Trung Kien Le

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EDUCATION

Bachelor of Science in Physics — Santa Barbara, CA
UC Santa Barbara — *June 2020 - June 2023*
GPA: 3.82 / 4.0

RESEARCH EXPERIENCE

Quantum Optimal Control — Berkeley, CA
UC Berkeley Quantum Nanoelectronics Lab — *June 2022 - Present*

- Superconducting quantum hardware research under Prof. Irfan Siddiqi
- Develop a model-aware reinforcement learning for quantum optimal control for superconducting qubits using Tensorflow and QuTiP
- Study the impact of non-Markovian noises - out of computation space leakage, crosstalk and classical noises - on the coherence of quantum processors

Indefinite Causality on-a-Chip — Santa Barbara, CA
UCSB Quantum Photonic Lab — *March 2022 - Present*

- Develop and design a chip-based experiment for testing quantum indefinite causality by superposition of operations, using KLayout
- Write an optimization program using CVXPY to find the witness of indefinite causal order for data analysis

Quantum Frequency Processor — Santa Barbara, CA
UCSB Quantum Photonic Lab — *November 2021 - Present*

- Conduct experiments to collect the resonance peaks of on-chip AlGaAs pulse shapers
- Develop interface to efficiently collect data and analyse resonance peaks and their frequencies
- Develop model to study the effects of crosstalks arise from heating thermo-optics phase shifters in pulse shaper
- Develop control algorithms to tune pulse shaper's ring-resonator to desired frequency responses and spacing
- Develop quantum frequency processor simulator with multi-tone modulation, and drive parameter compilation algorithm

Quantum Graph State Generator — Santa Barbara, CA
UCSB Quantum Photonic Lab — *June 2021 - September 2022*

- Quantum graph state generator using linear and nonlinear optics under Prof. Galan Moody
- Work on simulation of quantum photonic circuits to perform characterization and tomography of quantum photonic devices
- Study properties of measurement-based quantum algorithms using graph states, and data analysis to estimate state fidelities/sources of errors for graph states by developing a partially distinguishable boson sampling simulator combined with multiphoton error

Quantum Multiparameter Metrology — Hanoi, Vietnam
Vietnam National University Nano and Energy Center — *February 2021 - June 2022*

- Quantum metrology and quantum simulation under Prof. Le Bin Ho and Prof. Nguyen Quoc Hung
- Study quantum metrology performance of GHZ, variational linear-depth ansatz and graph states under Markovian and non-Markovian quantum noises effects using quantum simulators based on QuTiP, Pennylane and Qiskit
- Design and implement convex optimization algorithms to numerically evaluate symmetric logarithmic derivative bound and Holevo-Cramer-Rao bound for quantum metrology
- Optimize implementation of variational quantum algorithms on noisy-intermediate-scale-quantum hardware

TEACHING EXPERIENCES

Tutor Oakland, CA
Laney College *November 2018 - July 2020*
- Mathematics Tutor in Calculus, Statistics, Discrete Mathematics and Linear Algebra

Tutor and Grader Santa Barbara, CA
UCSB Physics Department *September 2021 - Present*
- Learning Assistant for Thermodynamics
- Grader for Statistical Mechanics, Complex Analysis and Condensed Matter Physics

EXTRACURRICULARS

Club Volunteer Santa Barbara, CA
UCSB Physics *September 2020 - Present*
- Undergraduate Diversity and Inclusion in Physics (UDIP)
- Society of Physics Student (SPS)
- SPS Journal Club Chair
- SPS Graduate Application Workshop Chair

PUBLICATIONS

1. Trevor J. Steiner, Joshua E. Castro, **Trung Kien Le**, Liao Duan, Jon Peters, Corey McDonald, Nicholas Lewis, Lillian Thiel, John E. Bowers, and Galan Moody. Integrated Tunable Bell State Generator and Hong-Ou-Mandel Experiment on AlGaAsOI, submitted to CLEO 2023

PRESENTATIONS

1. **Trung Kien Le**. Machine Learning for Quantum Optimal Control, UC LEADS Summer 2022 Symposium, August 2022, Berkeley, CA
2. **Trung Kien Le**, Photonic Pulse Shaper with AlGaAs-on-insulator, UC LEADS Winter 2022 Symposium, March 2022, Santa Barbara, CA
3. **Trung Kien Le**, Photonic Quantum Computing with AlGaAs-on-insulator, UCSB Undergraduate Physics Research Symposium, September 2021, Santa Barbara, CA
4. **Trung Kien Le**, Open Quantum System, SPS Journal Club Talk, February 2021, Santa Barbara, CA

AWARDS AND RECOGNITION

Research Grant
- **2021 - 2023 UC Leadership Excellence through Advanced Degree (UC LEADS)** fellowship, $4500 for each Summer
- **2022 - 2023 Cisco Research Grant Award**, $150,000, Project: "Memory-Free Quantum Repeaters"

Research Recognition
- Honorable Mention for UC LEADS Winter 2022 Symposium
- Recognized as significant contributor to Prof. Galan Moody's NSF CAREER Award for AlGaAs-on-Insulator Integrated Quantum Photonics

REFERENCES

Prof. Galan A. Moody
Assistant Professor of Electrical and Computer Engineering at the University of California, Santa Barbara
Email: moody@ucsb.edu
Prof. Nguyen Quoc Hung
Assistant Professor at Vietnam National University, Hanoi University of Science
Email: hungngq@hus.edu.vn
Prof. Philip Alan Pincus
Professor of Physics and Materials Science at the University of California, Santa Barbara
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Prof. Irfan Siddiqi
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