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: jdmena@mit.edu
Web: jdmena.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, large radio telescope arrays, correlators, 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 Journal Articles[†]

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

P. Chawla, V. M. Kaspi, S. M. Ransom, et al., *Modeling Fast Radio Burst Dispersion and Scattering Properties in the First CHIME/FRB Catalog*, Submitted to Astrophysical Journal, arXiv:2107.10858 2021

CHIME/FRB Collaboration, *Sub-second periodicity in a fast radio burst*, Submitted to Nature, arXiv:2107.08463 2021

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

R. Mckinven, D. Michilli, K. W. Masui, et al., *Polarization Pipeline for Fast Radio Bursts Detected by CHIME/FRB*, Astrophysical Journal, vol. 920, p. 138, arXiv:2107.03491 2021

Z. Pleunis, D. C. Good, V. M. Kaspi, et al., *Fast Radio Burst Morphology in the First CHIME/FRB Catalog*, Astrophysical Journal (in press), arXiv:2106.04356 2021

[†] **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.

M. Rafiei-Ravandi, K. M. Smith, D. Li, et al., *CHIME/FRB Catalog 1 results: statistical cross-correlations with large-scale structure*, Astrophysical Journal (in press), arXiv:2106.04354 2021

A. Josephy, P. Chawla, A. P. Curtin, et al., *No Evidence for Galactic Latitude Dependence of the Fast Radio Burst Sky Distribution*, Astrophysical Journal (in press), arXiv:2106.04353 2021

CHIME/FRB Collaboration, *The First CHIME/FRB Fast Radio Burst Catalog*, Astrophysical Journal Supplement Series (in press), arXiv:2106.04352 2021

D. Michilli, K. W. Masui, R. Mckinven, et al., *An analysis pipeline for CHIME/FRB full-array baseband data*, Astrophysical Journal, vol. 910, p. 147, arXiv:2010.06748 2021

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

CHIME/Pulsar Collaboration, *The CHIME Pulsar Project: System Overview*, Astrophysical Journal Supplement Series, vol. 255, p. 5, arXiv:2008.05681 2021

CHIME/FRB Collaboration, *Periodic activity from a fast radio burst source*, Nature, vol. 582, pp. 351-355, arXiv:2001.10275 2020

P. Chawla, B. C. Andersen, M. Bhardwaj, 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

CHIME/FRB Collaboration, *A bright millisecond-duration radio burst from a Galactic magnetar*, Nature, vol. 587, pp. 54-58, arXiv:2005.10324 2020

P. Scholz, A. Cook, M. Cruces, 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

E. Fonseca, B. C. Andersen, M. Bhardwaj, et al., *Nine New Repeating Fast Radio Burst Sources from CHIME/FRB*, Astrophysical Journal Letters, vol. 891, p. L6, arXiv:2001.03595 2020

B. Marcote, K. Nimmo, J. W. T. Hessels, et al., *A repeating fast radio burst source localized to a nearby spiral galaxy*, Nature, vol. 577, pp. 190-194, arXiv:2001.02222 2020

CHIME/FRB Collaboration, *CHIME/FRB Detection of Eight New Repeating Fast Radio Burst Sources*, 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

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