

Andrew Hard

Curriculum Vitae

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Experience

- 2019 - Present **Senior Software Engineer**, [Google](#)
- Researched and built federated models for Assistant with TensorFlow, Python
 - TL and manager for multiple interns and projects
 - Interviewed 100 candidates for engineer and ML research positions
- 2017 - 2019 **Software Engineer**, [Google](#)
- Published first paper describing federated learning for a production model
 - Researched and developed federated natural language processing (NLP) models
 - Developed multi-word prediction for Gboard with TensorFlow, C++, Python
- 2011 - 2016 **Graduate Research Assistant**, *Department of Physics, University of Wisconsin*
- Discovered Higgs boson, performed first measurements of mass, couplings, and spin
 - Optimized physics searches with TB-scale datasets using machine learning techniques
 - Statistical expert, created new Monte Carlo method to reduce CPU usage by 1000×
- 2014 **Graduate Teaching Assistant**, *Department of Physics, University of Wisconsin*
- Led discussions and labs on classical mechanics, electrodynamics, thermodynamics
 - Designed supplemental exercises and summary notes that boosted exam performances
- 2010 - 2011 **CERN Technologist**, *Enrico Fermi Institute, University of Chicago*
- Developed & maintained calibration software package using Python and MySQL

Education

- 2016 **Doctor of Philosophy** in Physics
University of Wisconsin, Madison WI, USA
Thesis: *Search and discovery with the resonant $\gamma\gamma$ final state at ATLAS*
Advised by Prof. Sau Lan Wu
- 2010 **Bachelor of Arts** in Physics, Honors
University of Chicago, Chicago IL, USA
Advised by Prof. Edward Blucher

Skills

- Scientific** Physics, Machine Learning, Statistics, Simulations, Numerical Methods, Data Structures, High-Throughput Computing, Databases, Public Presentation
- Programming** C++, Python, TensorFlow, Java, Go, \LaTeX , Unix/Linux shell scripting, ROOT, Matlab, SQL
- Languages** English (native), French (basic oral and written communication), German (A1.3)

Volunteering & Outreach



- Participated in industry panel discussions and advisory board for physicists 2019
- Repaired bicycles at the Silicon Valley Bicycle Exchange 2019
- Demonstrated Newtonian physics concepts for Chicago Public Library 2016
- Discussed research & funding with U.S. lawmakers in Washington D.C. 2014, 2015
- Created GIF visualizations of Higgs boson discovery data 2013

Awards

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

Selected Publications

Federated learning for mobile keyboard prediction, Andrew Hard, Kanishka Rao, Rajiv Mathews, Françoise Beaufays, Sean Augenstein, Hubert Eichner, Chloé Kiddon, Daniel Ramage, arxiv:1811.03604.

Search for resonances in diphoton events at $\sqrt{s} = 13$ TeV with the ATLAS detector, ATLAS Collaboration, J. High Energ. Phys. (2016) 2016: 1. doi:10.1007/JHEP09(2016)001, 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>.

A search for new phenomena in events with missing p_T and a Higgs boson decaying to two photons in a 13.3 fb^{-1} pp collision dataset at $\sqrt{s} = 13$ TeV with the ATLAS detector, ATLAS Collaboration, ATLAS-CONF-2016-087.

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 20 papers & notes since 2011, author on 250+ ATLAS publications since 2013.

Selected Conference Presentations

March 2019	Federated Learning for Mobile Keyboard Prediction (Poster) <i>13th Annual Machine Learning Symposium, New York Academy of Sciences, New York, USA</i>
August 2016	Search for the production of the Higgs boson in association with invisible particles in the ATLAS detector (Poster) <i>38th International Conference on High Energy Physics, Chicago, USA</i>
July 2016	Search for a high mass diphoton resonance using the ATLAS detector (Invited talk) <i>22nd International Symposium on Particles, Strings and Cosmology, ICISE, Vietnam</i>
April 2014	Higgs to diphoton workshop perspective (Invited talk) <i>ATLAS Higgs Workshop, Rome, Italy</i>
December 2013	Individual and combined measurements of the spin and parity properties of the Higgs boson using the ATLAS detector (Invited talk) <i>High Energy Physics in the LHC Era, Valparaíso, Chile</i>
August 2013	Spin measurement of the Higgs-like resonance observed in the two photon decay channel in ATLAS (Talk) <i>2013 APS Division of Particles and Fields Meeting, SCIPP, Santa Cruz, USA</i>
November 2012	$h \rightarrow \gamma\gamma$ vector boson fusion (Invited talk) <i>US ATLAS Diboson Jamboree, Brookhaven National Laboratory, USA</i>

References

Prof. Sau Lan Wu
University of Wisconsin
Contact available upon request

Prof. John Parsons
Columbia University
Contact available upon request

Dr. Tancredi Carli
CERN
Contact available upon request