

**Sarah Demers**  
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## EDUCATION

University of Rochester	Physics	Ph.D. 2005
University of Rochester	Physics	M.A. 2001
Harvard University	Physics	A.B. 1999

## EXPERIENCE

Yale University	Associate Professor	July, 2014 – present
Yale University	Assistant Professor	July, 2009 – June, 2014
SLAC National Accelerator Lab.	Research Associate	July, 2006 – June, 2009
Roberts Wesleyan College	Assistant Professor	August, 2004 – May, 2006
University of Rochester	Research Assistant	June, 1999 – July, 2004
Harvard University	Research Assistant	June, 1997 – May, 1999

## GRANTS, AWARDS AND FELLOWSIPS

May, 2014	<u>Yale Provost Teaching Award</u> for untenured faculty
May 2014 – 2017	<u>DOE Grant</u> for work on the Mu2e Experiment at Fermilab
2013 – 2014	<u>Whitney Humanities Fellow</u> , Yale University
April – Sept. 2013	<u>U.S. ATLAS Fellow: Upgrade Physics at ATLAS</u>
November, 2012	<u>Yale Poorvu Family Award for Interdisciplinary Teaching</u>
November, 2012	<u>Higgs, Dance and Photography grant, Arts Council of New Haven</u> Co-PI with Theater Studies Lecturer Emily Coates
April, 2012	<u>Yale University and New Haven Seton Elm-Ivy Award</u> for bridging the gap between Yale and New Haven with the Girls Science Investigations Program, co-Directed with Professor Bonnie Fleming
January, 2012	<u>Co-PI on NSF Grant: Conf. for Undergraduate Women in Physics</u>
December, 2011	<u>PI on DOE Grant: Conference for Undergraduate Women in Physics</u> Sub-awards to Stanford, CWRU, Tennessee, Washington, Texas A&M
May, 2011	<u>Department of Energy Early Career Award</u> “Taus and the Trigger for Discovery at ATLAS”
2005 – 2006	<u>Division of Mathematics and Natural Sciences Teaching Award</u> Roberts Wesleyan College, Rochester, NY

## PROFESSIONAL RESPONSIBILITIES

Sept '14 – present:	<u>Co-convener of ATLAS Data Quality</u>
Sept '14 – present:	<u>Member, University Wide Committee on Sexual Harassment and Sexual Assault, hears formal &amp; informal complaints for students, faculty and staff</u>
2013 – present:	<u>Co-convener of ATLAS VH, H-&gt;<math>\tau\tau</math> analysis group</u>
2013 – present:	<u>Steering Committee Member representing the Physics Department</u> <u>Yale's HHMI Undergraduate Bioscience Grant</u> <u>Focus on Retention of College Students in STEM</u>
2013 – present:	<u>Member of the Advisory Committee</u> <u>Yale's Franke Program in the Sciences and Humanities</u>
2012 – present:	<u>Co-leader/co-founder of Yale Franke and Whitney Humanities Center Group, "Interdisciplinary Arts and Science Research" with Theater Studies Lecturer Emily Coates</u>
2012 - present:	<u>Member of Selection Committee: APS Mitsuyoshi Tanaka Dissertation Award in Experimental Particle Physics</u>
2011 – present	<u>Faculty Adviser: Conferences for Undergraduate Women in Physics held at Yale in January 2012 and scheduled for January, 2015</u>
May '08 – present:	<u>ATLAS Tau Data Quality Group Leader</u>
2012 – 2013:	<u>Member of the DPF Program Committee for August, 2013 Meeting</u>
Jan '10 – Apr '13:	<u>Member, ATLAS Trigger Coordination Group &amp; TDAQ Steering Group</u>
Aug '09 - 2013:	<u>Elected member, US LHC Users Organization Executive Board</u>
July '09 - 2013:	<u>ATLAS Upgrade Simulation Coordinator</u>
2010 – May, 2012:	<u>Member of the CIPANP 2012 Conference Organizing Committee</u>
Nov '09 – Nov '11:	<u>Elected member, ATLAS TDAQ Speakers Committee</u>

## PRESENTATIONS

### Physics Department Colloquia:

November 10, 2014	Harvard University (scheduled)
March 3, 2014	<u>Physics, Dance and the Higgs at Yale, Yale University, New Haven, CT</u> Co-Presented with Yale Theater Studies Lecturer Emily Coates
October 30, 2013	<u>Discovering the Higgs Boson at CERN's LHC, University of Vermont, Burlington, VT</u>
September 12, 2013	<u>The Higgs Boson and What it Means for High Energy Physics</u> Wesleyan University, Middletown, CT
January 31, 2013	<u>Hunting for the Higgs Boson with ATLAS, Northeastern University, Boston, MA</u>
November 6, 2012	<u>Higgs Hunting at the LHC, University of Houston, Houston, TX</u>
March 30, 2012	<u>Hunting for New Phenomena with the ATLAS Experiment</u> Yale University, New Haven, CT
March 12, 2012	<u>Hunting for the Higgs and other Pursuits at CERN's LHC</u> Roberts Wesleyan College Science Department, Rochester, NY
September 17, 2010	<u>Hunting for New Physics at the LHC, Williams College, Williams, MA</u>
February 12, 2010	<u>Hunting for New Physics at the LHC, Bates College, Lewiston, ME</u>

January 7, 2010 Hunting for New Physics at the LHC, Union College, Schenectady, NY  
Dec 4, 2009 Hunting for New Physics at the LHC, Vassar College,  
Poughkeepsie, NY

**Particle Physics Seminars:**

February 19, 2013 Tau Polarization at ATLAS, SLAC, Menlo Park, CA  
October 30, 2012 Taus at ATLAS, University of Rochester, Rochester, NY  
September 26, 2012 Tau Polarization at ATLAS, Rutgers University, New Brunswick, NJ  
February 27, 2012 Physics with Taus at the LHC, Southern Methodist University, Dallas, TX  
December 7, 2011 Physics with Taus at the LHC, Columbia University, New York, NY  
April 5, 2011 Recent results from ATLAS on  $W \rightarrow \tau \nu$ , University of Pennsylvania

**Invited Talks at Conferences and Meetings:**

November 7, 2013 The ATLAS Upgrade Physics Program  
US Large Hadron Collider Users Organization, Madison, WI  
April 26, 2013 Hunting for the Higgs at CERN  
Plenary, SPS Zone 3 and AAPT Southeastern PA Joint Meeting  
Drexel University, Philadelphia, PA  
April 4, 2013 Tau Tagging, Energy Frontier Meeting, Brookhaven National Lab, NY  
July 5, 2012 Measurement of Tau Polarization in  $W \rightarrow \tau \nu$  events at ATLAS  
International Conference for High Energy Physics (ICHEP)  
Melbourne, Australia  
June 7, 2012 The Evolution and Performance of Electron and Photon Triggers  
at ATLAS in 2011  
International Conference on Calorimetry in High Energy Physics  
(CALOR), Santa Fe, NM  
March 13, 2012 The Future of Big Science: Unlocking the Mysteries of our Universe  
2012 Biennial Academic Conference  
Roberts Wesleyan College, Rochester, NY  
November 18, 2011 Recent Results from ATLAS  
Fermilab Joint Theory and Experiment Seminar (wine and cheese)  
October 3, 2011 The Standard Model: QCD and Electroweak Physics  
International Conference for Future Accelerators (ICFA)  
CERN, Geneva, Switzerland  
April 12, 2011 ATLAS Upgrades for the sLHC and the Related Physics Case  
International Workshop on Deep-Inelastic Scattering and Related Subjects  
(DIS2011), Newport News, VA  
April 7, 2011 Taus at ATLAS, The Tau Portal Workshop, UC Davis  
August 4, 2009 The Tau Trigger, ATLAS Workshop of the Americas at NYU, NY  
October 20, 2008 The ATLAS Trigger  
IEEE Nuclear Science Symposium, Dresden, Germany  
August 22, 2007 Tau Identification  
ATLAS Workshop of the Americas, SLAC, Menlo Park, CA  
June 8, 2007 Taus at ATLAS, CMS Tau Workshop, Pisa, Italy

### **Public Lectures, Panels and Workshops:**

- October 16, 2014 Science Happy Hour at BAR: Casual conversation about Big Science  
BAR in New Haven (scheduled)
- April 4, 2014 Q&A Session after Screening of Particle Fever  
Real Art Ways, Hartford, CT
- March 26, 2014 Physics and Dance: Potential Poetics, co-presented with Theater Studies  
Lecturer Emily Coates, TEDxYale, New Haven, CT
- February 16, 2014 Q&A Session after Screening of Particle Fever,  
Cinema Club, Madison Art Cinema, Madison, CT
- Oct. 10 – 11, 2013 Discovering the Higgs through Physics and Dance  
Talks and Workshops at UNC Chapel Hill with Theater Studies Lecturer  
Emily Coates  
Supported by the Mellon Foundation and Carolina Performing Arts
- August 13, 2013 Implicit Bias, Gender and You  
Division of Particles and Fields Bi-Annual Meeting, Santa Cruz, CA
- August 2, 2013 Crisis, Detection and Coping  
Physics Slam on Ice, Snowmass on the Mississippi Conference  
University of Minnesota Ridder Hockey Arena, Minneapolis, MN
- March 1, 2013 “Research, Teaching and Engagement” Panelist with Emily Coates  
Innovations: Intersections of Art and Science, Wesleyan University, CT
- May 4, 2012 “Tau Lepton Signatures” Session, Co-Chaired with Professor Tao Han,  
Chicago 2012 Workshop on LHC Physics  
University of Chicago, Chicago, IL
- November 29, 2011 Chaired Tau Lepton Parallel Session  
Intensity Frontier Workshop, MD
- August 12, 2011 Co-Moderator and Organizer of the Women in Science Forum  
Division of Particles and Fields (DPF) Yearly Meeting  
Brown University, Providence, RI
- June 21, 2011 Moderated Panel: STEM: Strengthening the Pipeline  
National Coalition of Girls’ Schools STEM Symposium  
Wellesley College, Wellesley, MA
- January 16, 2010 Career Panel: Panelist Representing the Academic Perspective  
Yale Undergraduate Conference for Women in Physics
- June 19, 2007 The Large Hadron Collider: Re-defining High Energy  
SLAC Public Lecture Series, Menlo Park, CA

### **Fellows Meetings and Alumni Groups at Yale:**

- March 23, 2015 The Higgs Boson (scheduled)  
Berkeley Fellows Meeting, Yale University
- September 20, 2014 Physics and Dance, co-presented with Theater Studies Lecturer  
Emily Coates, Pierson College Fellows Meeting, Yale University
- May 24 & 31, 2014 Alumni Weekend Masterclass: Physics and Dance, Saturday workshops  
for Yale Alums with Theater Studies Lecturer Emily Coates
- May 1, 2014 Girls Science Investigations at Yale  
Yale Science and Engineers Alumni Association, New York City, NY

- May 25 & Jun 1, '13 Alumni Weekend Masterclass: Physics and Dance, Saturday workshops for Yale Alums with Theater Studies Lecturer Emily Coates
- September 19, 2013 Physics and Dance, co-presented with Theater Studies Lecturer Emily Coates, Trumbull College, Yale University
- December 3, 2012 Hunting for the Higgs at CERN's Large Hadron Collider  
Timothy Dwight Fellows Meeting, Yale University

#### **Yale STEM Recruiting for Admissions Office**

- September 9, 2014 Faculty speaker at Yale STEM Forum at The Wheatley School in Old Westbury, NY
- February 16, 2014 Welcome panel for YES-W Undergraduate STEM recruiting weekend
- September 3, 2013 Faculty speaker at Yale STEM Forum, Montclair Kimberly Academy Montclair, NJ
- February 18, 2013 Welcome panel for YES-W Undergraduate STEM recruiting weekend
- September 5, 2012 Faculty speaker at Yale STEM Forum at The Wheatley School in Old Westbury, NY

#### **Summer School Lectures for Graduate Students and Postdocs:**

- Aug 11-12, 2014 Trigger, Data Acquisition and Data Preparation (two lectures)  
Joint CERN-Fermilab Hadron Collider Summer School, Batavia, IL
- July 15-16, 2013 LHC and TeVatron Results: Electroweak and QCD Physics (two lectures)  
CTEQ Summer School Lectures, University of Pittsburgh

#### **Talks for Undergraduate Groups:**

- September 5, 2014 Understanding the Higgs Boson with CERN's Large Hadron Collider  
Yale Perspectives in Science, New Haven, CT
- February 14, 2014 The Higgs Boson, Yale Society of Physics Students, New Haven, CT
- January 25, 2013 The Higgs Boson and the Future of Big Science  
Sir Thomas More Lecture Series, Yale University
- January 15, 2012 Hunting for the Higgs and other Pursuits at CERN's LHC  
Northeast Conference for Undergraduate Women in Physics  
Yale University, New Haven, CT
- October 14, 2011 Hunting for New Physics at the Energy Frontier  
Yale Perspectives in Science, New Haven, CT

#### **Talks for High School Science Teachers:**

- September 19, 2014 Understanding the Higgs Boson with CERN's Large Hadron Collider  
Institute for Science Instruction and Study  
Southern Connecticut State University, New Haven, CT
- May 3, 2012 Particle Physics: What, How and Why?  
Institute for Science Instruction and Study: High School Science Teachers  
Southern Connecticut State University, New Haven, CT

### Talks and Workshops for High School Groups:

- August 4, 2014 Big Science: Cosmic Rays, Telescopes and Accelerators  
Bridgeport, CT GEAR-UP program for college preparation
- February 7, 2013 Hunting for the Higgs Boson with the ATLAS Experiment  
Science Division Seminar, Phillips Academy, Andover, MA
- September 22, 2012 Higgs Hunting with High Energy Physics  
Yale Science Saturdays Program, New Haven, CT
- August 2, 2012 Particle Physics  
Lecture for Yale EXPO Program for High School Students
- July 16, 2012 Cosmic Rays, Telescopes and Accelerators: Big Science  
Lecture for Yale S.C.H.O.L.A.R. Program for  
New Haven Public School High School Students

### RESEARCH

#### Selected Publications: *(Complete list of 400+ publications with ATLAS and CDF on request)*

Search for the Standard Model Higgs boson in the H to tau+ tau- decay mode in sqrt(s) = 7 TeV pp collisions with ATLAS  
The ATLAS Collaboration  
JHEP (2012) 070

Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC  
The ATLAS Collaboration  
Phys. Lett. B 716 (2012) 1-29

Measurement of tau polarization in W->taunu decays with the ATLAS detector in pp collisions at sqrt(s) = 7 TeV  
The ATLAS Collaboration  
Eur.Phys.J. C72 2062 (2012), [arXiv:1204.6720v2](https://arxiv.org/abs/1204.6720v2)

Measurement of the top quark pair cross section with ATLAS in pp collisions at sqrt(s) = 7 TeV using final states with an electron or a muon and a hadronically decaying tau lepton  
The ATLAS Collaboration  
CERN-PH-EP-2012-102, [arXiv:1205.2067v1](https://arxiv.org/abs/1205.2067v1)

Measurement of the W to tau nu Cross Section in pp Collisions at sqrt(s) = 7 TeV with the ATLAS experiment.  
The ATLAS Collaboration (*Aad, G, et al.*)  
Phys.Lett.B 706, 276-294 (2012) [arXiv:1108.4101v2](https://arxiv.org/abs/1108.4101v2)

Performance of the ATLAS Detector using First Collision Data  
The ATLAS Collaboration (*Aad, G. et al.*)  
JHEP 1009:056 (2010)

Charged-particle multiplicities in pp interactions at  $\sqrt{s} = 900$  GeV measured with the ATLAS detector at the LHC

The ATLAS Collaboration (Aad, G. *et al.*)

Phys Lett B **688**, Issue 1, 21-42

The ATLAS Experiment at the CERN Large Hadron Collider

Aad, G. *et al.*, J. Instrum. 3 (2008) S08003

Search for charged Higgs bosons from top quark decays in p anti-p collisions at  $\sqrt{s} = 1.96$ -TeV

CDF Collaboration, Phys.Rev.Lett.96:042003 (2006)

A Search for  $t \rightarrow \tau \nu q$  in t anti-t production

CDF Collaboration, Phys. Lett. B 639, 172 (2006)

### Research In-Progress

A Search for  $Z'$  decays to tau pairs (ATLAS Collaboration)

Tau Polarization in Z Bosons (ATLAS Collaboration)

A Search for the Standard Model Higgs Produced in Association with a W or Z Boson, in the tau pair channel (ATLAS Collaboration)

### ADDITIONAL PUBLIC ENGAGEMENT

#### Popular Press Opinion Pieces

April 23, 2014 [“Let Them Play the Game”](#), InsideHigherEd

January 14, 2014 [“Aesthetic Motivation: A Scientific Idea Ready for Retirement?”](#)  
edge.org

March 29, 2013 [“The Still Tolerated Gender Bias in Science”](#), TED Blog

March 5, 2013 [“High Energy Physics Is Still a Worthwhile Investment”](#), The Atlantic

December 20, 2012 [“New Years Resolutions of a New Particle: The Higgs Boson”](#)  
Huffington Post

#### Radio, Podcasts and other Media

April 2, 2014 [Connecticut Public Radio \(WNPR\): The Colin McEnroe Show](#)  
before Hartford Premier of Particle Fever

December 20, 2013 Art-Science Film, [“Three Views of the Higgs and Dance”](#)  
Co-created with Theater Studies Lecturer Emily Coates

October 30, 2013 [Vermont Public Radio, Morning Edition](#), publicity for Higgs lecture at the  
University of Vermont

September 27, 2011 [Workstew Podcast](#): Regarding the “superluminal neutrino” result

## **Funding and Educational Visits to Congress**

- April '10 – April '14 Organizer of yearly trip to DC on behalf of the US LHC Users Organization Executive Committee, jointly with Fermilab and SLAC Users Committees  
The team of 30 – 40 physicists meets with appropriators, staffers and members of congress to thank officials and ask for continuation of their support of fundamental physics each spring, visiting 300+ offices.
- April '08 & April '09 Participant of yearly trip to DC described above

## **TEACHING AND MENTORING**

### **Teaching: Yale University, New Haven, CT**

- Spring '14,'15: Introductory Physics for the Life Sciences (PHYS 171)  
Calculus-based Electricity and Magnetism primarily for students in the life sciences, taught in the TEAL (technology enabled active learning) classroom.
- July, 2012: Participant in Yale Summer Institute on Scientific Teaching  
Four-day workshop to “explore new models of instruction and develop teaching skills and materials to transform undergraduate classes”  
Facilitator in June, 2014
- Spring, 2012: The Physics of Music (PHYS 118 / MUSI 200)  
Developed and taught this new course for non-scientists introducing topics in physics and mathematics that are relevant for the development of musical instruments, musical scales, the study of acoustics and other topics. The course fulfills Yale's science credit and quantitative reasoning credit and counts toward a music major.
- Fall '11 & '13: The Physics of Dance (PHYS 115/THST 115)  
Co-developed and taught with professional dancer Emily Coates, a lecturer in the Theater Studies department. This course breaks new ground at Yale with an interdisciplinary dialogue between the sciences and the arts. Taken primarily by non-science majors, the course fulfills Yale's science credit and quantitative reasoning credit.
- Spring, 2011: Modern Physics (PHYS 110)  
A quantitative reasoning course for non-majors that explores topics in modern physics. Co-taught with Professor Tobias Golling.
- General Physics Measurement Laboratory Course (PHYS 166)  
A second semester introductory lab sequence course for non-majors
- Fall, 2009: Modern Physical Measurement Laboratory Course (PHYS 205/206)  
A two-term sequence of experiments in classical and modern physics for students who plan to major in Physics.



## **Teaching: Roberts Wesleyan College, Rochester, NY (2004 – 2006)**

Introductory Physics Sequence, Lectures + Labs, Algebra-Based (PHY 101, 102, 103)  
Physics of Music, Lecture + Lab, Course for non-majors (PHY 115)  
Introductory Physics Sequence, Lectures + Labs, Calculus-Based (PHY 201, 202, 203)  
Statics (PHY 210)  
Electric Circuits (PHY 211)  
Classical Mechanics (PHY 301)  
Quantum Physics (PHY 401)

## **Other Service and Outreach Activities**

- July, 2009 – present    Co-Director of the Yale Girls Science Investigations, a Saturday morning science program for 6-8th grade girls meeting four times per year
- Fall '11, '12 & '13    Yale Physics Olympics  
Developed and ran one of the five competitive events for area high school students (scorekeeper in 2010)
- July, 2005            Mathematics, Engineering, and Science for Hispanics (MESH)  
Lecturer in Physics at the 1-Week Summer Program  
Rochester, NY
- 2002 – 2005            Pre-College Experience in Physics (PREP):  
To Encourage the Participation of Women in Science  
Guest Lecturer + Lab: Introduction to Particle Physics  
University of Rochester, Rochester, NY
- 2002 – 2004            University of Rochester Undergraduate Women in Science Club  
Graduate Student Advisor  
Organized panel discussions, tutoring sessions and public outreach

## **Dissertation Committees**

Gennady Voronov: thesis defense 2014  
Lawrence Lee: thesis defense Jan 14, 2014  
Kinga Partyka: thesis defense Sept 16, 2013  
Alice Ohlson: thesis defense Sept 10, 2013  
Brian Walsh: thesis defense: Feb 28, 2013  
Sarah Lockwitz: thesis defense, December 5, 2011  
Colin Anderson: thesis defense, November 12, 2010

## **Graduate Student Mentoring (advisees)**

**Susie Bedikian:** Graduated 2013, Search for the charged Higgs in  $t\bar{t}b\bar{a}$  using tau Polarization, currently a Senior Associate with Princeton Consulting Company, Princeton, NJ.

**Jane Cummings:** expected graduation 2015, Measurement of tau polarization in  $Z \rightarrow \tau \tau$  (lepton + hadron)

**Emma Ideal:** expected graduation 2015, Search for VH,  $H \rightarrow \tau \tau$  in the hadron-hadron channel.

**Andrew Leister:** expected graduation 2015, Search for  $Z'$  decays to tau pairs in the lepton-hadron channel

**Daniele Norcini:** incoming graduate student, expected graduation ~2018, summer 2014 project working on upgrade calorimeter electronics for improved trigger performance (Phase1 ATLAS upgrade) coordinated with Brookhaven National Lab

### **Undergraduate Research Mentoring (ATLAS Experiment, unless noted)**

Eran Rea, '15: investigating trigger efficiencies for Run 1 and Run 2 (VH, H to taus) (2014)

Barbara Santiago, '17: investigating diboson backgrounds to Higgs production (VH) (2014)

Rebecca Marvin, '16: tau trigger improvements with upgraded electronics (2013)

Ryan Humble, '16: tau trigger improvements with upgraded electronics (2013)

Vijay Narayan, '15: investigating new variables for tau polarization measurements (2013, 2014)

Megan Phelan, '15: investigating new variables for tau polarization measurements (2013)

Jerry Wang, '13: tau polarization in  $W \rightarrow \tau \nu$  and  $Z \rightarrow \tau \tau$  (had-had channel) (2011 – 2013)

Katherine Lawrence, '14: tau data quality (2011) and pi zero reconstruction (2012)

Mary Hadley, winter '12: tau polarization in  $t\bar{t}$  (2011 - 2012)

Catherine Harmer, '15: tau data quality (2012)

Dennis Mou, '12: medical physics senior research topic – HEP calorimeters for PET scans (2012-13)

Brigid Blakeslee, '13: tau data quality (2010) and electron- $\rightarrow$  tau veto (2011)

Akshay Gupta, '13: tau data quality (2010)