

# Michael 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

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

## RESEARCH EXPERIENCE

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|------------------|--|
| 1/2017 – Present | <b><i>Research Assistant</i></b><br>University of Washington, Seattle, Washington <ul style="list-style-type: none"><li>• Developed precision rotation sensors for use in the LIGO seismic isolation systems. One version designed to be deployed on the ground and a compact version to be used in vacuum on the isolation platforms</li><li>• Constructed and operated a interferometrically readout torsion balance as a pathfinder experiment into low frequency gravitational wave detector technologies and possible atmospheric Newtonian noise measurements</li><li>• Author on LIGO scientific collaboration papers since 2017</li><li>• 4 short author list papers</li></ul> |
| 2/2018 – 5/2018  | <b><i>LSC Fellow</i></b><br>LIGO Livingston Observatory, Livingston, Louisiana <ul style="list-style-type: none"><li>• 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</li></ul>   |

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](https://play.google.com/store/apps/details?id=net.mpross.pwspaid&hl=en_US)

## SELECTED PUBLICATIONS

- *Implications of dedicated seismometer measurements on Newtonian-noise cancellation for Advanced LIGO.* MW Coughlin, J Harms, J Driggers, DJ McManus, N Mukund, MP Ross, BJJ 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. Physical Review Letters. 2018.
- *Multi-messenger Observations of a Binary Neutron Star Merger.* B.P. Abbott et. al. 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. 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

- *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. 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.