Lawrence Wu

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Education

University of Cambridge *MSc Physics*   *Oct.2022–Jun.2023*
- Thesis: Application of Sheaf Neural Networks on Physical Systems
- Quantum Field Theory, Advanced Statistical Physics

University of Cambridge *BA(Hons) Physics, 1st class*   *Oct.2019–Jun.2022*
- Scored over 90% in 2/4 final year core modules (General Relativity, Electrodynamics)
- Computing Project: Simulation of the Ising Model
- Literature Review: Development of Quantum Computing Hardware
- Statistical Physics, Advanced Quantum Mechanics, Astrophysical Fluidynamics, Quantum Condenced Matter, Particle Physics

West London Free School (UK) *Sixth Form*   *Oct.2017–Jun.2019*
- A-Levels (All A*s): Physics, Maths, Further Maths, Chemistry.

Taipei Municipal Jianguo High School (Taiwan) *High School*   *Sept.2016–Oct.2017*
- Ranked 1st in entrance exam for the governmental Gifted Class of Mathematics and Science.

Awards

- United Steel Companies Scholarship, St John's College, University of Cambridge (2020, 2022)
- Top Gold, British Physics Olympiad (2019)
- Distinctions, British Mathematics Olympiad (2018 & 2019)

Publication

Investigation of Cosmic Preferred Directions in the Cosmic Microwave Background Using New Strategies, Lawrence Wu & Jiun-Huei Proty Wu (in preparation).

Research Experience/Projects

Application of Sheaf Neural Networks on Physical Systems   *Oct.2022–May.2023*

Supervisor: Prof. Pietro Lio, Computer Laboratory, University of Cambridge.
- (Graph Neural Networks Based on the Sheaf Laplacian)
- Geometric Deep Learning

Preferred Directions in the Cosmic Microwave Background (CMB)   *Aug.2021–present*

Supervisor: Prof. Jiun-Huei Proty Wu, Department of Physics, National Taiwan University.
- Independently developed the codebase, which analyses data with over 50 million pixels each
- Applied new strategies to investigate possible preferred axes or directions in the observed full-sky CMB maps.

Simulation of the Ising Model   *Oct.2021–Apr.2022*

Undergraduate Computational Project.

- Implemented and Investigated the Ising Model using Monte-Carlo optimisation algorithms.

Quantum Computing Hardware Research Review   *Oct.2021–Apr.2022*

Supervisor: Prof Mike Payne, Department of Physics, University of Cambridge.

- Looked into emerging technologies of Quantum Computer Hardware and their current difficulties.

Simulation of the domestic and international spreading of COVID-19   *Mar.–Jun.2020*

Independent research on Model building.

- Simulated the spreading by modeling individuals as repulsive particles.
- Investigated how the spreading rate varies with the strictness of quarantining, travel restriction and social distancing
- Determined how the rate of spreading varies with the vaccination rate.

Connect Four AI   *Jun.–Aug.2018*

Independent research on Machine Learning.

- An unbeatable AI that plays Connect4 based on Monte Carlo Tree Search (MCTS).
- Investigated the difference between different Selection Algorithms in MCTS.

Work Experience

M2 Digital Asset Management *Summer Intern*   *Jun.–Jul.2021*

Project: Research and Development of Bitcoin Pricing Models.

- Estimated the average mining cost per coin from historical mining difficulty and ASIC chip efficiency datas.
- Developed codes to estimate the probability distribution of future BTC prices by using current option prices.

Programming/Computers

Python (Numpy, Scipy, Scikit, Tensorflow), C++, LaTeX, Linux

Hobbies

Surfing, Skateboarding, Speed Cubing, Electronic Music, DJing