

Michael P. Ross

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RESEARCH EXPERTISE

- Precision mechanical development and construction
- Interferometric and non-interferometric optics
- Cryogenic engineering
- Software development
- Control systems design and operation
- Ultra high vacuum engineering
- Machine Learning
- Data analysis and signal processing

Computing skills: C#, Java, Python, C++, LabView, PLC programming, Matlab, Mathematica, Linux, SolidWorks, Windows, Machine learning, Supercomputing

EDUCATION

Present 2017	University of Washington PhD Candidate M.S. Physics	Seattle, WA
2015	Humboldt State University B.S. Physics	Arcata, CA
2013	College of the Redwoods A.A. Science A.A. Science Exploration	Eureka, CA

RESEARCH EXPERIENCE

1/2017 – Present	Research Assistant University of Washington, Seattle, Washington <ul style="list-style-type: none">• Designed and developed precision beam-balances for use on LIGO's in-vacuum seismic isolation platform• Developed and deployed ground rotation sensors for feed-forward control of the LIGO seismic isolation systems• Constructed and operated an interferometrically-readout torsion balance as a pathfinder experiment into low frequency gravitational wave detector technologies• Worked on a machine learning algorithm to detect gravitational wave transients in data from the LIGO observatories• Assisted in the decommissioning of an apparatus consisting of 3.5 tons of depleted uranium• Improved and operated a cryogenic torsion balance experiment which tested the equivalence principle for superconductors• Author on LIGO scientific collaboration papers since 2017• 6 short author list papers
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2/2018 – 5/2018 **LSC Fellow**
LIGO Livingston Observatory, Livingston, Louisiana
• Built four precision ground rotation sensors and implemented the sensors in the observatory's seismic isolation system to correct for the contamination of seismometer signals due to wind-driven tilts

8/2015 – 9/2016 **Laboratory Technician**
University of Washington, Seattle, Washington
• Developed precision rotation sensors for use in the LIGO seismic isolation systems
• Contributed to the development of a cryogenic torsion balance built to circumvent thermal noise which limits many torsion balance experiments

9/2013 – 5/2015 **Undergraduate Researcher**
Humboldt State University, Arcata, California
• Assisted in the construction of a torsion balance experiment aimed at testing the behavior of gravity at short-ranges
• Developed prototype interferometric readout for torsion balance experiments
• 3 published papers

TEACHING EXPERIENCE

5/2019 – 12/2019 **Directed Reading Instructor**
University of Washington, Seattle, Washington
• Taught a one-on-one reading course for undergraduates that covered the basics of gravitational wave theory and contemporary subjects in gravitational wave astronomy

9/2016 – 12/2016 **Teaching Assistance**
University of Washington, Seattle, Washington
• Taught a algebra-based heat and electromagnetism lab and an introductory level calculus-based mechanics tutorial
• Assisted in exam grading for the introductory mechanics course
• Tutored in an open lab study center

9/2013 – 5/2015 **Instructional Student Assistant**
Humboldt State University, Arcata, California
• Graded homework for a non-calculus based electromagnetism and modern physics course

8/2011 – 5/2013 **Peer Tutor**
College of the Redwoods, Eureka, California
• Tutored students in an open lab that were enrolled in courses ranging from basic arithmetic to multivariable calculus

NON-ACADEMIC EXPERIENCE

12/2016 – Present **Independent Software Developer**
• Developed and published an Android app that displays data from personal weather stations
Google Play:
https://play.google.com/store/apps/details?id=net.mpross.pwspaid&hl=en_US

SELECTED PUBLICATIONS

- *Towards windproofing LIGO: Reducing the effect of wind-driven floor tilt by using rotation sensors in active seismic isolation.* K. Venkateswara, M.P. Ross, J. Warner, C. Mow-Lowry, B. Lantz, J.S. Kissel, H. Radkins, T.J. Shaffer, R. Mittleman, S. Cooper, A. Pele, J.H. Gundlach. Submitted to Classical and Quantum Gravity. 2020.
- *Limits on the Stochastic Gravitational Wave Background and Prospects for Single Source Detection with GRACE Follow-On.* M.P. Ross, C.A. Hagedorn, E.A. Shaw, A.L. Lockwood, B.M. Iritani, J.G. Lee, K. Venkateswara, J.H. Gundlach. Submitted to Physical Review D. 2020.
- *GW190425: Observation of a Compact Binary Coalescence with Total Mass $\sim 3.4 M_{\odot}$.* BP Abbott et.al. (LIGO Scientific Collaboration, Virgo Collaboration). Accepted by The Astrophysical Journal Letters. 2020.
- *GWTC-1: A gravitational-wave transient catalog of compact binary mergers observed by LIGO and Virgo during the first and second observing runs.* BP Abbott et.al. (LIGO Scientific Collaboration, Virgo Collaboration). Physical Review X. 2019
- *Implications of dedicated seismometer measurements on Newtonian-noise cancellation for Advanced LIGO.* MW Coughlin, J. Harms, J. Driggers, D.J. McManus, N. Mukund, M.P. Ross, B.J.J. Slagmolen, K. Venkateswara. Physical Review Letters. 2018.
- *Low-Frequency Tilt Seismology with a Precision Ground-Rotation Sensor.* M.P. Ross, K. Venkateswara, C.A. Hagedorn, J.H. Gundlach, J.S. Kissel, J. Warner, H. Radkins, T.J. Shaffer, M.W. Coughlin, P. Bodin. Seismological Research Letters. 2018.
- *GW170817: Measurements of neutron star radii and equation of state.* B.P. Abbott et. al. (LIGO Scientific Collaboration, Virgo Collaboration). Physical Review Letters. 2018.
- *Multi-messenger Observations of a Binary Neutron Star Merger.* B.P. Abbott et. al. (LIGO Scientific Collaboration, Virgo Collaboration). The Astrophysical Journal Letters. 2017.
- *A gravitational-wave standard siren measurement of the Hubble constant.* LIGO Scientific Collaboration, Virgo Collaboration, 1M2H Collaboration, Dark Energy Camera GW-EM Collaboration, DES Collaboration, DLT40 Collaboration, Las Cumbres Observatory Collaboration, VINROUGE Collaboration, MASTER Collaboration. Nature. 2017.
- *GW170104: observation of a 50-solar-mass binary black hole coalescence at redshift 0.2.* B.P. Abbott et. al. (LIGO Scientific Collaboration, Virgo Collaboration). Physical Review Letters. 2017.
- *Experimental Progress Towards Testing the Behavior of Gravity at the 20-micron Distance Scale.* M.P. Ross, J.S. Johnson, I.S. Guerrero, H.F. Leopardi, C.D. Hoyle. Journal of Undergraduate Research and Scholarly. 2018.
- *Tests of Short-Range Gravity with a Novel Parallel-Plate Torsion Pendulum.* M.P. Ross. National Conference on Undergraduate Research Proceedings. 2015.
- *Experimental Progress on Tests of Gravity at 20 microns.* C. Cardenas, A.C. Harter, M.P. Ross. National Conference on Undergraduate Research Proceedings. 2014.

PRESENTATIONS

- *Compact-BRS Update*. M.P. Ross. LIGO/Virgo collaboration meeting, Warsaw, Poland. 2019.
- *Development and deployment of beam rotation sensors for the LIGO seismic isolation system*. M.P. Ross. Applied Physics Lab Seminar, University of Washington. 2019.
- *Development and deployment of beam rotation sensors for the LIGO seismic isolation system*. M.P. Ross. SeismoLunch Seminar, University of Washington. 2019.
- *Integration of Beam Rotation Sensors to seismic isolation*. A. Pele, M.P. Ross. Low-frequency sensing and control for aLIGO workshop, University of Birmingham, United Kingdom. 2018.
- *Beam Rotation Sensor Update*. M.P. Ross. LIGO/Virgo collaboration meeting, Sonoma State University. 2018.
- *Tests of Short-range Gravity with a Novel Parallel Plate Torsion Pendulum*. M.P. Ross. National Conference on Undergraduate Research, Eastern Washington University. 2015.
- *Experimental Progress on Tests of Gravity at 20 microns with a Parallel-Plate Torsion Pendulum*. M.P. Ross. 31st Pacific Coast Gravity Meeting, University of Oregon. 2015.
- *Experimental Progress on Tests of Gravity at 20 microns*. M.P. Ross and C. Cardenas. APS Far West Section Meeting, University of Nevada-Reno. 2014.