

QIYAO (CATHERINE) LIANG

(Updated as of April 2024)

qiyao@mit.edu

www.qiyaoliang.com

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA *Sep 2022 - May 2027*
Ph.D. in Electrical Engineering and Computer Science
Research Advisor: Ila R. Fiete

Duke University, Durham, NC *Aug 2018 - May 2022*
BS in Physics, minor in Math
Dissertation Title: "Robust Control in Trapped-ion Quantum Computers"
Research Advisor: Kenneth R. Brown

RESEARCH INTERESTS

Physics of intelligence, Mechanistic Interpretability, Neuroevolution, Artificial life, AI for Science, Quantum Computing.

INTERNSHIPS

Zapata Computing, Boston, MA *July 2022 - Sep 2022*
Algorithm Team
Supervisor: Peter D. Johnson

IonQ, College Park, MD *May 2021 - Aug 2021*
Theory Team
Supervisor: Yunseong Nam

PUBLICATIONS

Qiyao Liang, Ziming Liu, and Ila Fiete. Do diffusion models learn semantically meaningful and efficient representations?, 2024. (Accepted at ICLR 2024 Workshops)

Qiyao Liang, Mingyu Kang, Ming Li, and Yunseong Nam. Pulse optimization for high-precision motional-mode characterization in trapped-ion quantum computers. *Quantum Science and Technology*, 9(3):035007, Apr 2024

Qiyao Liang, Yiqing Zhou, Archismita Dalal, and Peter D. Johnson. Modeling the performance of early fault-tolerant quantum algorithms, 2023. (Accepted at Physical Review Research)

Mingyu Kang, **Qiyao Liang**, Ming Li, and Yunseong Nam. Efficient motional-mode characterization for high-fidelity trapped-ion quantum computing. *Quantum Science and Technology*, 8(2):024002, Jan 2023

Mingyu Kang, **Liang, Qiyao**, Bichen Zhang, Shilin Huang, Ye Wang, Chao Fang, Jungsang Kim, and Kenneth R. Brown. Batch optimization of frequency-modulated pulses for robust two-qubit gates in ion chains. *Phys. Rev. Appl.*, 16:024039, Aug 2021

Ye Wang, Stephen Crain, Chao Fang, Bichen Zhang, Shilin Huang, **Liang, Qiyao**, Pak Hong Leung, Kenneth R. Brown, and Jungsang Kim. High-fidelity two-qubit gates using a microelectromechanical-system-based beam steering system for individual qubit addressing. *Phys. Rev. Lett.*, 125:150505, Oct 2020

TALKS

Do Diffusion Models Learn Semantically Meaningful and Efficient Representations? *February 2024*

MIT Yang-Tan Collective Seminar, Jane Street Graduate Fellowship Workshop

Modeling Quantum Algorithm Performance on Early Fault-Tolerant *March 2023*

APS March Meeting, Las Vegas, NV, 2023

IBM Qiskit Advocate Demo *December 2020*

Variational quantum algorithms, hybrid quantum-classical neural networks, and denoising autoencoders for classifying and denoising MNIST hand-written digits.

Invited Speaker at Women in Quantum Summit II *October 2020*

PATENTS

Efficient motional-mode characterization for high-fidelity trapped-ion quantum computing

Mingyu Kang, **Qiyao Liang**, Ming Li, Yunseong Nam

US Patent Application No.18/202,270, Date of Application: May 25, 2023

Implementation of Batch Optimization for Robust Two-qubit Gates for Quantum Computation

Mingyu Kang, Kenneth Brown, **Qiyao Liang**, Bichen Zhang

US Patent Application No.63/175,228, Date of Application: April 15, 2021

AWARDS AND SCHOLARSHIPS

Alan V. Oppenheim Fellowship, MIT EECS Department *2022*

Awarded based on merit to cover first-year graduate stipend

Rodney I. McCormick Award, Duke Physics Department *2022*

Awarded for outstanding undergraduate research to one graduating senior

TEACHING

Applied Introduction to Quantum Computing *Spring, Fall 2021*

Lead Instructor, Physics Department, Duke University

Duke × QBraid Quantum Computing High School Summer Course *Summer 2021*

Lead Instructor, QBraid

LEADERSHIP & OUTREACH

Duke Undergraduate Quantum Information Society (Co-founder and President) *2020-2022*

Mentor and judge at HackDuke Quantum *2021*

Mentor and judge at McHacks Quantum (McMaster University) *2021*

SKILLS

Programming Languages and Frameworks

Python (PyTorch, SKLearn, Panda), Java, MATLAB, Mathematica, C, Julia, Assembly (MIPS), R, L^AT_EX, LabVIEW, Jupyter Notebook, Git.

Languages

English (native-level), Mandarin (native-level), Spanish (elementary), Japanese (elementary)