

# Mary I. Letey

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## 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**  
Yue Lu, Mary Letey, Anindita Maite, Jacob Zavatone-Veth, Cengiz Pehlevan  
*Manuscript In Progress*

2022 **Quantum Initial Conditions for Curved Inflating Universes**  
Mary Letey, Zakhar Shumaylov, Fruzina 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 **High Performance Computing, Harvard University**  
Instructor • **Professor Boris Kozinsky, Ignacio Becker-Troncoso**  
*Parallelisable algorithm for covariance estimation for data with structured missingness, w/ finance applications.*

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

Fall 2023 **Algorithms for Data Science, Harvard University**  
Instructor • **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** **Summer Research Bursary**  
Harvard University McGill University, 4000CAD

2022 **International Scholarship** **Summer Research Bursary**  
Perimeter Institute, 45000CAD Royal Society, 3000GBP

## COMMUNITY & SPORT

2023 **Reviewer** • ICLR Physics4ML Workshop

2021-23 **Tutor** • Mathematics & Physics. Over 20 Pupils, through **Blue Education** and **U2Tuition**.

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

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