Andrew Hard

Curriculum Vitae

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Education

Expected 2016 — **Doctor of Philosophy** in Physics
University of Wisconsin, Madison WI
Advised by Prof. Sau Lan Wu

2010 — **Bachelor of Arts** in Physics, Honors
University of Chicago, Chicago IL
Advised by Prof. Edward Blucher

Experience

2011 - 2016 — **Graduate Research Assistant**, *Department of Physics, University of Wisconsin*

- Discovered Higgs boson, performed first measurements of couplings, spin, and mass.
- Organizer for first $h \to \gamma\gamma$ coupling measurement.
- Wrote and coordinated DoE funding reports for Wisconsin ATLAS Group.
- Characterized CMOS detector with test beam analysis at LBNL and SLAC.
- Developed data analysis software in C++/ROOT used by many collaborators.
- Calibrated hadronic E_T^{miss} event trigger, improved S/B, reduced readout rate.

2014 — **Graduate Teaching Assistant**, *Department of Physics, University of Wisconsin*

- Led discussions and labs on classical mechanics, electrodynamics, thermodynamics.
- Invented supplemental exercises and summary notes that boosted exam performances.

2010 - 2011 — **CERN Technologist**, *Enrico Fermi Institute, University of Chicago*

- Expert for the electronic calibration of the ATLAS Experiment hadronic calorimeter.
- Developed, maintained python software package for detector calibration & monitoring.
- Published internal documentation, monitored and reported on status to collaboration.

Selected Publications

Search for resonances in diphoton events at $\sqrt{s} = 13$ TeV with the ATLAS detector, ATLAS Collaboration, arXiv:1606.03833 [hep-ex].

Search for Higgs boson pair production in the $b\bar{b}\gamma\gamma$ final state using pp collision data at $\sqrt{s} = 13$ TeV with the ATLAS detector, ATLAS Collaboration, ATLAS-CONF-2016-004, https://cds.cern.ch/record/2138949.

Search for new phenomena in events with missing transverse momentum and a Higgs boson decaying to two photons in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector, ATLAS Collaboration, ATLAS-CONF-2016-011.

Performance of Silicon Pixel Detectors at Small Track Incidence Angles for the ATLAS Inner Tracker Upgrade, ATLAS Collaboration, ATL-INDET-PROC-2015-011, https://cds.cern.ch/record/2065104.

Search for non-pointing and delayed photons in the diphoton and missing transverse momentum final state in 8 TeV pp collisions at the LHC using the ATLAS detector, ATLAS Collaboration, Phys. Rev. D90, 112005 (2014), arXiv:1409.5542 [hep-ex].

Evidence for the spin-0 nature of the Higgs boson using ATLAS data, ATLAS Collaboration, Phys. Lett. B726 (2013) 120, arXiv:1307.1432 [hep-ex].

Measurement of Higgs boson production in the diphoton decay channel in pp collisions at center-of-mass energies of 7 and 8 TeV with the ATLAS detector, ATLAS Collaboration, Phys. Rev. D90, 112015 (2014), arXiv:1408.7084 [hep-ex].

Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC, ATLAS Collaboration, Phys. Lett. B716 (2012) 1-29, arXiv:1207.7214 [hep-ex].

Significant contributions to 19 papers & notes since 2011, author on 250+ ATLAS publications since 2013.

Conference Presentations

August 2016	**Search for the production of Higgs boson in association with invisible particles in the ATLAS detector** (Poster) *38th International Conference on High Energy Physics*, Chicago, USA
July 2016	**Search for a high mass diphoton resonance using the ATLAS detector** (Invited talk) *22nd International Symposium on Particles, Strings and Cosmology*, ICISE, Vietnam
November 2014	**Search for non-pointing and delayed photons in the diphoton and missing transverse momentum final state in 8 TeV pp collisions** (Talk) *2014 US LHC User's Association Annual Meeting*, Argonne National Laboratory, USA
April 2014	**Higgs to diphoton workshop perspective** (Invited talk) *ATLAS Higgs Workshop*, Rome, Italy
December 2013	**Individual and combined measurements of the spin and parity properties of the Higgs boson using the ATLAS detector** (Invited talk) *High Energy Physics in the LHC Era*, Valparaíso, Chile
November 2013	**Spin determination of a narrow resonance near 125 GeV with the two-photon decay channel at ATLAS** (Invited talk) *2013 US LHC User's Association Annual Meeting*, Madison, USA
August 2013	**Spin measurement of the Higgs-like resonance observed in the two photon decay channel in ATLAS** (Talk) *2013 APS Division of Particles and Fields Meeting*, SCIPP, Santa Cruz, USA
November 2012	$h \to \gamma\gamma$ **vector boson fusion** (Talk) *US ATLAS Diboson Jamboree*, Brookhaven National Laboratory, USA

Skills

Scientific	Physics, Mathematics, Statistics, Simulation & Monte Carlo Methods, High Throughput Computing, Numerical Methods for Computing, Data Structures, Machine Learning, Collaborative Research, Publication & Presentation, Teaching, Outreach
Programming	C++, Python, Java, LaTeX, Unix/Linux shell scripting, SQL, Matlab, ROOT, TensorFlow
Languages	French (basic oral and written communication)

Volunteering & Outreach

- US voter outreach & registration at CERN — 2016
- Newtonian physics demonstration for Chicago Public Library — 2016
- Discussed research and funding with U.S. lawmakers in D.C. — 2014 & 2015
- Created GIF visualizations of Higgs boson discovery data — 2013
- Visited classrooms at the Chattanooga School for the Arts & Sciences — 2012

Awards

Teaching Assistant Rookie of the Year, *Department of Physics, University of Wisconsin* — 2015
Lighting Round Winner, *US LHC User's Association Annual Meeting* — 2013 & 2014

References

Prof. Sau Lan Wu
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