Mary I. Letey

maryletey@fas.harvard.edu
maryiletey.com

Education

Harvard University Sep 2023 • Present
Applied Mathematics PhD with Professor Cengiz Pehlevan.

Perimeter Institute for Theoretical Physics Sep 2022 • June 2023
Perimeter Scholars International MSc.

University of Cambridge, England Oct 2018 • June 2022
St John's College, Undergraduate Mathematical Tripos.

University of Colorado, Boulder June 2014 • May 2018
135 Credit Hours in Undergraduate Computer Science and Mathematics.

Publications

Pehlevan Lab (2024)
In-Context Learning in Transformers.
In Preparation.

M. Letey, Z. Shumaylov, F. Agocs, W. Handley, M. Hobson, A. Lasenby (2022)
Quantum Initial Conditions for Curved Inflating Universes.
Under review; arxiv:2211.17248.

Research Experience

Montreal Institute for Learning Algorithms (Mila)
Supervisor – Professor Siamak Ravanbakhsh June 2023 • Sep 2023
Generalising continuous kernel CNNs to implement neural operators continuously dependent on an input function.

Perimeter Institute for Theoretical Physics
Supervisor – Professor Latham Boyle Dec 2022 • Present
Master's Thesis. Extending the use of reflection groups in classifying discrete structures in Lorentzian spaces, we demonstrate substantial differences between reflection groups in Euclidean and Lorentzian spaces.

Kavli Institute for Cosmology, University of Cambridge
Supervisor – Dr Will Handley June 2022 • Sep 2022
A novel comoving curvature perturbation variable for inflaton fluctuations in curved universes is proposed and analysed. Novel initial conditions are proposed by setting the vacuum using the renormalised stress energy tensor.

Projects

• *For more detailed descriptions, cool maths, and less recent projects, please see my website.* •

Geometric Methods in Machine Learning, Harvard University
Supervisor – Professor Melanie Weber Jan 2024 • Present
Various ongoing research-based course projects in differential geometry, geometric deep learning, and ML on manifolds.

Algorithms and Data Science Expository Project, Harvard University
Supervisor – Professor Sitan Chen Oct 2023 • Dec 2023
On diffusion-based generative models; connecting variational inference in graphical models to score approximation.

Perimeter Institute Quantum Intelligence Lab
Supervisor – Professor Roger Melko Oct 2022 • Feb 2023
Generalising data-enhanced Variational Monte Carlo simulations to account for measurement error in Rydberg arrays.

Fellowships and Awards

Graduate Prize Fellowship
Harvard University. Sep 2023

Summer Research Bursary
McGill University, 4000 CAD. June 2023

Perimeter Scholar's International
Perimeter Institute, 45000 CAD • *25 per ~500*. Sep 2022

Royal Society Bursary
For summer research in Cosmology, 3000 GBP. June 2022

Community Involvement & Sport

Reviewer – ICLR 2023 Physics4ML Workshop Feb 2023

Tutor – Blue Education & Other Local Companies July 2021 • July 2023
Tutored over 20 pupils 1-on-1 in Mathematics and Physics for applications, interviews, exams, and passion projects.

Senior Coxswain – City of Cambridge Rowing Club June 2021 • Dec 2021
Served as the main coxswain for five rowing crews, coaching novices, organising outings, and training crews for races.