

Cari Cesarotti, Ph.D.
CTP Postdoctoral Research Associate

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RESEARCH FOCUS

As a high-energy particle theorist, my research includes:

- Developing model-agnostic phenomenological approaches to search for new physics
- Informing robust new-physics analyses with experimental data
- Contributing to the scientific collaboration of a future multi-TeV muon collider

ACADEMIC POSITIONS

2022- **CTP Postdoctoral Research Associate**, Center for Theoretical Physics, MIT, Cambridge, MA.

EDUCATION

2017-22 **Ph.D. in Physics**, Harvard University.
Ph.D. Advisor: Matthew Reece, Professor.

2013-17 **B.A. in Physics**, Summa Cum Laude, Cornell University.
Undergraduate Advisor: James Alexander, Professor.

FELLOWSHIPS & AWARDS

- J.J. and Noriko Sakurai Dissertation Award in Theoretical Physics, APS, 2023.
- Young Scientist Award, 14th International Conference on the Identification of DM, 2022.
- David J. Robbins Prize for Excellence in Teaching, Harvard Physics, 2022.
- NSF Graduate Research Fellow, 2019-22.
- PRISMA Cluster of Excellence Scholarship, Mainz University, 2017.
- Theodore H. Ashford Fellowship for the Sciences, Harvard GSAS, 2017-22.
- Peirce Fellowship, Harvard Physics, 2017-19.
- Kiev Prize in Physics for Outstanding Senior, Cornell Physics, 2017.
- Hunter R. Rawlings III Cornell Presidential Research Scholars, 2015-16.

PROFESSIONAL SERVICE

- Contributor to Muon Collider white papers and collaboration, US and Europe-based.
- Contributor to *BSM physics at the LHC* white papers.
- Contributor to several LOIs, white papers, and speaker at Snowmass 2021.
- Participant in 2023 P5 Town halls.

MENTORSHIP & TEACHING

MIT Research Science Institute (RSI) Summer Program Advisor

Co-advised rising college student Damian Musk during a month-long research program with Prof. Mike Williams on study of sensitivity to invisible Higgs decays at muon colliders.

Graduate Student Mentorship

- Co-advisor of graduate students Rikab Gambhir, Samuel Alipour-Fard, and Sean Benevedes at MIT
- Organizer of the pheno group meeting and journal club at MIT (2022-23)

Teaching Assistant

Responsibilities included writing homework solutions, grading, and holding office hours.

- *Graduate Standard Model*. Spring 2019 (taught by Matthew Reece), Harvard University.
- *Physics Foundations*. Summer 2021 and Winter 2022, Harvard University. Course responsibilities shared.

Harvard Summer School Instructor

Responsibilities included writing and delivering 30 hours of lectures per class, developing and grading homework, writing student assessments.

- *Fundamentals of Particle Physics*. Summer 2018-21, Harvard University.
- *F=ma: Fundamentals of Physics*. Summer 2019 and 2021, Harvard University.

Lumiere Education Mentor

Responsibilities include mentoring high school students on a short term research-like project. Students complete a literature review on some area of physics, topics like baryon asymmetry, the Higgs mechanism, dark matter, cosmology, and quantum mechanics.

OUTREACH

- ***Waves in an Impossible Sea***: Illustrator of science novel by Matthew Strassler
- **Muon Collider Twitter (@MuonCollider)**: Manager & owner, science communication regarding a future muon collider through twitter, 2022-
- **IAIFI Twitter (@IAIFI_news)**: Manager, science communication and information platform for IAIFI related events, 2023-, MIT
- **MIT Link K-12**: Volunteer with program at MIT where researchers visit local K-12 schools to discuss research and science, 2023-, MIT
- **Harvard College Women in STEM Mentorship Program**: Mentored undergraduate women in physics, 2017-2020, Harvard University.
- **Women in Physics at Harvard Co-President**: Organized events for the WiP and physics department in general, 2018-2019, Harvard University.
- **Equity and Inclusion Committee**: Served as co-chair with Prof. Jenny Hoffman on Retention & Recruitment, 2017-2019, Harvard University.
- **Science in the News**: Wrote monthly articles and delivered public colloquia about science topics, 2017-19, Harvard University.
- **March for Science Geneva**: Organizer for the March for Science, April 2017, Geneva, Switzerland.
- **Expand Your Horizons**: Performed physics demonstrations for young women interested in STEM, 2014-16, Cornell University, Ithaca, NY.

- **GIAC After School Program:** Created physics lectures and hands-on activities for weekly 2 hour afterschool program of underrepresented minority students, Fall 2015, Ithaca, NY.

PUBLICATIONS

Total number of publications: 26
 Total number of published works: 11
 Total number of citations: 938
 Citations excluding white papers: 305
 h-index: 11

Publications

1. ATLAS Collaboration (including **C. Cesarotti** as short-term associate)
[Measurements of multijet event isotropies using optimal transport with the ATLAS detector](#)
 ArXiv:2305.16930.
2. P. Asadi, **C. Cesarotti**, K. Fraser, S. Homiller, A. Parikh
[Oblique Lessons from the W Mass Measurement at CDF II](#)
 Submitted to PRD. ArXiv: 2204.05283.
3. **C. Cesarotti**, S. Homiller, R. Mishra, M. Reece
[Probing New Gauge Forces with a High-Energy Muon Beam Dump](#)
 PRL 130.071803. ArXiv: 2202.12302
4. P. Asadi, R. Capdevilla, **C. Cesarotti**, S. Homiller
[Searching for Leptoquarks at Future Muon Colliders](#)
 JHEP 10 (2021) 182. ArXiv: 2104.05720.
5. **C. Cesarotti**, M. Reece, M. Strassler
[The Efficacy of Event Isotropy as an Event Shape Observable.](#)
 JHEP 07 (2021) 215. ArXiv: 2011.06599.
6. **C. Cesarotti**, M. Reece, M. Strassler
[Spheres to Jets: Tuning Event Shapes with 5d Simplified Models.](#)
 JHEP 05 (2021) 096. ArXiv: 2009.08981
7. **C. Cesarotti**, J. Thaler
[A Robust Measure of Event Isotropy at Colliders.](#)
 JHEP 08 (2020) 084. ArXiv:2004.06125
8. **C. Cesarotti**, Y. Soreq, M. Strassler, J. Thaler, W. Xue
[Searching in CMS Open Data for Dimuon Resonance with Substantial Transverse Momentum.](#)
 Phys Rev D 100 (2019) 1, 015021. ArXiv:1902.04222

9. **C. Cesarotti, Q. Lu, Y. Nakai, A. Parikh, M. Reece**
[*Interpreting the Electron EDM Constraint.*](#)
JHEP 05 (2019) 059. ArXiv:1810.07736

TALKS AND CONFERENCES

Invited Talks

- [46] ***The Status of Future Colliders***
Higgs 2023 11/30/2023
- [44-45] ***The Case for a Future Muon Collider***
KEK-PH2023 Workshop 11/7/2023 – CERN Special Seminar 6/30/2023
- [43] ***KITP Muon Collider Rapid Response Summary***
IMCC Meeting 6/22/2023
- [37 -42] ***Physics Potential at Future Muon Colliders & Demonstrator Facilities***
IMCC Meeting 6/20/2023 – IAS Amplitudes Seminar 3/28/2023 – Simons Center
Workshop 3/22/2023 – KITP Rapid Response 3/1/23 – IMCC Meeting 10/12/22 –
Snowmass Summer Study 7/21/22
- [26-36] ***Probing New Gauge Forces at Muon Collider Beam Dumps***
Yale Seminar 11/8/22 – YITP Seminar 10/20/22 – UC Irvine Seminar 4/20/22 –
UMD 3/7/22 – McGill Seminar 2/14/22 – University of Washington 12/7/21 –
BSM PANDEMIC 12/7/21 – Caltech Seminar 11/15/21 – UC Berkeley 11/10/21 –
MIT Seminar 10/1/21 – Perimeter Institute 7/6/21
- [24-25] ***Oblique Lessons from the W Mass Measurement at CDFII***
NYU CCPP Seminar 9/28/22 – Harvard CMSA Seminar 5/12/22
- [18-23] ***Searching for New Physics at Colliders with Event Shape Observables***
FCC Physics Workshop 2/9/22 – Harvard LPPC Seminar 12/14/21 –
University of Tennessee 9/22/21 – FCC Physics Workshop 11/10/20 –
MIT Seminar 11/6/20 – FCCee Webinar 7/27/20
- [16-17] ***Leptoquarks at Future Muon Colliders***
Snowmass Workshop (EF08-EF09) 9/1/21 – MIT Seminar 4/2/21
- [15] **Panelist: *Future Directions***
BOOST 2021 Workshop 8/5/21
- [14] ***Global Searches for New Physics Based on Novel Event Characteristics***
9th Large Hadron Collider Physics Conference, BSM Parallel Session 6/7/21

- [13] **Discussion leader: *Dark Showers***
 Searches for long-lived particles at the LHC: 9th LLP workshop 5/27/21
- [12] ***Interpreting the Electron EDM Constraint***
 Huth ATLAS Group Meeting 2/18/21
- [11] ***The Efficacy of Event Isotropy at Colliders***
 MIT Seminar 5/1/20
- [8-10] ***A New Measure of Event Isotropy at Colliders***
 LLP at LHC Workshop 11/17/20 – LLP at LHC Workshop 5/26/20 –
 MIT Seminar 12/6/19
- [7] **24/7 Lecturer: *The LHC***
 The 29th First Annual Ig Nobel Prize Ceremony (Outreach) 9/13/19
- [6] ***Symmetry in Art and Nature***
 Science in the News: DayCon 2019, The Art of Science (Outreach) 6/15/19
- [3-5] ***Searching in CMS Open Data for Dimuon Resonances with Transverse Momentum***
 Cornell University Seminar 5/3/19 – MIT Seminar 12/7/18 –
 Snowmass Computational Frontier Workshop 8/11/20
- [2] ***Dark QCD: Jets vs. SUEPs***
 Searches for long-lived particles at the LHC: 2nd LLP workshop 8/20/17
- [1] ***The MMAPS proposal at Cornell***
 Light Dark Matter 2017 5/27/17

Submitted Talks

- [14] ***A Field Guide for Event Isotropy***
 BOOST 2023 Workshop 8/02/2023
- [13] ***Physics on the Way to 10 TeV***
 P5 BNL Town Hall 4/13/2023
- [12] ***Oblique Lessons from the W Mass Measurement at CDFII***
 14th International Conference on the Identification of Dark Matter 7/21/22
- [10-11] ***Searching for New Physics at Muon Colliders***
 Harvard Particle Physics Lunch Seminar (Internal) 10/20/21 –
 Phenomenology 2021 Symposium 5/26/21

- [9] *Searching for Vector Leptoquarks*
Harvard Lunch Seminar (Internal) 7/31/21
- [7-8] *A Robust Measure of Event Isotropy at Colliders*
BOOST Workshop Virtual Poster 7/24/20 – Phenomenology 2020 Symposium 5/4/20
- [5-6] *The Efficacy of Event Isotropy at Colliders*
Harvard Particle Physics Lunch Seminar (Internal) 7/14/20 –
Harvard Lunch Seminar (Internal) 4/15/20
- [4] *A New Measure of Event Isotropy at Colliders*
Harvard Lunch Seminar (Internal) 11/13/19
- [2-3] *Searching in CMS Open Data for Dimuon Resonances with Transverse Momentum*
Phenomenology 2019 Symposium 5/7/29 – GGI Winter School Seminar 1/23/19 –
Harvard Lunch Seminar (Internal) 10/10/18
- [1] *SUEPs to Jets: A Toy Model for New Physics at the LHC*
Harvard Particle Physics Lunch Seminar (Internal) 3/21/18

PREVIOUS RESEARCH EXPERIENCE

- 2017-22 Graduate Student Research Associate and NSF Graduate Fellow**, Physics Department, Harvard University, Cambridge, MA.
Faculty Advisor: Matthew Reece, Professor.
- 2016-17 Research Assistant**, NA62 Experiment, CERN, Geneva, Switzerland.
Faculty Advisor: Babette Döbrich, Tommaso Spadaro, Senior Researchers.
- 2014-16 Undergrad Research Assistant**, Physics Department and PADME Experiment, Cornell University, Ithaca, NY.
Faculty Advisors: James Alexander and Maxim Perelstein, Professors.

SELECTED MEDIA COVERAGE

1. *Why this Universe?* Podcast with Dan Hooper. [Episode 65 – Should we build a muon collider?](#)
2. Harvard University Graduate School of Arts & Sciences [Like A Rocket](#). Graduate Student Profile. March 2021
3. Symmetry Magazine [With open data, scientists share their work](#). Article. August 2019
4. Swiss Info [March for Science Geneva](#). Interview. April 2017