Gage DeZoort

Postdoctoral Research Associate and Lecturer

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Education

Princeton University *Princeton, NJ*

PhD in Physics *2023*

- Center for Statistics and Machine Learning Certificate
- Advisor: Daniel Marlow

University of Virginia *Charlottesville, VA*

BS in Physics and Engineering Science *2018*

- With Highest Distinction

Publications and Proceedings

Published

Note that large author lists are standard in the field of high energy particle physics. I am cited as an author on all of the below papers and conference proceedings.

The CMS Collaboration (2025). Search for a heavy pseudoscalar Higgs boson decaying to a 125 GeV Higgs boson and a Z boson in final states with two tau and two light leptons in proton-proton collisions at $\sqrt{s}$ = 13 TeV. Journal of High Energy Physics. https://doi.org/10.1007/JHEP10%282025%29074

G. DeZoort and Boris Hanin (2024). Principles for Initialization and Architecture Selection in Graph Neural Networks with ReLU Activations. SIAM Journal of Mathematics of Data Science. `https://doi.org/10.1137/23M1600621`.

K. Lieret, **G. DeZoort**, et al. (2023). High Pileup Particle Tracking with Object Condensation. Proceedings for the 8th International Connecting the Dots Workshop. `https://arxiv.org/abs/2312.03823`.

K. Lieret and **G. DeZoort** (2023). An Object Condensation Pipeline for Charged Particle Tracking at the High Luminosity LHC. Proceedings for the 26th International Conference on Computing in High Energy and Nuclear Physics (CHEP23). `https://arxiv.org/abs/2309.16754`.

G. DeZoort et al. (2023). Graph Neural Networks at the Large Hadron Collider. Nat Rev Phys 5, 281–303 (2023). `https://doi.org/10.1038/s42254-023-00569-0`.

S. Thais et al. (2022). Graph Neural Networks in Particle Physics: Implementations, Innovations, and Challenges. Contribution to the 2022 Snowmass Summer Study. arXiv:2203.12852.

C. Wang, X. Ju, et. al. (2022). Reconstruction of Large Radius Tracks with the Exa.TrkX Pipeline. Proceedings of 20th International Workshop on Advanced Computing and Analysis Techniques in Physics Research. arXiv:2203.08800.

A. Lazar, X. Ju, D. Murnane et al. (2022). Accelerating the Inference of the Exa.TrkX Pipeline. Proceedings of 20th International Workshop on Advanced Computing and Analysis Techniques in Physics Research. arXiv:2202.06929.

A. Elabd, V. Razavimaleki et al. (2022). Graph Neural Networks for Charged Particle Tracking on FPGAs. Frontiers in Big Data Science, Sec. Big Data and AI in High Energy Physics. doi:10.3389/fdata.2022.828666.

X. Ju, D. Murnane, et al. (2021). Performance of a geometric deep learning pipeline for HL-LHC particle tracking. European Physics Journal C 81(876). doi:1140/epjc/s10052-021-09675-8.

G. DeZoort et al. (2021). Charged Particle Tracking via Edge-Classifying Interaction Networks. Computing and Software for Big Science 5(26). doi:10.1007/s41781-021-00073-z.

A. Heintz, V. Razavimaleki et al. (2020). Accelerated Charged Particle Tracking with Graph Neural Networks on FPGAs. Third Workshop on Machine Learning and the Physical Sciences (NeurIPS 2020). arXiv:2012.01563.

A.M. Sirunyan et al. [CMS Collaboration]. 2018. Search for black holes and sphalerons in high-multiplicity final states in proton-proton collisions at $\sqrt{s}$ = 13 TeV. Journal of High Energy Physics. doi:10.1007/JHEP11(2018)042.

In Review / Preparation

G. DeZoort and Boris Hanin (2025). Principles for Learning Rate Transfer in Graph Transformers. In preparation for submission.

K. Lieret and **G. DeZoort** (2024). High Pileup Particle Tracking with Learned Clustering. Submitted as proceedings for the Advanced Computing and Analysis Techniques in Physics Research (ACAT) 2024 conference.

Awards, Fellowships, & Grants

2025	**School of Physical Sciences Visiting Fellowship**	*UC Irvine*
2025	**Breakthrough Prize in Fundamental Physics**	*Awarded to the CMS Collaboration*
2022	**Kusaka Memorial Prize in Physics**	*Princeton Physics*
	Departmental Equity, Diversity, and Inclusion Award	*Princeton Physics*
2021	**Departmental Equity, Diversity, and Inclusion Award,**	*Princeton Physics*
2020	**Departmental Teaching Award**	*Princeton Physics*
2017	**Mitchell Research Scholarship**	*University of Virginia*
2016	**Mitchell Research Scholarship**	*University of Virginia*
2014	**Rodman Scholarship**	*University of Virginia*
	Jefferson Scholarship	*University of Virginia*

Presentations

G. DeZoort and Boris Hanin (2025). *Hyperparameter Transfer for Graph Transformers*. Talk: 23rd International Workshop on Advanced Computing and Analysis Techniques in Physics Research. Hamburg, Germany.

G. DeZoort et al. (2024). *Search for a heavy pseudoscalar Higgs boson decaying to Zh with $ll\tau\tau$ final states*. Approval talk for the HIG-22-004 analysis.

G. DeZoort and Boris Hanin (2024). *Principled Graph Neural Networks*. Poster: USCMS Annual Meeting, Princeton, NJ.

G. DeZoort et al. (2022). *Particle Tracking with Graph Neural Networks*. Talk: Learning to Discover Workshop, Orsay, France.

G. DeZoort et al. (2022). *Track Condensation Networks*. Talk: Connecting the Dots Workshop, Princeton, NJ.

G. DeZoort et al. (2022). *The Princeton Physics Ambassadors Program.* Talk: 2022 April American Physical Society Meeting, New York City, NY.

G. DeZoort (2022). *Graph Neural Networks at the Large Hadron Collider*. Talk: Deep Learning Theory Seminar, Princeton, NJ.

G. DeZoort et al. (2021). *Charged Particle Tracking via Edge-Classifying Interaction Networks*. Poster: Princeton Physics Dicke Fellows Symposium, Princeton, NJ.

G. DeZoort et al. (2021). *Charged Particle Tracking via Edge-Classifying Interaction Networks*. Talk: Oxford School of ML, held remotely.

G. DeZoort et al. (2021). *Charged Particle Tracking via Edge-Classifying Interaction Networks*. Poster: London School of Geometry and ML, held remotely.

G. DeZoort et al. (2021). *Charged Particle Tracking via Edge-Classifying Interaction Networks*. Plenary Talk: Virtual Conference on Computing in High Energy and Nuclear Physics, held remotely.

Savannah Thais and **G. DeZoort** (2020). *Instance Segmentation GNNs for One-Shot Conformal Tracking*. Poster: NeurIPS Machine Learning and the Physical Sciences workshop, held remotely.

G. DeZoort et al. (2020). *Particle Tracking with Graph Neural Networks Accelerated on FPGAs*. Contributed Talk: Accelerated Artificial Intelligence for Big-Data Experiments conference, held remotely.

G. DeZoort and Dan Marlow (2019). *Desktop Cosmic Particle Detector*. Poster: Princeton Research Day, Princeton, NJ.

G. DeZoort et al. (2017). *The CMS Electron and Photon Trigger for the LHC Run 2*. Poster: American Physical Society April Meeting, Washington, DC.

G. DeZoort et al. (2016). *Anomalous Signal Reduction in the CMS Detector's ECAL Trigger*. Poster presentation: Society of Physics Students Quadrennial Physics Congress, San Francisco, CA. Outstanding Poster Presentation award in general physics category.

G. DeZoort et al. (2016). *Anomalous Signal Reduction in the CMS Detector's ECAL Trigger*. Contributed Talk: Southeastern Section of the APS Annual Conference, Charlottesville, VA.

Teaching

Fall 2024	**PHY 101: Introductory Physics I** Instructor	*Princeton, NJ*
Fall 2023	**PHY 103: General Physics I** Instructor	*Princeton, NJ*
Fall 2022	**PHY 103: General Physics I** Instructor	*Princeton, NJ*
Spring 2020	**PHY 529: High Energy Physics** Teaching Assistant	*Princeton, NJ*
Fall 2019	**PHY 115: Physics for Future Leaders** Teaching Assistant	*Princeton, NJ*
Spring 2018	**PHY 2660: Introduction to Scientific Computing** Teaching Assistant	*Charlottesville, VA*
Fall 2017	**PHY 1010: The Physical Universe** Teaching Assistant	*Charlottesville, VA*
Fall 2017	**PHY 1910: Intro to Physics Research** Course Organizer	*Charlottesville, VA*
Spring 2017	**PHY 2660: Intro to Scientific Computing** Teaching Assistant	*Charlottesville, VA*

Tutorials and Workshops

Oct. 2025	**Crash Course in Practical ML** Instructor `https://github.com/GageDeZoort/intro_ml_uci/`	*Irvine, CA*
January 2025	**Introduction to Machine Learning** Instructor `https://github.com/PrincetonUniversity/intro_machine_learning`	*Princeton, NJ*
March 2024	**The Neural Network Zoo** Instructor `https://github.com/GageDeZoort/neural-network-zoo`	*Princeton, NJ*
January 2024	**Introduction to Machine Learning** Instructor `https://github.com/PrincetonUniversity/intro_machine_learning`	*Princeton, NJ*
Spring 2023	**Graph Neural Networks for Your Research** Workshop Instructor `https://github.com/GageDeZoort/prc_gnn_tutorial`	*Princeton, NJ*
January 2023	**Introduction to Machine Learning** Instructor `https://github.com/PrincetonUniversity/intro_machine_learning`	*Princeton, NJ*
July 2022	**Introduction to Graph Neural Networks with PyG** Workshop Instructor `https://indico.cern.ch/event/1151329/`	*Princeton, NJ*

Mentoring

2025	**Alice Hu** Princeton University OURSIP Summer Research Scholar: *Data Augmentation for Graph Transformers*	*Princeton, NJ*
2024-2025	**Joah Macosko** Princeton University Senior Thesis: *Machine Learning for Extracting Track Physics*	*Princeton, NJ*
Spring 2024	**Joah Macosko** Princeton University Junior Project: *Using Machine Learning Techniques to Measure Track Physics in High-Pileup Collision Events*	*Princeton, NJ*
2021-2022	**Mufaro Chitoto** Princeton University Senior Thesis: *Charged Particle Tracking with Interaction Networks*	*Princeton, NJ*

Outreach & Professional Development

Service and Outreach

2023-2024	**Machine Learning in Physics Seminar Series,** Organizer	*Princeton, NJ*
2023-Present	**Princeton Physics EDI,** Postdoctoral Matters Committee Member	*Princeton, NJ*
2023	**Prospective Physics Ph.D. Preview (P4) Workshop,** Organizer	*Princeton, NJ*
2022-2023	**Princeton Physics Graduate Committee,** 5th-Year Class Representative	*Princeton, NJ*
2022	**Prospective Physics Ph.D. Preview (P4) Workshop,** Lead Organizer	*Princeton, NJ*
2021-2022	**Princeton Physics Graduate Committee,** 4th-Year Class Representative	*Princeton, NJ*
2021	**Prospective Physics Ph.D. Preview (P4) Workshop,** Lead Organizer	*Princeton, NJ*
2020-2023	**Princeton Physics Ambassadors (EDI Initiative),** Founder and President	*Princeton, NJ*
2020-2022	**Princeton Physics EDI,** Graduate Matters Committee Member	*Princeton, NJ*
2020-2022	**McGraw Center for Teaching and Learning,** Graduate Teaching Fellow	*Princeton, NJ*
2019-2020	**Graduate Student Government,** Physics Department Representative	*Princeton, NJ*

Professional Development

2022	**CERN-Fermilab Hadron Collider Physics Summer School**	*Virtual*
2021	**Oxford Machine Learning Summer School**	*Virtual*
2021	**Machine Learning in High Energy Physics Summer School**	*Virtual*
2021	**London Geometry and Machine Learning Summer School**	*Virtual*
2019	**CMS Data Analysis School**	*Fermilab*
2018	**Computational and Data Science in HEP**	*Princeton, NJ*
2017	**CMS Data Analysis School**	*Fermilab*

Professional Memberships

Sigma Pi Sigma Physics Honor Society
University of Virginia Raven Society