

Mary I. Letey



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EDUCATION

Harvard University

Applied Mathematics PhD with [Professor Cengiz Pehlevan](#).

Sep 2023 • Present

Perimeter Institute for Theoretical Physics

Perimeter Scholars International MSc.

Sep 2022 • June 2023

University of Cambridge, England

St John's College, Undergraduate Mathematical Tripos.

Oct 2018 • June 2022

University of Colorado, Boulder

135 Credit Hours in Undergraduate Computer Science and Mathematics.

June 2014 • May 2018

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

Sep 2023

Harvard University.

Summer Research Bursary

June 2023

McGill University, 4000 CAD.

Perimeter Scholar's International

Sep 2022

Perimeter Institute, 45000 CAD • 25 per ~500.

Royal Society Bursary

June 2022

For summer research in Cosmology, 3000 GBP.

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.