# Mary I. Letey

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## 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**                                                       June 2021 – Present

> 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

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

## University of Colorado, Boulder

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|---|---|---|---|
| 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) |