Dat Chi Le

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PERSONAL PROFILE

Final-year Theoretical Physics student at the University of Sheffield, researching generative modelling and photonic quantum machine learning within the QuDOS Group, Sheffield Quantum Centre. Winner and finalist at UK quantum hackathons, with experience applying quantum algorithms in end-to-end, use-case-driven research settings. Aspiring quantum computing researcher, interested in quantum algorithms, quantum machine learning, and quantum information science for near-term applications.

EDUCATION

University of Sheffield   Sheffield, UK
MPhys Theoretical Physics (First-Class Honours, expected)   September 2022 - June 2026
Fourth-year Dissertation: Generative AI for Photonic Systems (Supervisor: Prof. Oleksandr Kyriienko)
Key modules: Mathematical Physics (83%); Quantum Information Laboratory (75% project); Advanced Programming in Python (75% final project)

Bosworth Independent College   Northampton, UK
A levels: A*A*A for Mathematics, Further Mathematics, and Physics   September 2018 - June 2022

RESEARCH EXPERIENCE

Generative AI for Photonic Systems   Sheffield, UK
Fourth Year Dissertation (Master's Thesis) — Supervisor: Prof. Oleksandr Kyriienko   October 2025 – June 2026

- Designing and evaluating photonic quantum machine learning architectures using Python-based frameworks (Strawberry Fields, Piquasso), with a focus on algorithmic behaviour under realistic constraints.
- Analysing how quantum circuit structure and mode connectivity influence representational capacity and the correlations captured by generative models.
- Investigating optimisation landscapes to characterise trade-offs between expressivity, trainability, and poorly conditioned regimes affecting convergence.
- Evaluating performance under hardware-inspired constraints to inform real photonic hardware design.

Physics-Informed Ansatze for Ground State Preparation   London, UK
Undergraduate Summer Placement, UCL QC2 CDT — Supervisors: Prashati Tiwari, Prof. Sougato Bose   July – September 2025

- Developed physics-informed ansätze for ground-state preparation of spin Hamiltonians using the Variational Quantum Eigensolver (VQE) in Qiskit.
- Benchmarked VQE performance using ground-state energy error, state fidelity, and convergence behaviour on controlled test cases.
- Analysed how different ansatz design choices and optimisation settings influence VQE performance metrics across different problem instances.

Characterising Type-II SPDC Single Photons via Michelson Interferometry   Sheffield, UK
Third Year Project, Quantum Information Laboratory — Supervisor: Prof. Luke Wilson   February – May 2025

- Set up, aligned, and calibrated a Michelson interferometer to measure first-order coherence of heralded single photons generated via Type-II SPDC, using APD-based coincidence detection.
- Analysed time-tagged photon-counting data in Python to extract interference visibility curves and determine coherence length and coherence time, including uncertainty propagation.
- Cross-validated coherence measurements by comparing interferometric results with spectral linewidth estimates from grating-based spectrometry.

PROJECTS

Quantum-Enhanced Genomic Sequence Prediction   Bradford, UK
Grand Prix Winner, Quantinuum Bradford Quantum Hackathon 2025   October – November 2025

- Designed a hybrid quantum–classical pipeline using compositional quantum natural language processing (Guppy) for genomic sequence prediction.
- Benchmarked quantum models against classical baselines, observing improved predictive performance and indications of favourable scaling behaviour.
- Presented the work at the Quantinuum Bradford Quantum Hackathon 2025; awarded Best Use Case for Healthcare and Overall Grand Prix (First Prize).

Quantum Algorithms for Time-Series Market Simulation & Forecasting London, UK
Finalist, IBM City of London Quantum Hackathon 2025 September – October 2025

- Explored quantum generative modelling using Born-machine-based approaches with quantum Monte Carlo–style sampling for financial time-series prediction.
- Analysed how architectural and sampling choices influence a model's ability to capture evolving statistical structure in financial datasets.
- Presented the project at the IBM City of London Quantum Hackathon Finals; selected as finalists.

Modelling Surface Interactions with Hydrogen Edinburgh, UK
NQCC Quantum Hackathon 2025, in partnership with Rolls-Royce PLC July 2025

- Applied Variational Quantum Eigensolver (VQE) methods to model hydrogen–metal surface interactions.
- Evaluated algorithm performance under realistic resource and noise constraints.
- Presented the project at the NQCC Quantum Hackathon, emphasising technical realism and credible performance claims.

RESEARCH OUTPUTS

Research Outputs (in preparation)

- Compositional Quantum Natural Language Processing for Genomic Sequence Prediction
- Physics-Informed Ansätze for Ground-State Preparation of Spin Hamiltonians

Funding, Awards & Scholarships

Undergraduate Summer Research Placement (Competitive Funding) London, UK
Competitive funding grant to conduct research at UCL QC2 CDT July – September 2025

Grand Prix Winner & Best UseCase for Healthcare (Funded Award) Bradford, UK
Quantinuum Bradford Quantum Hackathon 2025 November 2025

National Quantum Computing Centre (NQCC) Travel Grant Edinburgh, UK
National Quantum Computing Centre (NQCC) Quantum Hackathon 2025 July 2025

Finalist London, UK
IBM City of London Quantum Hackathon 2025 October 2025

Undergraduate Scholarship Sheffield, UK
MPhys Theoretical Physics at the University of Sheffield September 2022 – June 2026

Academic Scholarship (70%) Northampton, UK
GCSE & A-Level Programme, Bosworth Independent College 2018 – 2022

Bronze Award Northampton, UK
British Physics Olympiad (BPhO) 2021

Bronze Award Northampton, UK
UKMT Senior Mathematics Challenge 2019, 2021

TECHNICAL SKILLS

- **Programming & Simulation:** Python (NumPy, SciPy, Pandas, Matplotlib), JAX, TensorFlow; optimisation, benchmarking, and data analysis; LaTeX
- **Quantum Frameworks:** Qiskit, PennyLane, Strawberry Fields, Piquasso, QuTiP, Guppy
- **Experimental:** SPDC, Michelson interferometry, optical alignment, single-photon detection (APDs), time-tagging (IDQtdc), photon-counting data analysis, uncertainty analysis, LabVIEW
- **Tools:** Git (version control), Linux/Unix, Overleaf;

REFERENCES

Professor Oleksandr Kyriienko
Director of Sheffield Quantum Centre, Group Leader of QuDOS Group, School of Mathematical & Physical Sciences, University of Sheffield, Sheffield, UK
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Dr. Abbie Bray
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