Roy T. Forestano
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github | linkedin | google scholar

Education

Pursuing a Physics PhD, University of Florida, Gainesville, FL *August 2021 - Present*

Physics B.S., Mathematics B.S., Magna Cum Laude, Boston College, Chestnut Hill, MA *August 2017 - May 2021*

Steinert High School, Valedictorian, Hamilton Township, NJ *September 2013 - June 2017*

Research Interests

Unsupervised, Supervised, and Self Supervised Learning, Deep Learning (NNs, CNNs, GNNs, GANs)
Generative Modeling (GANs, NFs, Diffusion), NLPs, Quantum Information and Computing

Research

Graduate RA in Theoretical High Energy Physics *January 2022 - Present/ University of Florida*

Group of Matchev/a, Novel ML/AI Applications to HEP and Astrophysics

Undergraduate RA in Theoretical CM Physics *January 2019 - May 2021/ Boston College*

Group of Kevin S. Bedell, Analyzed the effect of the Higgs amplitude mode on the SC transition temperature, T_C, in FFLs

Undergraduate RA in Experimental CM Physics *February 2018 - August 2018 / Boston College*

Group of Cyril P. Opeil, Used Resonant Ultrasound Spectroscopy (RUS) to reveal thermoelectric properties of materials

Experience

2023 Google Summer of Code (GSOC) ML4SCI Contributor *May - October 2023 / Google*

Graduate Student and Postdoc Seminar Organizer *Januray 2023 - Present / University of Florida*

Graduate Lab & Discussion Teaching Assistant *May 2022 - Present / University of Florida*

Graduate Laboratory Teaching Assistant *September 2021 - May 2022 / University of Florida*

SPS Secretary & Events Coordinator *August 2019 - May 2021 / Boston College*

Presentations and Projects

Supervised Methods for Exoplanet Atmospheric Retrievals *3 October 2023/ AAS DPS*

Invariant and Equivariant Quantum Graph Neural Networks *19 September 2023/ GSOC*

Accelerated Machine Learning Symmetry Discovery *12 September 2023/ UF GSPS*

Deep Learning Symmetries and their Lie Groups *11 August 2023/ IAIFI*

Unsupervised ML Methods for Novelty and Outlier Detection *24 July 2023 / Sagan*

Deep Learning Symmetries and Lie Groups *25 April 2023 / APS April*

2022 NeurIPS Ariel Data Challenge: RT 1^{st} and LT 2^{nd} Place *18 November 2022 / NeurIPS*

Unconventional SC mediated by the Higgs amplitude mode in itinerant FMs *6 May 2021 / BC Thesis Defense*

Licenses and Certifications

NVIDIA DLI – Building Transformer-Based Natural Language Processing Applications *Issued 2023*

NVIDIA DLI – Fundamentals of Accelerated Computing with CUDA Python *Issued 2022*

Awards and Honors

2023 Steigleman Family Fellowship *Presented by the UF Department of Physics in 2023*

Grinter Fellowship *Presented by the UF Department of Physics (active all graduate years) in 2021*

2021 George J. Goldsmith Award *Presented by the BC Department of Physics in 2021*

Mathematics Honors *Presented by the BC Department of Mathematics in 2021*

Dean's Scholar *Presented by BC in 2020*

Skills

Technical Skills ***Fluent:*** Python | Numpy | Scikit-learn | Tensorflow | PyTorch | Pennylane | Seaborn
CPLEX | DOCPLEX | C++ | C | LaTeX | Mathematica
Basic Knowledge: CUDA | Qiskit | Cirq | MATLAB | Java | LabVIEW

Languages ***Native:*** English ***Conversational:*** Italian

Publications

A Comparison Between Invariant and Equivariant Classical and Quantum Graph Neural Networks *2023*

Roy T. Forestano et al.

Submitted to the Conference Proceedings of *NeurIPS 2023* (Under Review).

Quantum Vision Transformers for Quark-Gluon Classification *2023*

Marçal Comajoan Cara et al.

Submitted to the Conference Proceedings of *NeurIPS 2023* (Under Review).

$\mathbb{Z}_2 \times \mathbb{Z}_2$ Equivariant Quantum Neural Networks: Benchmarking against Classical Neural Networks *2023*

Zhongtian Dong et al.

Submitted to the Conference Proceedings of *NeurIPS 2023* (Under Review).

Identifying the Group-Theoretic Structure of Machine-Learned Symmetries *2023*

Roy T. Forestano, Konstantin T. Matchev, Katia Matcheva, Alexander Roman, Eyup B. Unlu, Sarunas Verner

Submitted to *Physics Letters B* (Under Review). arXiv:2309.07860

Searching for Novel Chemistry in Exoplanetary Atmospheres using Machine Learning for Anomaly Detection *2023*

Roy T. Forestano, Konstantin T. Matchev, Katia Matcheva, Eyup B. Unlu

Submitted to *The Astrophysical Journal* (Under Review). arXiv:2308.07604

Reproducing Bayesian Posterior Distributions for Exoplanet Atmospheric Parameter Retrievals with a ML Surrogate Model *2023*

Eyup B. Unlu, Roy T. Forestano, Konstantin T. Matchev, Katia Matcheva

Submitted to the Conference Proceedings of *ECML*.

Accelerated Discovery of Machine-Learned Symmetries: Deriving the Exceptional Lie Groups G2, F4, and E6 *2023*

Roy T. Forestano, Konstantin T. Matchev, Katia Matcheva, Alex Roman, Eyup B. Unlu, Sarunas Verner

Submitted to the *Physics Letters B* (Under Review). arXiv:2307.04891

Inferring Physical Properties of Exoplanets From Next-Generation Telescopes *2023*

Kai Hou Yip, Quentin Changeat, Ingo Waldmann et al.

Proceedings of Machine Learning Research PMLR 220:1-17.

Discovering Sparse Representations of Lie Groups with Machine Learning *2023*

Roy T. Forestano, Konstantin T. Matchev, Katia Matcheva, Alexander Roman, Eyup B. Unlu, Sarunas Verner

Physics Letters B. DOI: 10.1016/j.physletb.2023.138086

Oracle-Preserving Latent Flows *2023*

Alexander Roman, Roy T. Forestano, Konstantin T. Matchev, Katia Matcheva, Eyup B. Unlu

MDPI Symmetry. DOI: 10.3390/sym15071352

Deep Learning Symmetries and Their Lie Groups, Algebras, and Sub-algebras from First Principles *2023*

Roy T. Forestano, Konstantin T. Matchev, Katia Matcheva, Alexander Roman, Eyup B. Unlu, and Sarunas Verner

Machine Learning: Science and Technology. DOI: 10.1088/2632-2153/acd989