Garrett Merz
garrettwmerz@gmail.com
(614)460-9386
Github Page: https://github.com/GarrettMerz
Website: https://garrettmerz.github.io/

EDUCATION:

University of Michigan, Ann Arbor MI
ATLAS High Energy Experimental Physics Group; Advisor Thomas Schwarz
2021 Ph.D. Physics
2017 M.Sc. Physics

The Ohio State University, Columbus, OH
Deep Learning for High-Energy Experimental Physics; Advisor Richard Hughes
2016 B.S. Physics
2016 B.S. Mathematics

PROFESSIONAL EXPERIENCE:

University of Wisconsin-Madison Data Science Institute, Madison,WI
AI for Analytic Amplitudes; Supervisor Kyle Cranmer
2023 Postdoctoral Researcher

Intelinair, Inc., Indianapolis, IN
2021 -2023 Machine Learning Scientist

AWARDS AND HONORS:

2018 National Science Foundation Graduate Research Fellowship
2017 Norman Barnett Award
2015 Staninovski Mathematics Scholarship
2013 Hellen Cowan Book Award
2012 Valentino Physics Scholarship
2012 Honors Medalist Scholarship

SERVICE AND LEADERSHIP:

2025 American Physical Society Group on Data Science: Industry Advisory Board Member
2023 American Physical Society Group on Data Science: Executive Committee, Early-Career Member at Large
Ongoing Reviews for: Journal of High-Energy Physics, Machine Learning: Science and Technology, Journal of Open Source Software, NeurIPS Machine Learning for the Physical Sciences Workshop, CVPR Agriculture-Vision Workshop (2022, 2023)

TEACHING AND SCIENCE COMMUNICATION:

2018-2021: University of Michigan: Center for Academic Innovation VR/XR Program
2018: University of Michigan Museum of Natural History Science Communication Fellowship
2016-2017: Graduate Student Intructor , University of Michigan Dept. of Physics.
-Physics 131 (Introductory Lab Course)

SELECTED PUBLICATIONS AND CONFERENCE PROCEEDINGS:

1. Cai et al 2024. *Mach. Learn.: Sci. Technol.* https://doi.org/10.1088/2632. Transforming the Bootstrap: Using Transformers to Compute Scattering Amplitudes in Planar N=4 Super Yang-Mills Theory.
2. Merz, Garrett W., et al. Transformers for Scattering Amplitudes. NeurIPS 2023 Workshop on Machine Learning in the Physical Sciences. New Orleans, LA. 15 December 2023. https://ml4physicalsciences.github.io/2023/files/NeurIPS_ML4PS_2023_72.pdf
3. Cao et al. Learning Conformal Field Theory With Symbolic Regression: Recovering the Energy Spectrum. NeurIPS 2024 Workshop on Machine Learning in the Physical Sciences. Vancouver, Canada, 14 December 2024.
4. ATLAS Collaboration. CP Properties of Higgs Boson Interactions with Top Quarks in the $t\bar{t}H$ and tH Processes Using $H \rightarrow \gamma\gamma$ with the ATLAS Detector. Phys. Rev. Lett. 125. 9 April 2020. 10.1103/PhysRevLett.125.061802
5. ATLAS Collaboration. Measurement of the properties of Higgs boson production at $s\sqrt{}=13$ TeV in the $H \rightarrow \gamma\gamma$ channel using 139 fb^{-1} of pp collision data with the ATLAS experiment. Journal of High Energy Physics 07. JHEP 07 (2023) 088
6. ATLAS Collaboration. Searches for third-generation scalar leptoquarks in $\sqrt{s}$ = 13 TeV pp collisions with the ATLAS detector. Journal of High Energy Physics 06. 28 June 2019. 10.1007/JHEP06(2019)
7. ATLAS Collaboration. Observation of Higgs boson production in association with a top quark pair at the LHC with the ATLAS detector. Phys. Lett. B 784 (2018) 173.
8. Merz, Garrett W. Precision Measurements of Higgs Boson Couplings in the Diphoton Decay Channel with Run-2 of the ATLAS Detector. 2020. University of Michigan, Ph.D. Thesis.
9. ATLAS Collaboration. Measurement of the properties of Higgs boson production at $s\sqrt{}=13$ TeV in the $H \rightarrow \gamma\gamma$ channel using 139 fb^{-1} of pp collision data with the ATLAS experiment. ATLAS Conference Note (40th International Conference on High Energy Physics, Prague, Czech Republic). 3 Aug 2020.
10. ATLAS Collaboration. Measurements of Higgs boson properties in the diphoton decay channel with 36 fb^{-1} of pp collision data at $\sqrt{s}$=13 TeV with the ATLAS detector. Phys. Rev. D 98 (2018) 052005.
11. ATLAS Collaboration. Search for pair production of heavy vectorlike quarks decaying into hadronic final states in pp collisions at $\sqrt{s}$= 13 TeV with the ATLAS detector. Phys. Rev. D 98 (2018) 092005.
12. ATLAS Collaboration. Combination of the searches for pair-produced vector-like partners of the third-generation quarks at $\sqrt{s}$ = 13 TeV with the ATLAS detector. Phys. Rev. Lett. 121, 211801 (2018).

13. Merz, Garrett W. Novel Applications of Image-Processing Techniques to Particle Physics. 2016. The Ohio State University. Undergraduate Thesis. https://kb.osu.edu/handle/1811/76804.

14. Kevin Jablonka et al. 14 Examples of How LLMs Can Transform Materials Science and Chemistry: A Reflection on a Large Language Model Hackathon. *Digital Discovery*, **2023.** 8 August 2023

PRESENTATIONS, WORKSHOPS, AND CONTRIBUTED TALKS:

1. Transformers for Scattering Amplitudes. IAIFI Summer Workshop 2024. Poster.

2. Transformers for Scattering Amplitudes. SLAC AI Seminar. 1 February 2024 (Virtual)

3. Transforming the Bootstrap: Transformers for Scattering Amplitudes. ORIGINS Data Science Lab Seminar. 19 April 2024. Munich, Germany (Virtual).

4. Rieck, Patrick; Dreyer, Etienne; Kakati, Nilotpal; Kobylianskii, Dmitrii; **Merz, Garrett**; Soybelman, Nathalie; Cranmer, Kyle; Gross, Eilam. Generic Representations of Jets at Detector-Level with Self-Supervised Learning. European AI for Fundamental Physics Conference 2024. Amsterdam, NL. 30 April to 3 May 2024.

5. Rieck, Patrick; Dreyer, Etienne; Kakati, Nilotpal; Kobylianskii, Dmitrii; **Merz, Garrett;** Soybelman, Nathalie; Cranmer, Kyle; Gross, Eilam. Generic Representations of Jets at Detector-Level with Self-Supervised Learning. 22nd International Workshop on Advanced Computing and Analysis Techniques in Physics Research. 11 March-15 March 2024.

6. Transformers for Scattering Amplitudes. SLAC AI Seminar. 1 February 2024

7. Transformers for Scattering Amplitudes. Hammers and Nails, Ascona, Switzerland. https://indico.cern.ch/event/1202995/. 1 November 2023.

8. Transformers for Scattering Amplitudes. University of Wisconsin-Madison Postdoctoral Research Symposium. 20 September 2023.

9. Full Run-2 $H \rightarrow \gamma\gamma$ Couplings Measurement. 2020 Higgs Workshop Plenary Meeting. 19 November 2020. CERN (Virtual).

10. Measuring the CP Properties of a Neutral Higgs with $ttH \rightarrow \gamma\gamma$ in $\gamma\gamma$ in pp Collisions at $\sqrt{s}$= 13 TeV with the ATLAS Detector. ATLAS HTOP 2020 Workshop. 25 March 2020. CERN (Virtual).

11. Measuring the CP Properties of a Neutral Higgs with $ttH \rightarrow \gamma\gamma$ in $\gamma\gamma$ in pp Collisions at $\sqrt{s}$= 13 TeV with the ATLAS Detector. 2019 USATLAS Collaboration Meeting. Aug 6, 2019- Aug 11, 2019. Amherst, MA.

12. Saturday Morning Physics: Update on Physics from the LHC. University of Michigan Department of Physics, 30 March 2019.