Kiyoshi Wesley Masui

Curriculum Vitae

Department of Physics and Astronomy
University of British Columbia
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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, 50 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, 49 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, 65 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 – Contributing Author

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.

Manuscripts in Submission

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 and J. Yadav, "Erasing the Milky Way: new cleaning technique applied to GBT intensity mapping data", ArXiv e-prints (2015), arXiv:1510.05453, in revision.

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. 18, 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 **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

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

Events Organized

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

Public Lectures

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

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).