Mary I. Letey

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EDUCATION

Harvard University   Sep 2023 • Present
Applied Mathematics PhD with Professor Cengiz Pehlevan
Perimeter Institute for Theoretical Physics   Sep 2022 • June 2023
Perimeter Scholars International MSc
University of Cambridge, England   Oct 2018 • June 2022
St John's College, Undergraduate Mathematical Tripos
University of Colorado, Boulder   June 2014 • May 2018
135 Credit Hours in Undergraduate Computer Science and Mathematics

PUBLICATIONS

M. Letey*, Z. Shumaylov*, F. Agocs, W. Handley, M. Hobson, A. Lasenby (2022)
Quantum Initial Conditions for Curved Inflating Universes.
Under review; arxiv

RESEARCH EXPERIENCE

Montreal Institute for Learning Algorithms (Mila)   June 2023 • Sep 2023
Supervisor – Professor Siamak Ravanbakhsh
    Generalising the use of continuous kernel CNNs to implement neural operators continuously dependent on an input
    function.
Perimeter Institute for Theoretical Physics   Dec 2022 • June 2023
Supervisor – Professor Latham Boyle
    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   June 2022 • Sep 2022
Supervisor – Dr Will Handley
    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.

PROJECTS

Perimeter Institute Winter School Research   Oct 2022 • Feb 2023
Supervisor – Professor Freddy Cachazo
    Investigating tree-level scattering amplitudes for gluons in Yang-Mills. By utilising colour decomposition, we study the
    singularity structure partial amplitude formulas in the case of 3 negative-helicity gluons with projective geometry.
Perimeter Institute Quantum Intelligence Lab   Oct 2022 • Feb 2023
Supervisor – Professor Roger Melko
    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.

PROGRAMMING EXPERIENCE

         MATLAB, Maple, Mathematica   **Python, Pytorch, JaX**   **C++, C**   **Linux**

FELLOWSHIPS AND AWARDS

Graduate Prize Fellowship   Sep 2023
Harvard University
Perimeter Scholar International   Sep 2022
Perimeter Institute, 45000 CAD
Royal Society Bursary   June 2022
For summer research in Cosmology, 3000 GBP