

Kiyoshi Wesley Masui

Curriculum Vitae

Department of Physics and Astronomy
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Personal Information

Citizenship Canadian
Languages English, French

Education

- 2013 **PhD**, Physics, University of Toronto
Thesis: “Advancing precision cosmology with 21 cm intensity mapping”
Advisor: Ue-Li Pen
- 2008 **BScE**, 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

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

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

Contributed Public Software

- 2014 – present **Bitshuffle**, Primary author
<https://github.com/kiyo-masui/bitshuffle>
- 2014 – present **Burst Search**, Maintainer and contributor
https://github.com/kiyo-masui/burst_search
- 2013 – present **Cluster Astronomical Python Utilities**, Maintainer and contributor
<https://github.com/radioc cosmology/caput>

Academic Service

- 2014 – 2016 **Reporter**, Canadian Institute for Advanced Research, Program in Cosmology and Gravity, annual meeting
- 2016 – present **Peer review**, Astrophysical Journal, American Astronomical Society
- 2015 – present **Peer review**, Nature, Nature Publishing Group
- 2015 – present **Peer review**, Astronomy and Computing, Elsevier
- 2011 – present **Peer review**, Physics Review D, American Physical Society

Publications

Refereed Articles

- 2015 E. R. Switzer, T.-C. Chang, **K. W. Masui**, U.-L. Pen, T. C. Voytek, “Interpreting the Unresolved Intensity of Cosmologically Redshifted Line Radiation”, *Astrophys. J.* **815**, 51 (2015), [arXiv:1504.07527](https://arxiv.org/abs/1504.07527).
- 2015 **K. Masui**, H.-H. Lin, J. Sievers, C. J. Anderson, T.-C. Chang, X. Chen, A. Ganguly, M. Jarvis, C.-Y. Kuo, Y.-C. Li, Y.-W. Liao, M. McLaughlin, U.-L. Pen, J. B. Peterson, A. Roman, P. T. Timbie, T. Voytek, J. K. Yadav, “Dense magnetized plasma associated with a fast radio burst”, *Nature* **528**, 523 (2015), [arXiv:1512.00529](https://arxiv.org/abs/1512.00529).
- 2015 **K. W. Masui**, K. Sigurdson, “Dispersion Distance and the Matter Distribution of the Universe in Dispersion Space”, *Phys. Rev. Lett.* **115**, 121301 (2015), [arXiv:1506.01704](https://arxiv.org/abs/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, K. Vanderlinde, “A compression scheme for radio data in high performance computing”, *Astronomy and Computing* **12**, 181 (2015), [arXiv:1503.00638](https://arxiv.org/abs/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, 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](https://arxiv.org/abs/1304.3712).
- 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, 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](https://arxiv.org/abs/1208.0331).
- 2010 **K. W. Masui**, U.-L. Pen, “Primordial Gravity Wave Fossils and Their Use in Testing Inflation”, *Phys. Rev. Lett.* **105**, 161302 (2010), [arXiv:1006.4181](https://arxiv.org/abs/1006.4181).

- 2010 **K. W. Masui**, P. McDonald, 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, 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**, 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).

Manuscripts in Submission

- 2016 L. Connor, H.-H. Lin, **K. Masui**, N. Oppermann, U.-L. Pen, J. B. Peterson, A. Roman, J. Sievers, “Constraints on the FRB rate at 700-900 MHz”, ArXiv e-prints (2016), [arXiv:1602.07292 \[astro-ph.HE\]](#), submitted.
- 2015 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, J. Yadav, “Erasing the Milky Way: new cleaning technique applied to GBT intensity mapping data”, ArXiv e-prints (2015), [arXiv:1510.05453](#), submitted.

Conference Proceedings

- 2015 N. Denman, M. Amiri, K. Bandura, J.-F. Cliche, L. Connor, M. Dobbs, M. Fandino, M. Halpern, A. Hincks, G. Hinshaw, C. Höfer, P. Klages, **K. Masui**, J. Mena Parra, L. Newburgh, A. Recnik, J. R. Shaw, K. Sigurdson, K. Smith, K. Vanderlinde, “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, G. E. Addison, M. Amiri, J. R. Bond, D. Campbell-Wilson, L. Connor, J.-F. Cliche, G. Davis, M. Deng, N. Denman, M. Dobbs, M. Fandino, K. Gibbs, A. Gilbert, M. Halpern, D. Hanna, A. D. Hincks, G. Hinshaw, C. Höfer, P. Klages, T. L. Landecker, **K. Masui**, J. Mena Parra, L. B. Newburgh, U.-L. Pen, J. B. Peterson, A. Recnik, J. R. Shaw, K. Sigurdson, M. Sitwell, G. Smecher, R. Smegal, K. Vanderlinde, D. Wiebe, “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, G. E. Addison, M. Amiri, K. Bandura, J. R. Bond, L. Connor, J.-F. Cliche, G. Davis, M. Deng, N. Denman, M. Dobbs, M. Fandino, H. Fong, K. Gibbs, A. Gilbert, E. Griffin, M. Halpern, D. Hanna, A. D. Hincks, G. Hinshaw, C. Höfer, P. Klages, T. Landecker, **K. Masui**, J. M. Parra, U.-L. Pen, J. Peterson, A. Recnik, J. R. Shaw, K. Sigurdson, M. Sitwell, G. Smecher, R. Smegal, K. Vanderlinde, D. Wiebe, “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](#).

Selected Talks

- 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.

- 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.
- 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 “Large-scale structure with CHIME”, Seminar, Academia Sinica Institute of Astronomy and Astrophysics, Taipei, Oct. 30, 2014.
- 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.
- 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.
- 2010 “Gravity wave fossils—signatures of tensor modes in pre-reionization 21 cm structure”, CITA25/Bond60, Toronto, May 13, 2010.

Outreach

- 2016 “Fast radio bursts—flashes from outside the galaxy”, Monthly Meeting, Royal Astronomical Society of Canada—Vancouver Centre, Vancouver, Apr. 14, 2016.

Selected Press

FRB 110523 Coverage

- 2015 E. Gibney, “Mysterious radiowave blast may have come from starquake”, [Nature \(2015\) 10.1038/nature.2015.18935](https://doi.org/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”, [Physics 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 \(2015\)](#).