JOAKIM OLSSON

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RESEARCH INTERESTS

- Experimental high energy physics: searches for BSM physics, SM/Higgs measurements, jets and jet substructure, hardware/firmware development, and machine learning applications
- Experimental astrophysics and cosmology
- Machine learning research

EDUCATION

University of Chicago — Chicago, IL
Ph.D. Physics, Advisor: David W. Miller — *2012 – 2018*
M.S. Physics — *2014*

Dissertation:
Searching for Supersymmetry in Fully Hadronic Final States with the ATLAS Experiment

Chalmers University of Technology — Gothenburg, Sweden
M.S. Fundamental Physics — *2010 – 2012*
Thesis: *Simulation of physics beyond the Standard Model with an extra $U(1)'$ gauge boson*

Tohoku University — Sendai, Japan
Exchange student: full time research in lab, courses in physics and Japanese — *2009 – 2010*

Chalmers University of Technology — Gothenburg, Sweden
B.S. Engineering Physics — *2006 – 2009*
Thesis: *Autonomous guidance system for a model airplane*

RELEVANT EXPERIENCE

University of California, Irvine — Irvine, CA
Postdoctoral Scholar — *October 2018 – Present*

- Leading a team as analysis contact for an ATLAS search with pair production of two Higgs bosons decaying into final states with quarks and leptons.
- Working on hardware upgrade projects for the Phase-II upgrade of the ATLAS Muon Spectrometer.

CERN (European Organization for Nuclear Research) — Geneva, Switzerland
Ph.D. Student, UChicago/ATLAS Experiment — *September 2012 – August 2018*

- Lead analyser in two searches for supersymmetry with the ATLAS detector, an 8 TeV search for R-parity-violating stops [3], and a 13 TeV search for direct production of a chargino and a neutralino decaying via Wh to fully hadronic final states (thesis analysis, paper in-progress). I was responsible for all aspects of the analysis, including private sample production for sensitivity studies, developing the strategy to suppress background, data/MC comparisons, systematics, HistFitter limit setting, helping to maintaining the analysis framework, editing supporting note, etc.
- Analyzed data and helped to prepare material for an ATLAS Run I search for R-parity-violating supersymmetric gluino pair-production with signatures based on high jet multiplicities [4].

- Measured the ATLAS calorimeter response to single isolated charged hadrons (E/p) during LHC Run II data taking, focusing primarily on the ATLAS Tile Calorimeter (TileCal).
- Developed software, analyzed data, supervised students, and took on a leading role during four test beam runs at CERN for the ATLAS TileCal High Luminosity LHC upgrade.
- Oversaw the trigger and beam line elements during TileCal test beam activities at CERN.
- Led a small team responsible for data quality of TileCal (Tile DQ Team Leader).
- Supervised students working in the University of Chicago ATLAS group at CERN.
- Initiated a project using Deep Neural Networks for ATLAS calorimeter topo-cluster classification.

University of Chicago, Kavli Institute for Cosmological Physics Chicago, IL
Graduate Researcher for the South Pole Telescope (SPT-3g) *September 2012 – May 2013*

- Measured loss properties in superconducting microstrip transmission lines for coupling the receiving antenna to transition-edge sensor (TES) bolometers in each pixel of the SPT-3g focal plane.
- Designed a special "cold stage" in Solid Works to minimize heat transfers and reduce noise.
- Worked for Professor John Carlstrom as part of a course in Advanced Experimental Physics.

CERN (European Organization for Nuclear Research) Geneva, Switzerland
Summer Student in the Caltech CERN CMS Group *June – September, 2011*

- Studied the impact of spurious signals ("spikes") in the avalanche photo diodes in the CMS Electromagnetic Calorimeter (ECAL). Authored an CMS Draft Analysis Note: CMS AN-11-481.
- Presented my work (indico link) for a large audience at end of the program.
- Worked under the supervision of Professor Maria Spiropulu.

Tohoku University Sendai, Japan
Graduate Researcher in the Solid-State Quantum Transport Group *October 2009 – August 2010*

- Investigated fundamental characteristics of quantum point contacts; measuring quantized conductance, quantum Hall effect, and resistively-detected Nuclear Magnetic Resonance.
- Verified and improved upon research published by the group (PRL 100, 186801), where *e-e* interactions was suggested as an influence for deviations from idealized conductance values.
- Improved the accuracy in a transport measurement system by significant noise reduction.
- Worked under the supervision of Professor Yoshiro Hirayama.

University of Florida Gainesville, FL
REU at the Institute for High Energy Physics and Astrophysics *June – August, 2009*

- Implemented a track reconstruction algorithm for the CMS muon system (using *C++* and ROOT).
- Developed trip data analysis software for the CMS Muon Endcap High-Voltage System.
- Worked under the supervision of Professor Guenakh Mitselmakher and Professor Ivan Furic.

TEACHING

University of Chicago *Chicago, IL*
Graduate Student Teaching Assistant *2012–2013, 2015, 2017, and 2018*

- Demonstrated physics problem solving in discussion sessions of 15-80 students, graded homework, and prepared solutions for courses in classical physics, modern physics, and particle physics.
- Supervised experiments and graded technical reports in senior undergraduate physics labs.
- Led hands-on electronics laboratory classes for about 20 students.
- Courses:
  - PHYS154 – Modern Physics Fall 2012
  - PHYS185 – Classical Physics Winter 2013

- PHYS237 – Particle Physics — Spring 2013
- PHYS211 – Advanced Undergraduate Labs — Winter 2015
- PHYS226 – Electronics — Spring 2015
- PHYS211 – Advanced Undergraduate Labs — Winter 2017
- PHYS211 – Advanced Undergraduate Labs — Winter 2018

SELECTED PUBLICATIONS

[1] ATLAS Collaboration, *Search for non-resonant Higgs boson pair production in the $bb\ell\nu\ell\nu$ final state with the ATLAS detector in pp collisions at $\sqrt{s} = 13$ TeV*, Phys. Lett. **B801** (2020) 135145, arXiv:1908.06765 [hep-ex].

[2] ATLAS Collaboration (main author), *Search for chargino and neutralino production in final states with a Higgs boson and missing transverse momentum at $\sqrt{s} = 13$ TeV with the ATLAS detector*, Submitted to: Phys. Rev. (2018), arXiv:1812.09432 [hep-ex].

[3] ATLAS Collaboration (main author), *A search for top squarks with R-parity-violating decays to all-hadronic final states with the ATLAS detector in $\sqrt{s} = 8$ TeV proton-proton collisions*, JHEP **06** (2016) 067, arXiv:1601.07453 [hep-ex].

[4] ATLAS Collaboration, *Search for massive supersymmetric particles decaying to many jets using the ATLAS detector in pp collisions at $\sqrt{s} = 8$ TeV*, Phys. Rev. **D91** (2015) 112016, arXiv:1502.05686 [hep-ex].

SELECTED TALKS

[5] J. Olsson, *Measurement of the Calorimeter Response to Single Hadrons with ATLAS at 13 TeV*, November, 2017. US LHC Users Association Annual Meeting, 2017. https://indico.fnal.gov/event/15068.

[6] J. Olsson, *Performance of the ATLAS Tile Calorimeter in Run 2 and Electronics Upgrade for High Luminosity LHC*, August, 2017. APS Division of Particles and Fields 2017. https://indico.fnal.gov/event/11999/session/11/contribution/112.

[7] J. Olsson, *Tile Phase-II Upgrade*, June, 2017. ATLAS Week (CERN). https://indico.cern.ch/event/626968.

[8] J. Olsson, *Topo-Clustering Classification with Deep Neural Networks*, December, 2016. Hadronic Final State Forum 2016 (SLAC). https://indico.cern.ch/event/565930.

HONORS & AWARDS

Scholarship for Excellent Academic Achievements, Hvitfeldtska, Gothenburg, Sweden, 2011
Scholarship for Studies in Japan, Adlerbertska Foundation, Gothenburg, Sweden, 2009
Scholarship for Studies in Japan, Sweden-Japan Foundation, Stockholm, Sweden, 2009
Scholarship for Studies in Japan, Japan Students Services Organization, Sendai, Japan, 2009

LEADERSHIP

Intize.org — Gothenburg, Sweden
Math tutor for high-school students — *January 2011 – June 2012*

- Mentored a group of Swedish high school students for a few hours every week.

CETAC (Chalmers Engineering Trainee Appointment Committee) — Gothenburg, Sweden
Appointment Manager and Member of the Board — *2008 – 2009*

- Coordinated trainee appointments for 13 Swedish engineering students at companies in the US and Canada. Despite the 2009 financial crisis, we managed to find paid positions for all members.

Employment Market Group at the Physics Student Union Gothenburg, Sweden
Chairman *2007 – 2008*

- Organized a field-trip to CERN for 35 undergraduate students in Engineering Physics at Chalmers.

OUTREACH

The Museum of Science and Industry, Chicago (March 2013)
Gave a popular science talk for the general public: The Higgs Boson – What's the big deal? A HUGE discovery of a TINY particle!

Public Event: Screening of Particle Fever and Discussion Panel (August 2015)
Chaired a discussion panel of physicists after a movie screening for the general public.

SKILLS/INFO

Programming	*C*, *C*++, Python, Bash, Java, JavaScript, Ruby
Markup	JSON, YAML, XML, HTML, CSS, LaTeX 2_ε
Software/Tools	Unix/Linux, Version Control, GitHub/GitLab, Vim (awesome editor), Emacs ROOT, Keras, TensorFlow, scikit-learn, NumPy, SciPy, Matplotlib, pandas root_numpy, rootpy, PyROOT, Docker, AutoCAD, SolidWorks, LabVIEW MATLAB, Mathematica, Adobe Illustrator/Photoshop/InDesign
Hardware	Calorimeters, Arduino controllers, NIM crates, FPGA basics, soldering
Interpersonal	Project management, leadership, mentorship, public speaking, science outreach
Languages	English (bilingual), Swedish (native), Japanese (elementary), French (elementary)
Other	Swedish citizen, Swedish and US driver's license
Hobbies	Skiing, long distance running, powerlifting, hiking, wave surfing traveling, reading, coding