

# Andrew Hard

## Curriculum Vitae

CERN PH Division, B32 RA-14, 1211 Genève, Switzerland  
(+41) 76 30 88 007, (+1) 423 227 4106  
andrew.straiton.hard@cern.ch  
github.com/rasumovsky

## EDUCATION

---

- 2016 (Expected)    **Doctor of Philosophy** in Physics  
*University of Wisconsin, Madison WI, USA*  
Thesis: *Searches and Discoveries 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

## EXPERIENCE

---

- 2011 - 2016        **Graduate Research Assistant, Department of Physics, University of Wisconsin**
  - Discovered Higgs boson, performed first measurements of mass, couplings, and spin
  - Contributed significantly to 19 papers & notes, author on 250+ ATLAS publications
  - Statistical expert for multiple physics analyses, developed toy Monte Carlo tools
  - Invented algorithm to spatially and temporally match CMOS chip hits at LBNL
  - Developed analysis software with C++, ROOT, & shell scripts for ATLAS collaboration
  - Optimized physics searches in large phase spaces using massive datasets  $O(10\text{ TB})$
  - Wrote and coordinated DoE funding reports for Wisconsin ATLAS Group
- 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**
  - Electronic calibration expert for the ATLAS Experiment hadronic calorimeter
  - Developed & maintained calibration software package using python and SQL
  - Documented, monitored and reported on detector status to collaboration
- 2009 - 2010        **Undergraduate Research Assistant, Enrico Fermi Institute, University of Chicago**
  - Developed particle detector simulation in C++, ROOT, and Geant4
  - Constructed  $\mu$  particle modules, worked in machine shop, tested electronics

## SELECTED PUBLICATIONS

---

*Search for resonances in diphoton events at  $\sqrt{s} = 13\text{ TeV}$  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  $\sqrt{s} = 13\text{ TeV}$  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  $\sqrt{s} = 13\text{ TeV}$  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	<b>Search for the production of the Higgs boson in association with invisible particles in the ATLAS detector</b> (Poster) <i>38<sup>th</sup> International Conference on High Energy Physics</i> , Chicago, USA
July 2016	<b>Search for a high mass diphoton resonance using the ATLAS detector</b> (Invited talk) <i>22<sup>nd</sup> International Symposium on Particles, Strings and Cosmology</i> , ICISE, Vietnam
November 2014	<b>Search for non-pointing and delayed photons in the diphoton and missing transverse momentum final state in 8 TeV <math>pp</math> collisions</b> (Talk) <i>2014 US LHC User's Association Annual Meeting</i> , Argonne National Laboratory, USA
April 2014	<b>Higgs to diphoton workshop perspective</b> (Invited talk) <i>ATLAS Higgs Workshop</i> , Rome, Italy
December 2013	<b>Individual and combined measurements of the spin and parity properties of the Higgs boson using the ATLAS detector</b> (Invited talk) <i>High Energy Physics in the LHC Era</i> , Valparaíso, Chile
November 2013	<b>Spin determination of a narrow resonance near 125 GeV with the two-photon decay channel at ATLAS</b> (Invited talk) <i>2013 US LHC User's Association Annual Meeting</i> , Madison, USA
August 2013	<b>Spin measurement of the Higgs-like resonance observed in the two photon decay channel in ATLAS</b> (Talk) <i>2013 APS Division of Particles and Fields Meeting</i> , SCIPP, Santa Cruz, USA
November 2012	<b><math>h \rightarrow \gamma\gamma</math> vector boson fusion</b> (Invited talk) <i>US ATLAS Diboson Jamboree</i> , Brookhaven National Laboratory, USA

## SKILLS

---

<b>Scientific</b>	Physics, Statistics, Monte Carlo Simulation, Numerical Methods, Data Structures, High Throughput Computing, Collaborative Research, Public Presentation, Machine Learning
<b>Programming</b>	C++, Python, Java, $\LaTeX$ , Unix/Linux shell scripting, ROOT, Matlab, SQL, TensorFlow
<b>Languages</b>	English (native), French (basic oral and written communication)

## VOLUNTEERING & OUTREACH

---



■ Newtonian physics demonstration for Chicago Public Library	2016
■ US voter outreach & registration at CERN	2016
■ Discussed research & funding with U.S. lawmakers in Washington 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

---

2015	<b>Teaching Assistant Rookie of the Year</b> , <i>Department of Physics, University of Wisconsin</i>
2013, 2014	<b>Lighting Round Winner</b> , <i>US LHC User's Association Annual Meeting</i>

## REFERENCES

---

**Prof. Sau Lan Wu**  
University of Wisconsin  
Sau.Lan.Wu@cern.ch

**Prof. John Parsons**  
Columbia University  
parsons@nevis.columbia.edu

**Dr. Tancredi Carli**  
CERN  
Tancredi.Carli@cern.ch