Mary I. Letey

maryletey@fas.harvard.edu
maryiletey.com

Education

Present — **Harvard University**
Applied Mathematics PhD with the Pehlevan Group

2023 — **Perimeter Institute**
Theoretical Physics MSc

2022 — **University of Cambridge**
Mathematics BA (Tripos)

2018 — **University of Colorado**
Mathematics & Computer Science, 135 Credit Hours

Publications

2024 — **In-Context Learning in Transformers**
Pehlevan Lab
Manuscript In Progress

2022 — **Quantum Initial Conditions for Curved Inflating Universes**
Mary Letey, Zakhar Shumaylov, Fruzsina Agocs, Will Handley, Michael Hobson, Anthony Lasenby
In Review, Preprint 2211.17248

Research

Summer 2023 — **Montreal Institute for Learning Algorithms (Mila)**
Supervisor • Professor Siamak Ravanbakhsh
Generalising continuous kernel CNNs for neural operators continuously dependent on input functions.

Thesis 2022-23 — **Perimeter Institute for Theoretical Physics**
Supervisor • Professor Latham Boyle
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.

Summer 2022 — **Kavli Institute for Cosmology, University of Cambridge**
Supervisor • Dr Will Handley
A novel comoving curvature perturbation variable for inflaton fluctuations in curved universes is proposed. Initial conditions are derived by setting the vacuum using renormalised stress energy tensor.

Projects

• For more detailed descriptions, fun maths, and earlier projects, please see my website •

Spring 2024 — **Geometric Methods in Machine Learning, Harvard University**
Supervisor • Professor Melanie Webber
Implementing a generalisable taxonomy of manifold learning algorithms.

Fall 2023 — **Algorithms for Data Science, Harvard University**
Supervisor • Professor Sitan Chen
On diffusion-based generative models; connecting variational inference in graphical models to score approx.

Fall 2022 — **Perimeter Quantum Intelligence Lab**
Supervisor • Professor Roger Melko
Generalising data-enhanced Variational Monte Carlo simulations to include measurement error in Rydberg arrays.

Awards

2024 — **Clare Marie Doris Innovation Fund**
Harvard University

2023 — **Graduate Prize Fellowship**
Harvard University

Summer Research Bursary
McGill University, 4000CAD

2022 — **International Scholarship**
Perimeter Institute, 45000CAD

Summer Research Bursary
Royal Society, 3000GBP

Community & Sport

2023 — **Reviewer** • ICLR Physics4ML Workshop

2021-23 — **Tutor** • Mathematics & Physics. Over 20 Pupils.

2021 — **Senior Coxswain** • Cambridge City Rowing Club (employed) & St Johns College Rowing Club (volunteer).

2019-21 — **President** • St Johns College Entrepreneurs' Club