



Shek Lun Leung

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Summary

A Quantum Engineer with a Master's in Engineering Physics specializing in **Quantum Communication** and network optimization. Combines a strong theoretical foundation in quantum mechanics and optical physics with hands-on experience developing solutions for **Quantum Key Distribution (QKD)**. Proven expertise in bridging academic research with practical application through projects in high-performance computing (PyTorch) and novel protocol design (BPPM). A collaborative technical leader and co-founder, adept at prototyping, stakeholder communication, and driving innovation from concept to demonstration.

Core Competencies & Technical Skills

Quantum Communication & Security

Quantum Key Distribution (QKD, BB84), Post-Quantum Cryptography (PQC), Quantum Error Correction, Quantum Repeaters, Single-Photon Detectors (SNSPDs), Optical Communication Protocols (PPM, BPPM)

Quantum Information & Algorithms

Qiskit, Cirq, Pennylane, Shor's & Grover's Algorithms, Quantum Circuit Design

Data Science & Machine Learning

PyTorch, Python, Pandas, Numpy, Scipy, Supervised & Unsupervised Learning

Software & Prototyping

Unity (AR), MATLAB, Manim, Git

Languages

Cantonese (Native), English (Fluent)

Professional Experience

Metvibee | Chief Technology Officer and Co-founder

2023-2024

- Led the technical development of an AR application in Unity for sustainable urban planning, from concept to prototype.
- Pitched innovative ideas and presented app demonstrations to external partners and at conferences, translating complex technology into clear use cases and defining project roadmaps.
- Collaborated across teams to align technology with business goals and Sustainable Development Goals (SDGs).

Education Leader/ EIB | Online Tutor

2020-2022

- Tutored students in advanced IB Physics and Mathematics, simplifying complex scientific concepts using digital simulation tools.

CCC MK Church KaiOi School | Teacher

2018-2019

- Taught Mathematics, CL, and ICT and led a S.T.E.M. class, culminating in a public exhibition of student projects.

Education

Engineering Physics (Quantum Technology) | Royal Institute of Technology (KTH)

2026

Master of Science

Key Coursework: Advanced Quantum Mechanics, Quantum Technology, Quantum Information & Algorithms, Quantum Photonics & Entanglement, Fiber-Optical Communication, Quantum Materials

Physics (Honor) | The Chinese University of Hong Kong

2018

Master of Science

The Chinese University of Hong Kong

Information and Communication Technology (Major), Liberal Studies (Minor)

Postgraduate Diploma of Education

2016

The Education University of Hong Kong

Science and Web Technology

2014

Bachelor of Science Education

Academic Projects

Master Project: Machine Learning for BB84 QKD Network Optimization | KTH

2024-2025

- Addressed the computational bottleneck of real-time QKD by designing a PyTorch neural network to predict optimal system parameters.
- Achieved a **~270x performance speedup** over conventional Dual Annealing methods while maintaining a final secret key rate error of less than 6%.
- Validated the model's ability to generalize to unseen channel conditions, proving its viability for dynamic, real-world quantum networks on resource-constrained devices.
- Technologies: PyTorch, JAX, Python, Scipy, Pandas

Master Thesis: Communication & Error Correction via Polarisation and Time Ordering | Ericsson 2023

- Authored and published a thesis **analyzing** a novel protocol, "Beyond Pulse Position Modulation" (BPPM), for energy-efficient secure communication.
- Demonstrated the protocol's viability** via Python simulation, proving BPPM achieves a superior information density (bits/photon) over standard protocols (PPM, OOK, General) in noisy, long-distance channels.
- Conducted an in-depth analysis of channel capacity using mutual information to **evaluate its robustness** against photon loss and addition errors.

Professional Development

Quantum Error Correction with Google AI Quantum | 2025

Coursera

- Gained hands-on experience implementing the surface code using Google's high-performance Stim simulator.
- Simulated code performance under various noise models to analyze error propagation and estimate the physical error rate threshold required for robust error suppression. [\[Github link\]](#)

Introduction to Post-Quantum Cryptography | 2025

Edx

- Hands-on project experience implementing and analyzing the NIST-standardized Kyber KEM, including building a secure chat application using AES encryption.
- Developed network security tools for vulnerability scanning and analysis (Nmap, socket). [\[Github link\]](#)

Quantum Computing Projects

- [Qiskit-Hackathon-Taiwan \(2021\)](#): Being a mentor in QPong
- [Quantum Optimization \(2021\)](#): Developed generalized code for Max Cut Problem with weighted-edge graphs.
- [Quantum Machine Learning \(2020\)](#): Optimize Quantum Circuit Parameters via Gradient Descent.
- [Quantum Game \(2020\)](#): Built and installed "QPong" on Raspberry Pi via lexaloffie & procedural generation in Unity.

Awards & Community Leadership

IBM Qiskit Community Award Winner IBM Qiskit Hackathon Global 2020

2020

Developed an award-winning program in Qiskit to translate quantum circuits and states like superposition and entanglement into multi-instrument musical compositions and sheet music [\[link\]](#)

International Physicist Tournament 2022 (Win National Selection) IPT

2022

IBM Qiskit Badges

IBM | 2020-2021

- Qiskit Advocate, IBM Quantum Challenge - Fall 2020, IBM Certified Associate Developer -Quantum Computation using Qiskit v0.2X, Qiskit Localization Contributor -Platinum Level Translator - 2021 [\[link\]](#)

Certifications & License

Quantum Information (QTM1x, QTM4x)

Delft University of Technology | 2022

- QTM1x: The Quantum Internet and Quantum Computer & QTM4x: Fundamentals of Quantum Information

Getting Started with Quantum Machine Learning

Coursera | 2021

Machine Learning

Stanford University | 2020

IOT1x: Introduction to the Internet of Things (IoT) (T2 2018)

Curtin University | 2018

Certificate of Registration as a Teacher

Education Bureau of Hong Kong | 2016