

Alec Drobac

Education

Tufts University

Medford, MA

Ph.D. in Physics (August 2022)

Thesis: *Measurement of Associated Z Boson and Heavy-Quark Jet Production in pp Collisions at $\sqrt{s} = 13$ TeV*

M.S. in Physics (January 2018)

Middlebury College

Middlebury, VT

B.A. in Physics (May 2016)

Research Experience

Beauchemin Research Group, Tufts University

Medford, MA

Research Assistant (Summer 2017 – July 2022)

- Member of ATLAS experimental collaboration at CERN's Large Hadron Collider.
- Dissertation written on precision measurement of Z + heavy flavor jets events
 - Developed novel unfolding technique which preserves correlations between signal regions
 - Results illuminate shortcomings of current modelling techniques, motivate further analysis
- Completed qualification task to produce trigger scale factors for the dimuon triggers; developed production framework for future researchers to use

Teaching Experience

Department of Physics, Skidmore College

Saratoga Springs, NY

Visiting Assistant Professor (Fall 2022 – Present)

- Fall semester: teaching two sections of General Physics I (calculus-based introductory mechanics)
- Integrating frequent transitions between lecture, group work, and laboratory experimentation

Department of Physics and Astronomy, Tufts University

Medford, MA

Instructor, General Physics II (Summer 2019)

- Calculus-based electromagnetism course
- Used FlipIt Physics and clicker questions, as well as occasional small group projects and demos, to center course on student learning and maximize student agency

Co-Instructor, General Physics II (Fall 2018)

- Calculus-based electromagnetism course
- Extensively used clicker questions to facilitate peer instruction and classroom inquiry on physics
- Co-instructor with Prof. Timothy Atherton. Taught half of lecture periods and collaborated on writing exams and homework

Graduate Teaching Assistant (9 semesters over Fall 2016 – Spring 2021)

- Led laboratory classes and recitations for introductory physics students
- Promoted student inquiry and physics thinking while setting expectations of inclusion and respect
- Provided written and oral feedback to students and assisted in evaluation of students' progress
- As lead TA in Fall 2019, helped redesign laboratories to give students freedom to design experiments

Graduate Institute for Teaching (GIFT), Tufts University

Medford, MA

GIFT Fellow (Summer 2018)

- Competitive-acceptance program for graduate students interested in teaching
- Participated in workshops culminating in a 45-minute sample lecture
- Program in conjunction with teaching General Physics II with Prof. Timothy Atherton (Fall 2018)

Middlebury College Writing Center

Middlebury, VT

Writing Tutor (Fall 2014–Spring 2016)

- Advised students in First Year Seminar and English & American Literature courses on structure and style
- Set up and ran International Write-In event where students wrote continuously for a set period of time

Other Professional Experience

Apt Tutoring, Test Prep & College Counseling

Remote

Academic and Test Preparation Tutor (Spring 2020)

- Tutored Medford-area high school students in introductory physics and algebra courses
- Topics included homework assignments, test preparation, general understanding, and study techniques

Department of Occupational Therapy, Tufts University

Medford, MA

Guest Lecturer (4 times)

- Taught kinesiology students basics of levers and torque and their applications to physical therapy
- Shared physics perspective and intuition to therapy challenges which students will face in their careers

NASA Goddard Space Flight Center

Greenbelt, MD

Science Writer for Earthzine, IEEE OES publication on Earth sciences (Summer 2015)

- Researched and wrote articles -- including interviews of relevant professionals -- for scientific audience
- Topics included: water metering technology; L-band sensing satellites; open-source geospatial software

Community Work

Tufts University

Medford, MA

Physics and Astronomy Department Diversity, Equity, and Inclusion (DEI) Committee (Fall 2020 - Present)

- Committee formed to help Department become more inclusive and to foster equitable practices
- Analyzed data collected from a survey of past and present physics students to learn about their experience and sense of belonging; presented findings to the Department at a colloquium

Graduate Assistant Union Steward (Fall 2018 - Spring 2021)

- Elected as union representative for graduate students, addressed questions and potential grievances
- Previously, participated in negotiating 1st union contract
- Ran event for new graduate students describing the purpose and scope of the union

Honors and Awards

Honos Civicus Society Inductee (2022)

"...recognizes graduating students who engaged in meaningful service and leadership activities" while at Tufts
Tufts University Jonathan M. Tisch College of Civic Life

John F. Burlingame Graduate Fellowship in Physics (2021-2022)

Recognizes outstanding achievement by graduate students in physics
Tufts University Physics and Astronomy Department

Award for Outstanding Contributions to Undergraduate Education (2020)

Tufts University Graduate School of Arts and Sciences

Tufts University 3-Minute Thesis Competition - 1st Prize (April 2019)

Tufts University Graduate School of Arts and Sciences

Middlebury College Ward Prize for Freshman Writing - Finalist (Fall 2012)

Middlebury College

Strengths, Skills, and Interests

- Public speaking and audiovisual communication; clear and concise writer
- Practiced educator comfortable with the use of evidence-based pedagogical techniques
- Initiative and willingness to tackle new problems
- Programming languages and software: Linux, Python, C++, Mathematica, Microsoft Office Suite
- Interests: Physics education research; education policy and advocacy; science policy development, analysis

Publications

All publications below are hyperlinked on my website: alecdrobac.com/publications

ATLAS Collaboration

Performance of the ATLAS muon triggers in Run 2 (2018)

Contributed production and studies of dimuon scale factors

ATLAS publications list the entire collaboration as authors; I include this paper because I directly contributed text and plots

Design and Performance of the ATLAS Muon Trigger System (2022)

Poster presented at the Large Hadron Collider Physics (LHCP) 2022 Conference

Proceedings (*currently under review*) written following LHCP 2022

The ATLAS Muon Trigger Design and Performance (2020)

Poster presented at the Large Hadron Collider Physics (LHCP) 2020 Conference

Proceedings written following LHCP 2020

Earthzine

OSGeo: Mapping the World of Open Source Geospatial Software (2015 (all))

A description of OSGeo's push to provide geospatial software for public collaboration

From Space to Earth with John Mather

A conversation with the Nobel Laureate about COBE and his excitement for its spiritual successor, the James Webb Space Telescope

Untouched Oceans Provide Context for Earth's Uniqueness

Understanding the need to study the oceans, on Earth and on other planets

Meters Matter: How Water Metering Promotes Conservation and Technological Development

Examining the importance of water metering as a means to contend with increasingly frequent droughts

Big Data Flows: Water, Outsourcing, and the Flood of Data

Exploring the intersection of big data and utilities

Climate Change Tightening its Grip on Bumblebee Habitat

My first publication, reporting on climate change's effects on bumblebee habitable ranges