

# 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)

## Professional Experience

### U.S. National Science Foundation (NSF)

Alexandria, VA

AAAS Science and Technology Policy Fellow (September 2023 - Present)

- Member of Government Affairs team within the Office of Legislative and Public Affairs
- Serve as liaison between NSF and U.S. lawmakers:
  - Field inquiries from lawmakers and committee staff; organize briefings, informal calls, etc.
- Prepare NSF witnesses for Congressional testimony in collaboration with other federal agencies
- Communicate NSF's awards and mission to relevant stakeholders

## 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; developed novel production framework

## Teaching Experience

### Department of Physics, Skidmore College

Saratoga Springs, NY

Visiting Assistant Professor (September 2022 - May 2023)

- Taught calculus-based introductory mechanics and electricity and magnetism; APS-IDEA participant
- 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 Flipt 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)

## Other Relevant 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 - Spring 2022)*

- 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 1<sup>st</sup> 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 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 - 1<sup>st</sup> Prize (April 2019)

Tufts University Graduate School of Arts and Sciences

## 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](http://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