Mary I. Letey

maryletey@fas.harvard.edu **2023**

Education

Perimeter Institute for Theoretical Physics Sep 2022 – June 2023
Perimeter Scholars International (PSI) Master's Program **Full Funding ($45000)**

University of Cambridge, England Oct 2018 – June 2022
St John's College, Mathematical Tripos **Class II, Division 1**

University of Colorado, Boulder June 2014 – May 2018
135 Credit Hours in Computer Science and Mathematics **3.93 / 4.00 GPA**

Research Experience

Perimeter Institute For Theoretical Physics Jan 2023 – Present
Supervisor – Professor Latham Boyle

Master's Thesis. Towards constructing a mathematical framework to generalise the use of reflection groups in classifying discrete symmetries of Lorentzian spaces. We present a generalisation of the notion of crystallographic symmetry and demonstrate substantial differences between reflection groups in Euclidean and Lorentzian spaces.

Kavli Institute for Cosmology, University of Cambridge June 2022 – Sep 2022
Supervisor – Dr Will Handley **arXiv:2211.17248**

Royal Society bursary support. To generalise results in cosmological inflation to include non-flat universes and non-eternal inflation, a novel comoving curvature perturbation variable is proposed and analysed. Novel initial conditions are proposed by setting the vacuum using the renormalised stress energy tensor.

Dowell Lab, University of Colorado June 2018 – Sep 2018
Supervisor – Professor Robin Dowell

Contributed to the development of a genome-wide probabilistic model of 3-prime transcription components during the post-termination phase to build understanding of transcription by RNA polymerase II.

Projects

Perimeter Institute Quantum Intelligence Lab Oct 2022 – Feb 2023
Supervisors – Professor Roger Melko, M. Schuyler Moss

Generalising data-enhanced Variational Monte Carlo simulations to account for measurement error in Rydberg arrays.

Mathematical Computational Projects, University of Cambridge Oct 2021 – Apr 2022

Isotropic Quantum Scattering
Geodesic Motion and Symmetries of the Kerr Black Hole
Modelling Accretion Discs
Modified $V/V_{\max}$ Tests for Quasar Redshift Distribution

Graduate Machine Learning Project, University of Colorado Jan 2018 – May 2018
Supervisor – Dr Christopher Ketelsen

Developed an RNN model to predict fluctuations in stock prices, using topic modelling to derive features from text.

Jobs and Community Involvement

Reviewer – ICLR 2023 Physics4ML Workshop Feb 2023

Tutor – Blue Education & U2Tuition June 2021 – Dec 2022

Tutored over 20 pupils one-on-one in Mathematics and Physics for Oxbridge applications, interviews, and STEP.

Senior Coxswain – Cambridge City Rowing Club June 2021 – Dec 2021

Main coxswain for five rowing crews: coached novices, organised outings, trained multiple senior crews for races.

Associate – Embryo Ventures Apr 2020 – Dec 2020

Boosted client engagement fivefold; launched a marketing initiative through portfolio interviews.

Intern – Iguana Investments Dec 2019 – Aug 2020

Lead a review of investment strategies, presenting a report on algorithm optimisation and general market outlook.

Founder and President – Johnian Entrepreneurs' Club Oct 2019 – Oct 2021

Hosted funding competitions and provided educational resources and investor-partnership opportunities.

Programming Experience

MATLAB, Maple, Mathematica Python C++, C LaTeX

HIGHLIGHTED COURSEWORK

Perimeter Institute for Theoretical Physics

Statistical Physics	Quantum Field Theory	Numerical Methods	Symplectic Geometry
Machine Learning	Quantum Matter	AdS / CFT	Quantum Gravity

University of Cambridge

Optimisation	Markov Chains	Linear Algebra	Statistics
Quantum Mechanics	Solid State Physics	General Relativity	Cosmology
Quantum Information	Dynamical Systems	Integrable Systems	

University of Colorado, Boulder

Differential Geometry	Analysis 1, 2	Group Theory	Combinatorics & Graph Theory
Symbolic Logic	Digital Logic	Coding & Cryptography	Non-Euclidean Geometry
Data Structures	Computer Systems	Algorithms	Machine Learning (graduate)