

University of Massachusetts, Amherst
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Brokk Toggerson

Education

- 2008-2012 **Ph.D.**, *Department of Physics*, University of California, Irvine, Irvine, California.
Advisor: Anyes Taffard
- 2007-2008 **M.S.**, *Department of Physics*, University of California, Irvine, Irvine, California.
- 2002-2006 **B.S.**, *Department of Physics and Honors College, Cum Laude*, University of Arizona, Tucson, Arizona.

Professional Appointments

- Sept 2015 - **Lecturer**, *University of Massachusetts, Amherst*, Physics Department.
Present Leading an effort to transition algebra-based introductory physics (P131) from a traditional lecture to a team-based-learning environment with integrated laboratory experience using a flipped model. As part of this effort, I am developing an experimental course for physics majors interested in education including both theoretical knowledge as well as practical experience.
- Jan 2013 - **Lecturer**, *University of Arizona*, Physics Department.
- May 2015 Instructor of record for several different courses including calculus based courses for physics, engineering, and life science majors. Also responsible for supervising up to nine graduate student teaching assistants each semester.
- 2009-2012 **Research Assistant**, *University of California, Irvine*, ATLAS Experiment, CERN.
Advisor: Prof. Anyes Taffard
Designed tools in C++ and Python to analyze data from the ATLAS experiment as part of an international collaboration. Multiple supersymmetry searches including the first ever search for direct gaugino production at LHC. Contributions include: signal region optimization, implementation of simplified model paradigm, development and implementation of data driven background estimation techniques.
- 2009-2012 **Research Assistant**, *University of California, Irvine*, ATLAS Experiment, CERN.
Advisors: Prof. Andrew Lankford, Dr. Ivo Gough-Eschrich
Developed tools in C++ and bash to facilitate performance analysis of ATLAS Cathode Strip Chambers' (CSC) read-out drivers; a real-time data acquisition system. Logistical support linking engineers and ATLAS operations.
- 2007-2009 **Teaching Assistant**, *University of California, Irvine*.
Introductory mechanics for physics, mathematics, and engineering majors.
Upper division physics laboratory for physics, mathematics, and engineering majors.
C-programming and numerical methods for physics and mathematics majors.

Awards

- Spring 2015 **Award for Exceptional Undergraduate Teaching**, *University of Arizona*, Physics Department.
Selected by students and faculty for distinguished undergraduate teaching.
- Fall 2014 **Inaugural Recipient of Undergraduate STEM Teaching Excellence Award**, *University of Arizona*, AAU STEM Education Initiative, \$1000.
Campus-wide award given each semester to acknowledge STEM faculty who have implemented active learning instructional strategies.
- Spring 2014 **Award for Exceptional Undergraduate Teaching**, *University of Arizona*, Physics Department.
Selected by students and faculty for distinguished undergraduate teaching.
- Fall 2013 **Apple Polishers Award**, *Chi Omega Sorority*, University of Arizona Chapter.
Recognition of excellent teaching and mentoring.
- 2007-2010 **Video recorded lecture used as demonstration of effective teaching**, *University of California, Irvine*, Physics Department.
Used in *Seminar for Teaching Physics* course required for all departmental teaching assistants.
- 2007-2009 **Frederick Reines Fellowship**, *University of California, Irvine*.
Full tuition, fees, living stipend, and funds to conduct summer research.
- 2002-2006 **Associated Foundations Scholar**, *University of Arizona*, Honors College.
Awarded to one out-of-state student each year.

Grants

- Summer 2016 **MSP Flex Grant**, *Massachusetts Society of Professors*, \$500.
To assist funding an undergraduate student working on analysis of P131 results.
- Summer 2016 **Open Education Initiative**, *University of Massachusetts, Amherst*, W.E.B. du Bois Libraries, \$2500.
To develop free-to-students course materials for P131 and to assess their impact.

Courses Taught

This is a simple listings of courses. More information on each course can be found on my web-page.

- Spring 2016 **PHYS 296 & 496**, *An Independent Study on Physics Education Theory and Practice*, University of Massachusetts, Amherst, 9 physics majors.
- Spring 2016 **PHYS 131**, *Algebra-Based Introductory Physics I*, University of Massachusetts, Amherst, Four sections of 100 students.
- Fall 2015 **PHYS 131**, *Algebra-Based Introductory Physics I*, University of Massachusetts, Amherst, Three sections of 100 students.
- Spring 2015 **PHYS 331**, *Electrodynamics I*, University of Arizona, 23 physics majors.
- Spring 2015 **PHYS 241**, *Calculus-Based Introduction to Electricity and Magnetism*, University of Arizona, 262 students.
- Fall 2014 **PHYS 102**, *Algebra-Based Introductory Physics I*, University of Arizona, Three sections of 100 students.
- Fall 2014 **PHYS 162H**, *Calculus-Based Introduction to Thermodynamics, Wave Motion, and Optics*, University of Arizona, 25 physics majors.

- Summer 2014 **PHYS 241**, *Calculus-Based Introduction to Electricity and Magnetism*, University of Arizona, 50 students.
- Spring 2014 **PHYS 103**, *Algebra-Based Introductory Physics II*, University of Arizona, 300 students.
- Spring 2014 **PHYS 142**, *Calculus-Based Introduction to Thermodynamics, Wave Motion, and Optics*, University of Arizona, 100 students.
- Fall 2013 **PHYS 241**, *Calculus-Based Introduction to Electricity and Magnetism*, University of Arizona, 250 students.
- Fall 2013 **PHYS 162H**, *Calculus-Based Introduction to Thermodynamics, Wave Motion, and Optics*, University of Arizona, 27 physics majors.
- Summer 2013 **PHYS 241**, *Calculus-Based Introduction to Electricity and Magnetism*, University of Arizona, 40 students.
- Spring 2013 **PHYS 261H**, *Calculus-Based Introduction to Electricity and Magnetism*, University of Arizona, 29 physics majors.
- Spring 2013 **PHYS 141**, *Calculus-Based Introduction to Mechanics*, University of Arizona, 250 students.

Undergraduate Students

- Summer 2016 - Present **Chasya Church**, *Development of free-to-student course materials and the analysis of student performance data for P131*, University of Massachusetts, Amherst.

Professional Development

- March 2016 **Open Classroom Days Pilot**, *University of Massachusetts, Amherst*, Institute for Teaching and Faculty Development.
One of twenty faculty who volunteered to open their classrooms to visits from other faculty from across the campus in this pilot program.
- Fall 2015 - Spring 2016 **Student Centered Teaching and Learning Fellow**, *University of Massachusetts, Amherst*, Institute of Teaching and Faculty Development, \$1500.
A fellowship focusing on active, collaborative, and innovative pedagogies. Fellows engage in a variety of initiatives to assist with course design, technology familiarity, and assignment development. Upon completion, fellows receive a certificate of Team-Based Learning qualification.
- October 2014 **Collaborative Learning Space Pilot**, *University of Arizona*, AAU STEM Education Initiative.
Invited by the Senior Vice Provost for Academic Affairs to participate in a two-week pilot program to investigate new, collaborative classrooms for teaching large classes.
- Fall 2013 - Spring 2015 **Faculty Learning Community**, *University of Arizona*, AAU STEM Education Initiative.
A community for discussing readings about learning and teaching. Exploring evidence-based instructional strategies, developing teaching resources for trying new strategies, and designing teaching projects.
- Fall 2013 - Spring 2014 **New Faculty Teaching Talks**, *University of Arizona*, AAU STEM Education Initiative.
Attended a series of lectures on evidence based techniques for STEM education.

- Spring 2013 - **Teaching peer review pilot**, *University of Arizona*,
 Fall 2013 Office of Instruction and Assessment.
 Met with experts in physics education to improve teaching quality.
- Spring 2013 - **Supplemental Instruction pilot**, *University of Arizona*, Think Tank.
 Spring 2015
 Spring 2013 was the first physics course for this program which sets up sessions run by successful undergraduates where students can receive additional small group instruction to supplement the large lecture. Responsibilities include guiding two undergraduate instructors, receiving feedback on topics with which students are having trouble, and providing feedback to the UA Think Tank on effectiveness of program for physics courses.

Service and Outreach

- Summer **Summer College Particle Physics Program**,
 2016 *University of Massachusetts, Amherst*, Commonwealth Honors College.
 A two-week program for talented high school students using real data events from the CMS experiment at CERN
- Fall 2015 - **Service Courses Committee**, *University of Massachusetts, Amherst*,
 Spring 2016 Physics Department.
 Committee oversees quality of all introductory service courses and associated laboratories as well as approving major reforms
- Fall 2013 - **Women in Physics Faculty Advisor**, *University of Arizona*, Physics Department.
 Spring 2015 Organization's mission is to provide education and awareness within the department to the issues facing women and other under-represented minorities. Also engages in significant outreach activities with local public schools.
- Fall 2013 - **Department Teaching Evaluation and Innovation Committee**,
 Spring 2015 *University of Arizona*, Physics Department.
 Committee evaluates graduate student teaching assistants and implements new teaching evaluation of faculty procedures.
- November **Physics Phun Nite Demonstrator**, *University of Arizona*, Physics Department.
 2013, 2014 Performed a series of diffraction and interference experiments for the general public.
- Spring 2014 **Public Showing of "Cosmos: A Spacetime Odyssey"**, *Sky Bar*, Tucson, Arizona.
 Contacted the owner of a local establishment to have public viewings of the show. Held a Q&A/discussion with members of the public after each episode.
- March 2013 **Judge**, *Arizona Junior Science and Humanities Symposium*, Tempe, Arizona.
- March 2014 **Guest Teacher**, *Arts for All, Inc.*, Tucson, Arizona.
 Developed and ran a set of sun science based activities for kids with and without disabilities aged preschool to eighth grade. Activities involved projecting the sun on a screen, having students build sundials, and exploring a scale model of the solar system on the playground.
- May 2013 **Judge**, *Intel International Science and Engineering Fair*, Phoenix, Arizona.
- March 2013 **Judge**, *Arizona Junior Science and Humanities Symposium*, Tempe, Arizona.
- September **CERN representative**, *United Nations Open Day*, Geneva, Switzerland.
 2012 Represented CERN and answered questions from the public
- Summer **Official guide**, *CERN*, Geneva, Switzerland.
 2012 Tours of the ATLAS Experiment and *Universe of Particles* exhibit.
- February **French Swiss Semifinalist**, *FAMELab Science outreach event*, Geneva, Switzerland.
 2012 Public talk: *Quantum Mechanics and the Slinky*
- May 2011 **Guest lecturer**, *Gwinnett County Public Schools*, Suwanee, Georgia.
 Lectured on basics of particle physics and what it is like to be a physicist to Collins Hill High School and Peachtree Ridge High School students.

Presentations

- February 2012 University of Arizona *Search for Direct Gaugino Production Decaying to Two Leptons and Missing Transverse Momentum at ATLAS with $\sqrt{s} = 7$ TeV "*
- June 2012 CIPANP 2012 *Searches for direct gaugino production and RPV SUSY with leptons at $\sqrt{s} = 7$ TeV*
- May 2012 BNL Workshop on SUSY with 5 fb^{-1} at the LHC *Leptons+X (direct gaugino) - ATLAS*
- April 2011 APS April Meeting *Search for supersymmetry in same-sign dilepton channel at $\sqrt{s} = 7$ TeV with 35 pb^{-1}*

Publications

This is a partial list, including only papers with significant contributions.

Dissertations

Brokk Toggerson. *Search for Direct Gaugino Production Decaying to Two Leptons and Missing Transverse Momentum at ATLAS with $\sqrt{s} = 7$ TeV*. PhD thesis, University of California, Irvine, 2012.

Journal Articles

The ATLAS Collaboration. Search for direct slepton and gaugino production in final states with two leptons and missing transverse momentum with the ATLAS detector in pp collisions at $\sqrt{s} = 7$ TeV. *Phys.Lett.*, B718:879–901, 2013.

The ATLAS Collaboration. Searches for supersymmetry with the ATLAS detector using final states with two leptons and missing transverse momentum in proton–proton collisions. *Physics Letters B*, 709(3):137 – 157, 2012.

The ATLAS Collaboration. Search for supersymmetric particles in events with lepton pairs and large missing transverse momentum in $\sqrt{s} = 7$ TeV proton-proton collisions with the ATLAS experiment. *EPJC*, 71:1682, 2011.

The ATLAS Collaboration. Measurement of the top quark-pair production cross section with ATLAS in pp collisions at $\sqrt{s} = 7$ TeV,. *EPJC*, 71:1577, 2011.

T. Argyropoulos et al. Cathode Strip Chambers in ATLAS: Installation, Commissioning and in Situ Performance. *IEEE Transactions on Nuclear Science*, 56(3), June 2011.

B. Toggerson et al. Onset of space charge effects in liquid argon ionization chambers. *Nuclear Inst. and Methods A*, 608(2), September 2009.

Conference Papers

The ATLAS Collaboration. Interpretation of same-sign dilepton events at ATLAS with a simplified SUSY model. ATLAS CONF Note ATL-COM-PHYS-2011-294, CERN, Geneva, Mar 2011.

Technical Skills

- C++** **Advanced proficiency.**
Tools for ATLAS data analysis.
- Bash** **Advanced proficiency.**
scripting Tools to monitor web based services for new LHC data and notify a team at UCI when datasets are ready for processing.
- UNIX** **Advanced proficiency.**
Personal and professional applications. Comfortable with `awk` and `sed`.
- Python** **Advanced proficiency.**
Tools for ATLAS data management. Software to analyze data from P131 at University of Massachusetts, Amherst
- L^AT_EX** **Advanced proficiency.**
- MS Office** **Advanced proficiency.**
Writing course materials at University of Massachusetts, Amherst