

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.

- 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](https://arxiv.org/abs/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](https://arxiv.org/abs/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](https://arxiv.org/abs/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](https://doi.org/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](https://doi.org/10.1140/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](https://doi.org/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](https://arxiv.org/abs/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](https://doi.org/10.1007/JHEP11(2018)042).

IN REVIEW / PREPARATION

- G. DeZoort** et al. (2024). Search for a Neutral Pseudoscalar Boson A Decaying to a Z Boson and a Standard Model-like Higgs Boson in $\ell\ell\tau\tau$ Final States Using the Full Run 2 Dataset. Unblinded, undergoing internal CMS approval process.
- 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

- 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** et al. (2024). *Search for a heavy pseudoscalar Higgs boson decaying to Zh with $\ell\ell\tau\tau$ 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

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

2024-2025	Joah Macosko Princeton University Senior Thesis: <i>Machine Learning for Extracting Track Physics</i>	Princeton, NJ
Spring 2024	Joah Macosko Princeton University Junior Project: <i>Using Machine Learning Techniques to Measure Track Physics in High-Pileup Collision Events</i>	Princeton, NJ
2021-2022	Mufaro Chitoto Princeton University Senior Thesis: <i>Charged Particle Tracking with Interaction Networks</i>	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

American Physical Society
Sigma Pi Sigma Physics Honor Society
University of Virginia Raven Society