

Lau Pak To (Ryan)

CONTACT INFORMATION

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EDUCATION

University College London (UCL)

September 2022 - Present

MSc Physics

- Research Project: Non-Hermitian Discrete Time Crystals in 1D (In progress)
- Literature Review Project: On the potential of Topological Time Crystals for Quantum Error Correction (82.5%)
- Intensive training on C++, computer science and advanced C++ concepts for high performance and parallel computing
- Modules taken: Quantum Computation and Communication, Research Computing with C++, Advanced Quantum Theory (92%), Theoretical Condensed Matter, Quantum Field Theory, Mathematics For General Relativity
- Associate Member of the Institute of Physics (IOP)

University College London (UCL)

September 2019 - June 2022

BSc Natural Sciences (Major: Physics, Minor: Physical Chemistry)

- Overall: High Second Upper Class Honours
- Recipient of the Brian Duff Summer studentship to conduct Theoretical Condensed Matter Physics research
- Final Year Project (Literature Review): Classifying Topological Phases of Quantum Matter using Tensor Networks(1st)
- Silver-medalist of the University Physics Competition 2020
- Associate Member of the Institute of Physics (IOP)
- Co-founder and Treasurer of Arts for Mental Health (ARTSMH)

Ardingly College (UK)

September 2017 - June 2019

Sixth Form

- A-Levels: Mathematics (A*); Physics (A); Chemistry (A)
- Competitions: British Physics Olympiad: Commendation (2019); RSC Chemistry Olympiad: Silver (2019), Bronze (2018); Google Science Fair 2018 (Certificate of Recognition); Internal & external sports and music competitions
- Academic Awards: Distinctions & Academic Awards in Physics & Mathematics; Maureen McDonnell Prize (Scholarship)

TECHNICAL SKILLS

Languages: Intermediate: Python, Wolfram Language (Mathematica), MATLAB, C++; Novice: C, Julia, HTML, CSS

Quantum Technologies: Platforms and Tools: Qiskit, QASM 2.0, IBM Quantum Composer & Quantum Lab, D-Wave (Quantum Annealer), QuSpin

Tools: Visual Studio Code, CMake, Jupyter Notebook, Google Colab, GitHub, Git Bash, Powershell, Overleaf, Wolfram Notebooks, Wolfram Mathematica

Typesetting Documents: \LaTeX , Microsoft Office, Google Docs

SUMMER SCHOOLS

Qiskit Global Summer School 2023: Theory to Implementation

July 2023

Quantum Technologies

IBM, Online

<https://qiskit.org/events/summer-school/>

Qiskit Global Summer School 2022: Quantum Simulations

July 2022

Quantum Technologies

IBM, Online

UCLQ Quantum Tech Summer School

July 2022

Quantum Technologies

UCL & London Centre for Nanotechnology (LCN)

<https://www.ucl.ac.uk/quantum/study-here/uclq-quantum-tech-summer-school>

Wolfram Summer School

June 2021 - July 2021

Fundamental Physics Track

Wolfram Research / Wolfram Physics Project

<https://education.wolfram.com/summer-school/programs/physics/>

RELEVANT CERTIFICATIONS & COURSES

Certificates:

Google: IT Automation with Python; LinkedIn: C++ Essential Training; JuliaAcademy: Introduction to Julia; Microsoft: Azure AI Fundamentals (AI-900); IBM: Qiskit Global Summer School 2022 - Quantum Excellence (Advanced)

Courses: IOP Workshops: C++ & Julia; Wolfram Research Workshops: The Wolfram Language: Programming Fundamentals, Introduction to Machine Learning

UCL Innovation & Enterprise: Explore your entrepreneurial idea workshops

RELEVANT RESEARCH EXPERIENCE

Non-Hermitian Discrete Time Crystals in 1D

Oct 2022 - Present

Theoretical condensed matter & Quantum Computation (Master's Project)

UCL, CMMP, UK

Reporting to: Dr. Arijeet Pal

Conducting research to characterise a 1D time-varying quantum model to look for time crystals when coupled with an external environment.

Quantum Simulations of Antigen-Antibody reactions

Aug 2022 - Sept 2022

Computational Biophysics & Quantum Technologies

Imperial College, UK

Reporting to: Dr. Henry Lee

Assisting a company to understand the interactions between antigen-antibody reactions on a gold nanoparticle surface using density matrix methods via reviewing literature and weekly discussions as a team.

Q-Wave: Simulating sound waves using Quantum Algorithms

June 2022 - Sept 2022

Computational Physics & Quantum Technologies

UCL, UK

Reporting to: Dr. Reza Haqshenas

Developed a software package in Python for future therapeutic applications by reviewing and applying quantum algorithms to simulate sound-wave propagation.

Classifying Topological Phases of Quantum Matter using Tensor Networks

Sept 2021 - March 2022

Literature Review on Theoretical Condensed Matter & Computational Physics

UCL, UK

Reporting to: Professor Andrew Green

Conducted a rigorous literature review on using tensor network techniques to classify topological phases of matter.

Topological phase transition in $S=\frac{1}{2}$ spin chains with alternating ferromagnetic (FM) and antiferromagnetic (AFM) couplings and exchange anisotropy

June 2021 - August 2021

Theoretical Condensed Matter Physics

UCL, CMMP, UK

Reporting to: Dr. Frank Kruger

Conducted theoretical research on topological phase transitions of the suggested model and constructed its topological phase transition diagram numerically using Python after deriving coupled self-consistent equations, with secured funding.

The 3-Coloured Distributive Consensus Problem

June 2021 - July 2021

Wolfram Summer School Fundamental Physics Track

Wolfram Research / Wolfram Physics Project

Reporting to: Hatem Elshatlawy & Stephen Wolfram

Reviewing cellular automata and how it is used to describe phase transitions. Developed code in Mathematica and have written a computational essay as a contribution to the Wolfram Physics Project: <https://community.wolfram.com/groups/-/m/t/2312007> (with a Staff Picked Featured Contributor Badge and more than 2000 views)

WORK EXPERIENCE

Private Tutoring

September 2022 - June 2023

Notebook Tutors

Online, UK

Reporting to: Marilyn Brydges

Tutoring and supporting students with IGCSE and A-Level Maths, Physics, Chemistry and Natural Sciences Admissions Assessment entrance exam.

Research Intern

July 2022 - Sept 2022

Quantum Simulations Internship

Imperial College, UK

Research Topic: Quantum Simulations of Antigen-Antibody reactions

Research Assistant <i>MAPS Summer Research Internship</i> <u>Research Topic:</u> Q-Wave: Simulating sound waves using Quantum Algorithms	June 2022 - Sept 2022 UCL, MAPS, UK
Research Intern <i>Brian Duff Summer Studentship (Theoretical Condensed Matter Physics)</i> <u>Research Topic:</u> Topological phase transition in $S=\frac{1}{2}$ spin chains with alternating ferromagnetic (FM) and antiferromagnetic (AFM) couplings and exchange anisotropy	June 2021 - August 2021 UCL, CMMP, UK
Undergraduate Research Assistant/Mentee <i>UCL Connect.ed Mentorship Project</i> <u>Research Topic:</u> Machine Learning in Stock Markets	January 2021 - April 2021 UCL, UK
Private Tutoring <i>Self-employed (through recommendations)</i> One on one tutoring on topics of A-Level Physics and Mathematics	Summer 2019, 2020 Hong Kong

CONFERENCE ATTENDED

Quantum.Tech Europe 2022 <i>Quantum Technologies</i>	September 2022 UK
https://www.quantumtechdigital.co.uk/	

ADDITIONAL RESEARCH EXPERIENCE

Machine Learning in Stock Markets <i>UCL Connect.ed Mentorship Research Assistant/Mentee</i> Reporting to: Dr. Ava Lee Studied and implemented Machine Learning models on large, collected datasets of stock markets to predict its trends.	January 2021 - May 2021 UCL, UK
Birdsong Audio Signal Analysis <i>Scientific Programming Module (Python)</i> Reporting to: Dr. Peter Bratby Utilised Python packages and developed code to identify different bird species by performing Fourier Transforms on bird song audios, while attempting a Principal Component Analysis as a team. https://github.com/SavitarRL/NatSci-Computing/tree/master/Group%20Project/NSCI0007_Group_Project	March 2021 UCL, UK

COMPETITIONS

Explore your entrepreneurial idea Pitching Competition <i>1st Runner Up</i> Collaborated and presented my partner's and my business idea to a lay audience, securing a funding of £500.	Oct 2022 <i>UCL Innovation & Enterprise</i>
The University Physics Competition <i>Quadcopter Stability in Wind: Silver Medal</i> https://www.ucl.ac.uk/mathematical-physical-sciences/news/2021/jan/ucl-natural-sciences-students-win-silver-medal-2020-university-physics-competition Supervisor & Team Sponsor: Dr. Frank Kruger Solved a real-life problem by implementing classical mechanics and computation simulation in a team of 3 representing UCL. A formal paper was written in \LaTeX within 48 hours. https://drive.google.com/drive/folders/1zf8b-X1uo8PzFvZiwtYG0lvUieJ02r5p?usp=sharing	November 2020 http://www.uphysicsc.com/

LANGUAGES

English (Proficient)	Cantonese (Native)	Mandarin (Fluent)
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