107.03491	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), arXiv:2106.04356	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, arXiv:2106.04354	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, arXiv:2106.04353	2021
CHIME/FRB Collaboration, <i>The First CHIME/FRB Fast Radio Burst Catalog</i> , Submitted to Astrophysical Journal Supplement Series, arXiv:2106.04352	2021
D. Michilli, K. W. Masui, R. Mckinven, et al., <i>An analysis pipeline for CHIME/FRB full-array baseband data</i> , Astrophysical Journal , vol. 910, p. 147, arXiv:2010.06748	2021
<u>C. Leung</u> , J. Mena-Parra , K. Masui, et al., <i>A Synoptic VLBI Technique for Localizing Non-Repeating Fast Radio Bursts with CHIME/FRB</i> , Astronomical Journal , vol. 161, p. 81, arXiv:2008.11738	2021
CHIME/Pulsar Collaboration, <i>The CHIME Pulsar Project: System Overview</i> , Astrophysical Journal Supplement Series , vol. 255, p. 5, arXiv:2008.05681	2021
CHIME/FRB Collaboration, <i>Periodic activity from a fast radio burst source</i> , Nature , vol. 582, pp. 351-355, arXiv:2001.10275	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> , Astrophysical Journal Letters , vol. 896, p. L41, arXiv:2004.02862	2020
CHIME/FRB Collaboration, <i>A bright millisecond-duration radio burst from a Galactic magnetar</i> , Nature , vol. 587, pp. 54-58, arXiv:2005.10324	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> , Astrophysical Journal , vol. 901, p. 165, arXiv:2004.06082	2020
E. Fonseca, B. C. Andersen, M. Bhardwaj, et al., <i>Nine New Repeating Fast Radio Burst Sources from CHIME/FRB</i> , Astrophysical Journal Letters , vol. 891, p. L6, arXiv:2001.03595	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> , Nature , vol. 577, pp. 190-194, arXiv:2001.02222	2020
CHIME/FRB Collaboration, <i>CHIME/FRB Detection of Eight New Repeating Fast Radio Burst Sources</i> , Astrophysical Journal , vol. 885, p. L24, arXiv:1908.03507	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

- Guest Lecturer and Project Head Instructor, Computational Data Science in Physics 2021
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