Radha Mastandrea

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Education

PhD in Physics — *Berkeley, CA*
University of California, Berkeley — Aug. 2021 - Present
Designated Emphasis in Computational and Data Science and Engineering
Thesis Advisor: Ben Nachman

MPhil in Physics — *Cambridge, UK*
University of Cambridge — Oct. 2020 - Sep. 2021
Thesis: Investigating non-standard sources of parity violation at the LHC
Thesis Advisor: Christopher Lester

MASt in Physics — *Cambridge, UK*
University of Cambridge — Oct. 2019 - Jun. 2020
Thesis: Search for new physics in $B^0_{(s)} \to \mu^+\mu^-\mu^+\mu^-$ decays
Thesis Advisor: Valerie Gibson

B.S. in Physics — *Cambridge, MA*
MIT — Aug. 2015 - Jun. 2019
Thesis: Analyzing CMS Open Collider Data through Topic Modeling
Thesis Advisor: Jesse Thaler

Publications and Preprints

[11] **Radha Mastandrea**, Benjamin Nachman, and Tilman Plehn. *Constraining the Higgs Potential with Neural Simulation-based Inference for Di-Higgs Production*. 2024. arXiv: 2405.15847 [hep-ph]. URL: https://arxiv.org/abs/2405.15847

[10] Kehang Bai, **Radha Mastandrea**, and Benjamin Nachman. "Non-resonant anomaly detection with background extrapolation". In: *Journal of High Energy Physics* 2024.4 (Apr. 2024). ISSN: 1029-8479. DOI: 10.1007/jhep04(2024)059. URL: http://dx.doi.org/10.1007/JHEP04(2024)059

[9] Tobias Golling, Samuel Klein, **Radha Mastandrea**, Benjamin Nachman, and John Andrew Raine. "Morphing one dataset into another with maximum likelihood estimation". In: *Phys. Rev. D* 108 (9 Nov. 2023), p. 096018. DOI: 10.1103/PhysRevD.108.096018. URL: https://link.aps.org/doi/10.1103/PhysRevD.108.096018

[8] Tobias Golling, Gregor Kasieczka, Claudius Krause, **Radha Mastandrea**, Benjamin Nachman, John Andrew Raine, Debajyoti Sengupta, David Shih, and Manuel Sommerhalder. "The interplay of machine learning-based resonant anomaly detection methods". In: *The European Physical Journal C* 84.3 (Mar. 2024). ISSN: 1434-6052. DOI: 10.1140/epjc/s10052-024-12607-x. URL: http://dx.doi.org/10.1140/epjc/s10052-024-12607-x

[7] Tobias Golling, Samuel Klein, **Radha Mastandrea**, and Benjamin Nachman. "Flow-enhanced transportation for anomaly detection". In: *Phys. Rev. D* 107.9 (2023), p. 096025. DOI: 10.1103/PhysRevD.107.096025. arXiv: 2212.11285 [hep-ph]

[6] **Radha Mastandrea** and Benjamin Nachman. "Efficiently Moving Instead of Reweighting Collider Events with Machine Learning". In: *36th Conference on Neural Information Processing Systems: Workshop on Machine Learning and the Physical Sciences*. Dec. 2022. arXiv: 2212.06155 [hep-ph]

[5] Gregor Kasieczka, **Radha Mastandrea**, Vinicius Mikuni, Benjamin Nachman, Mariel Pettee, and David Shih.

"Anomaly detection under coordinate transformations". In: *Phys. Rev. D* 107.1 (2023), p. 015009. DOI: 10.1103/PhysRevD.107.015009. arXiv: 2209.06225 [hep-ph]

[4] Barry M. Dillon, **Radha Mastandrea**, and Benjamin Nachman. "Self-supervised anomaly detection for new physics". In: *Phys. Rev. D* 106.5 (2022), p. 056005. DOI: 10.1103/PhysRevD.106.056005. arXiv: 2205.10380 [hep-ph]

[3] Christopher G. Lester, **Radha Mastandrea**, Daniel Noel, and Rupert Tombs. "Hunting for vampires and other unlikely forms of parity violation at the Large Hadron Collider". In: *JHEP* 08 (2022), p. 231. DOI: 10.1007/JHEP08(2022)231. arXiv: 2205.09876 [hep-ph]

[2] Brian T Cook, Deborah F Woods, Jessica D Ruprecht, Jacob Varey, **Radha Mastandrea**, Kaylee de Soto, Jacob F Harburg, Umaa Rebbapragada, and Ashish A Mahabal. "Tracing Milky Way substructure with an RR Lyrae hierarchical clustering forest". In: *Monthly Notices of the Royal Astronomical Society* (Apr. 2022). stac1007. ISSN: 0035-8711. DOI: 10.1093/mnras/stac1007. eprint: https://academic.oup.com/mnras/advance-article-pdf/doi/10.1093/mnras/stac1007/43400845/stac1007.pdf. URL: https://doi.org/10.1093/mnras/stac1007

[1] Patrick T. Komiske, **Radha Mastandrea**, Eric M. Metodiev, Preksha Naik, and Jesse Thaler. "Exploring the Space of Jets with CMS Open Data". In: *Phys. Rev. D* 101.3 (2020), p. 034009. DOI: 10.1103/PhysRevD.101.034009. arXiv: 1908.08542 [hep-ph]

Conference Talks

Constraining the Higgs Potential Shape with Machine Learning
DPF-PHENO, *University of Pittsburgh* — May 2024

A Survey of Machine Learning Methods for Anomaly Detection
Workshop on Machine Learning and High-Energy Physics, *Campus Akademie, Vienna* — Dec. 2023

The Interplay of Machine Learning–based Resonant Anomaly Detection Methods
Hammers & Nails, *Ascona, Switzerland* — Oct. 2023
ML4Jets, *DESY* — Nov. 2023

FETA: Flow-Enhanced Transportation for Anomaly Detection
APS April Meeting, *New York* — Apr. 2023

HEPSim2Real: Creating background templates with normalizing flows
ML4Jets, *Rutgers University* — Nov. 2022

Using symmetries to build better latent spaces for dijet representation learning
APS April Meeting, *New York* — Apr. 2022

Exploring the Parity of the Quark-Sector SME with Madgraph
Fourth Summer School on the Lorentz- and CPT-violating Standard-Model Extension, *ICUSS* — May 2021

Analyzing CMS Open Collider Data through Topic Modeling
BOOST Physics Workshop, *MIT* — Jul. 2019

Jet Analysis with the CMS Open Data
Greater Boston Undergraduate Research Conference, *MIT* — Nov 2019

Testing Parameterized Theories of General Relativity using Gravitational Waves
APS New England Section Meeting, *URI* — Dec. 2017

Seminars

The Interplay of Machine Learning-based Anomaly Detection Methods

IAIFI Journal Club	April 2024
RWTH HEP-ML Club	January 2024
SLAC AI Seminar	December 2023

FETA: Flow-Enhanced Transportation for Anomaly Detection

Fermilab AI Meetings	July 2023
University College London HEP Seminars	December 2022
Imperial College London HEP Seminars	December 2022
UC Berkeley 4D Seminars	October 2022

Honors and Awards

Apr. 2024	Berkeley Grad Slam Semi-Finalist
Aug. 2023 - May 2025	Templeton TEX Fellowship
Apr. 2023	Citadel PhD Summit Attendee
Mar. 2023	APS GDS Impact Award
Mar. 2022 - Mar. 2023	APS DSECOP Fellow
Sep. 2021 - Aug. 2024	NSF Graduate Research Fellowship
Oct. 2019 - Jul. 2021	Marshall Scholarship
Jun. 2019	Joel Matthew Orloff Award for Outstanding Service
Jun. 2019	Phi Beta Kappa
Jun. 2019	Sigma Pi Sigma
Oct. 2019	FUTURE of Physics @ Caltech participant
May. 2018 - Sep. 2018	Heising-Simons @ MIT Physics Research Fellow

Summer Schools

Jun. 2024	TASI, *UC Boulder*
Aug. 2023	SLAC Summer Institute, *SLAC*
Jul. 2023	CMS Open Data Workshop, *Fermilab*

Technical Skills

Programming	Python, C++, Mathematica, Matlab
HEP Softwares	ROOT, MadGraph, Pythia, Delphes