# Kiyoshi Wesley Masui

*Curriculum Vitae*

Department of Physics and Astronomy
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## Personal Information

Citizenship Canadian
Languages English, French

## Education

2013 Ph.D., Physics, University of Toronto
Thesis: "Advancing precision cosmology with 21 cm intensity mapping"
Advisor: Ue-Li Pen

2008 B.Sc.E., Engineering Physics, Queen's University at Kingston, First class honours
Thesis: "Radioactively inert argon"
Advisor: Arthur B. McDonald

## Professional Appointments

2013 – present Postdoctoral Fellow, University of British Columbia, Department of Physics and Astronomy

2016 – present Canadian Institute for Theoretical Astrophysics National Fellow, University of British Columbia, Department of Physics and Astronomy

2013 – 2015 Canadian Institute for Advanced Research Global Scholar, University of British Columbia, Department of Physics and Astronomy

## Publications

### Refereed Articles – Leading Author

2015 **K. Masui** *et al.*, "Dense magnetized plasma associated with a fast radio burst", Nature **528**, 523 (2015), arXiv:1512.00529, 69 citations.

2015 **K. W. Masui** and K. Sigurdson, "Dispersion Distance and the Matter Distribution of the Universe in Dispersion Space", Phys. Rev. Lett. **115**, 121301 (2015), arXiv:1506.01704.

2015 **K. Masui**, M. Amiri, L. Connor, M. Deng, M. Fandino, C. Höfer, M. Halpern, D. Hanna, A. D. Hincks, G. Hinshaw, J. M. Parra, L. B. Newburgh, J. R. Shaw and K. Vanderlinde, "A compression scheme for radio data in high performance computing", Astronomy and Computing **12**, 181 (2015), arXiv:1503.00638.

2013 E. R. Switzer, **K. W. Masui**, K. Bandura, L.-M. Calin, T.-C. Chang, X.-L. Chen, Y.-C. Li, Y.-W.

Liao, A. Natarajan, U.-L. Pen, J. B. Peterson, J. R. Shaw and T. C. Voytek, "Determination of $z \sim 0.8$ neutral hydrogen fluctuations using the 21 cm intensity mapping autocorrelation", Mon. Not. R. Astron. Soc. **434**, L46 (2013), arXiv:1304.3712, 62 citations.

2013 **K. W. Masui**, E. R. Switzer, N. Banavar, K. Bandura, C. Blake, L.-M. Calin, T.-C. Chang, X. Chen, Y.-C. Li, Y.-W. Liao, A. Natarajan, U.-L. Pen, J. B. Peterson, J. R. Shaw and T. C. Voytek, "Measurement of 21 cm Brightness Fluctuations at $z \sim 0.8$ in Cross-correlation", Astrophys. J. Lett. **763**, L20 (2013), arXiv:1208.0331, 77 citations.

2010 **K. W. Masui** and U.-L. Pen, "Primordial Gravity Wave Fossils and Their Use in Testing Inflation", Phys. Rev. Lett. **105**, 161302 (2010), arXiv:1006.4181, 30 citations.

2010 **K. W. Masui**, P. McDonald and U.-L. Pen, "Near-term measurements with 21 cm intensity mapping: Neutral hydrogen fraction and BAO at $z < 2$", Phys. Rev. D **81**, 103527 (2010), arXiv:1001.4811.

2010 **K. W. Masui**, F. Schmidt, U.-L. Pen and P. McDonald, "Projected constraints on modified gravity cosmologies from 21 cm intensity mapping", Phys. Rev. D **81**, 062001 (2010), arXiv:0911.3552.

2008 S. P. Pecknold, **K. W. Masui** and P. C. Hines, "Transmission loss measurements and geoacoustic sensitivity modeling at 1.2 kHz", The Journal of the Acoustical Society of America **124**, EL110 (2008).

## Refereed Articles – Collaborating Author

2017 L. Wolz, C. Blake, F. B. Abdalla, C. M. Anderson, T.-C. Chang, Y.-C. Li, **K. W. Masui**, E. Switzer, U.-L. Pen, T. C. Voytek and J. Yadav, "Erasing the Milky Way: new cleaning technique applied to GBT intensity mapping data", Mon. Not. R. Astron. Soc. **464**, 4938 (2017), arXiv:1510.05453.

2016 Y.-W. Liao, T.-C. Chang, C.-Y. Kuo, **K. W. Masui**, N. Oppermann, U.-L. Pen and J. B. Peterson, "Accurate Polarization Calibration at 800 MHz with the Green Bank Telescope", Astrophys. J. (2016), arXiv:1610.04365, in press.

2016 L. Connor, H.-H. Lin, **K. Masui**, N. Oppermann, U.-L. Pen, J. B. Peterson, A. Roman and J. Sievers, "Constraints on the FRB rate at 700-900 MHz", Mon. Not. R. Astron. Soc. **460**, 1054 (2016), arXiv:1602.07292.

2015 E. R. Switzer, T.-C. Chang, **K. W. Masui**, U.-L. Pen and T. C. Voytek, "Interpreting the Unresolved Intensity of Cosmologically Redshifted Line Radiation", Astrophys. J. **815**, 51 (2015), arXiv:1504.07527.

## Conference Proceedings

2016 P. Berger *et al.*, "Holographic Beam Mapping of the CHIME Pathfinder Array", in Ground-based and Airborne Telescopes VI, Vol. 9906, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series (Aug. 2016), arXiv:1607.01473.

2015 N. Denman *et al.*, "A GPU-based Correlator X-engine Implemented on the CHIME Pathfinder", in Application-specific Systems, Architectures and Processors, Institute of Electrical and Electronics Engineers (IEEE) International Conference Series (July 2015), arXiv:1503.06202.

2014 K. Bandura *et al.*, "Canadian Hydrogen Intensity Mapping Experiment (CHIME) pathfinder", in Ground-based and Airborne Telescopes V, Vol. 9145, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series (July 2014), arXiv:1406.2288.

2014 L. B. Newburgh *et al.*, "Calibrating CHIME: a new radio interferometer to probe dark energy", in Ground-based and Airborne Telescopes V, Vol. 9145, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series (July 2014), arXiv:1406.2267.

## Awards

### Recognitions

2012 Van Kranendonk Teaching Award, University of Toronto, Department of Physics

### Fellowships

2016 – present National Fellow, Canadian Institute for Theoretical Astrophysics

2013 – 2015 Global Scholar, Canadian Institute for Advanced Research

2012 – 2013 Walter C. Sumner Memorial Fellowship, Walter C. Sumner Foundation

2010 – 2012 Alexander Graham Bell Canada Graduate Scholar—Doctoral, Natural Sciences and Engineering Research Council of Canada

2008 – 2010 Canada Graduate Scholar—Master's, Natural Sciences and Engineering Research Council of Canada

## Contributed Public Software

2014 – present Bitshuffle, Primary author
https://github.com/kiyo-masui/bitshuffle
https://pypi.python.org/pypi/bitshuffle

2014 – present Burst Search, Maintainer and contributer
https://github.com/kiyo-masui/burst_search

2013 – present Cluster Astronomical Python Utilities, Maintainer and contributer
https://github.com/radiocosmology/caput

## Grants and Allocations

### Telescope allocations

2015 Green Bank Telescope, "Follow-up of two candidate 21 cm absorbers found by blind searching", PI: Wenkai Hu, 8 hours

2014 Green Bank Telescope, "Redshift space distortions with 21 cm intensity mapping in cross-correlation" (continuation), PI: Christopher Anderson, 500 hours

2014 Parkes Observatory, "HI intensity mapping: Parkes-2dFGRS and BAO science", PI: Yi-Chao Li, 70 hours

2013 Green Bank Telescope, "Redshift space distortions with 21 cm intensity mapping in cross-correlation", PI: Christopher Anderson, 134 hours

2012 Green Bank Telescope, "21 cm intensity mapping with prototype receiver", PI: Tzu-Ching Chang, 10 hours

2012 Green Bank Telescope, "Baryon acoustic oscillations with 21 cm intensity mapping", PI: Tzu-Ching Chang, 100 hours

2011 Green Bank Telescope, "21 cm intensity mapping", PI: Tabitha Voytek, 100 hours plus student support

2010 Green Bank Telescope, "Study of velocity distortions using 21 cm intensity mapping", PI: Enrique Suarez, 300 hours plus student support

### Research Grants

2014 Global Scholar Creativity Fund, "Using the stars to test quantum mechanics", Canadian Institute for Advanced Research, PI: Keith Vanderlinde, $5000 CAD for meeting support

## Teaching Experience

### Teaching Assistantships

2012 Foundations of Physics II, University of Toronto, Department of Physics

2011 Foundations of Physics I, University of Toronto, Department of Physics

2011 Quantum and Thermal Physics, University of Toronto, Department of Physics

2009 Introduction to Physics I, University of Toronto, Department of Physics

2009 Introduction to Physics II, University of Toronto, Department of Physics

### Student Supervision

2011 – 2012 Nidhi Banavar, Undergraduate, for-credit research in time variability of radio point sources

2011 – 2012 Liviu-Mihai Calin, Undergraduate, paid, summer research in hydrogen mapping data analysis

## Academic Service

### Reports

2014 – 2016 Cosmology and Gravity Program Meeting Report, Coauthor, Canadian Institute for Advanced Research (three annual reports)

### Peer Review

2016 – present Monthly Notices of the Royal Astronomical Society

2016 – present Astrophysical Journal Letters, American Astronomical Society

2016 – present Nature Astronomy, Nature Publishing Group

2016 – present Astrophysical Journal, American Astronomical Society

2015 – present Nature, Nature Publishing Group

2015 – present Astronomy and Computing, Elsevier

2011 – present Physics Review D, American Physical Society

## Selected Talks

### Seminars

2017 Astronomy Seminar, Carnegie Mellon University, Pittsburgh, Mar. 10, 2017.

2017 Seminar, Canadian Institute for Theoretical Astrophysics, Toronto, Mar. 6, 2017.

2017 "Fast radio bursts: a mysterious new class of astronomical object", Physics and Astronomy Departmental Colloquium, University of British Columbia, Vancouver, Jan. 5, 2017.

2016 "The environment of a fast radio burst source and outlook for CHIME–FRB", Astronomy Tea Talk, California Institute of Technology, Pasadena, Nov. 15, 2016.

2016 "Fast radio bursts as probes of cosmic structure", Seminar, Perimeter Institute for Theoretical Physics, Waterloo, Jan. 12, 2016.

2015 "Fast radio bursts as probes of structure in 3D", Dark Universe Science Center Seminar, University of Washington, Seattle, Oct. 14, 2015.

2014 "Large-scale structure with CHIME", Seminar, Academia Sinica Institute of Astronomy and Astrophysics, Taipei, Oct. 30, 2014.

2012 "Pioneering 21 cm intensity mapping at the Green Bank Telescope", Cosmology Seminar, University of California, Berkeley, Oct. 30, 2012.

2012 "21 cm intensity mapping—large scale structure with the Green Bank Telescope", Seminar, Australia Telescope National Facility Headquarters, Sydney, Apr. 2, 2012.

2012 "21 cm intensity mapping—large scale structure with the Green Bank Telescope", Astrophysics Seminar, University of Melbourne, Mar. 14, 2012.

### Conferences

2016 "Dense magnetized plasma associated with a fast radio burst", Canadian Institute for Advanced Research, Program in Cosmology and Gravity, annual meeting, Whistler, Mar. 31, 2016.

2015 "Clustering of fast radio bursts in dispersion measure space", Canadian Institute for Advanced Research, Program in Cosmology and Gravity, annual meeting, Banff, Mar. 27, 2015.

2014 "CHIME: calibration and pipeline", Canadian Institute for Advanced Research, Program in Cosmology and Gravity, annual meeting, Quebec City, May 24, 2014.

2013 "21 cm intensity mapping with the Green Bank Telescope: interpretation and prospects", Innovative Techniques in 21cm Analysis, Columbus, Apr. 19, 2013.

2010 "Gravity wave fossils—signatures of tensor modes in pre-reionization 21 cm structure", CITA25/Bond60, Toronto, May 13, 2010.

## Outreach

### Articles

2016 K. Masui, "Research brief: A repeating fast radio burst", Canadian Institute for Advanced Research—Ideas Exchange (2016), in press.

### Public Lectures

2016 "Fast radio bursts—Flashes from outside the galaxy", Monthly Meeting, Royal Astronomical Society of Canada—Vancouver Centre, Vancouver, Apr. 14, 2016.

### Events Organized

2016 Salal Preschool Visit, Department of Physics and Astronomy, University of British Columbia, July 12, 2016.

## Selected Press

### FRB 110523 Coverage

2016 S. Hall, "The Mystery of Fast Radio Bursts", Sky & Telescope **132**, 24 (2016).

2015 E. Gibney, "Mysterious radiowave blast may have come from starquake", Nature (2015) 10.1038/nature.2015.18935.

2015 N. Drake, "Those Blasts of Radio Waves from Deep Space? Not Aliens", Phenomena, National Geographic (2015).

2015 L. Billings, "Fast Radio Bursts Mystify Experts—for Now", Scientific American (2015).

2015 "'Fast Radio Burst' Sheds New Light on Origin of These Extreme Events", National Radio Astronomy Observatory, press release (2015).

### Dispersion Space Coverage

2015 D. Lindley, "Focus: Radio Signals May Reveal Cosmological Structure", Phyiscs **8**, 90 (2015).

2015 "Researchers propose new way to chart the cosmos in 3D", University of British Columbia, press release (2015).

2015 "The Flash Measure", Radio New Zealand National—Nights (2015).