Quynh The Nguyen

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Education

Harvard University — Cambridge, MA
Ph.D. in Quantum Science & Engineering — *2022 - 2027*

Massachusetts Institute of Technology — Cambridge, MA
B.S. in Physics and Computer Science, minor in Math (GPA: 5.0/5.0) — *2018 - 2022*

Research Experience

Los Alamos National Laboratory — Los Alamos, NM
Summer research intern — *06/2022 - 08/2022*

- Conducting research on quantum machine learning and quantum information theory

Research Laboratory of Electronics (MIT), advised by Prof. Dirk Englund and Prof. Seth Lloyd — Cambridge, MA
Undergraduate research assistant — *01/2021 - 05/2022*

- Using machine learning and mathematical tools to study quantum error-correcting codes
- Developing quantum algorithms for group-equivariant transformations
- Developing quantum(-inspired) algorithms for numerical linear algebra

Quantum Measurement Group (MIT), advised by Prof. Mingda Li — Cambridge, MA
Undergraduate research assistant — *01/2019 - 11/2020*

- Assisted in growing single crystalline materials by the salt flux and vapor transport methods
- Analyzed transport measurement data on novel quantum materials
- Used physics-inspired machine learning frameworks to study material properties

Publications and Preprints

[1] **Q. T. Nguyen**, B. T. Kiani, S. Lloyd, "Quantum algorithm for dense and full-rank kernels using hierarchical matrices," arXiv:2201.11329

[2] G. Castelazo*, **Q. T. Nguyen***, G. D. Palma, D. Englund, S. Lloyd, B. T. Kiani, "Quantum algorithms for group convolution, cross-correlation, and equivariant transformations," arXiv:2109.11330

[3] N. C. Drucker, T. Nguyen, F. Han, X. Luo, N. Andrejevic, Z. Zhu, G. Bednik, **Q. T. Nguyen**, et al., "Fluctuation-driven, topology-stabilized order in a correlated nodal semimetal," arXiv:2103.08489

[4] Z. Chen, N. Andrejevic, T. Smidt, Z. Ding, Q. Xu, Y. Chi, **Q. T. Nguyen**, A. Alatas, J. Kong and M. Li, "Direct prediction of phonon density of states with Euclidean neural network," *Advanced Science*, 2021.

[5] F. Han, N. Andrejevic, T. Nguyen, V. Kozii, **Q. T. Nguyen**, T. Hogan, Z. Ding, R. Pablo-Pedro, S. Parjan, B. Skinner, A. Alatas, E. Alp, S. Chi, J. Fernandez-Baca, S. Huang, L. Fu, M. Li. "Quantized thermoelectric Hall effect induces giant power factor in a topological semimetal," *Nature Communications*, 2020.

Skills

Programming: Python, Java, Matlab, Julia, Mathematica, RISC-V

Softwares & libraries: GitHub, Qiskit, Tensorflow, PyTorch, PennyLane, Mosek, CVX

Languages: English, Vietnamese, French (reading)

Honors and Awards

James Mills Peirce Fellowship, Harvard University, 2022

Memorial Scholarship, MIT FCU, 2020

Tuomala Award for outstanding performance in Thermal Fluids Engineering, MIT MechE, 2019

Gold Medal at International Physics Olympiad, Indonesia 2017

Gold Medal at International Physics Olympiad, Switzerland 2016

Oral and Poster Presentations

[1] Quantum algorithm for dense kernel matrices using hierarchical splitting, QuARC, MIT, Feb 7, 2022

Teaching Experience

Teaching assistant for MIT 6.036 (Intro to Machine Learning, Fall 2021, 400+ students): developed problem sets, graded exams, held weekly recitation sessions with 20 students; received teaching evaluations of **7.0/7.0**

Personal projects

Learning separation between equivariant and fully-connected networks: final project for the class Statistical learning theory at MIT; Bobak Kiani and I showed a class of learning problems for which equivariant neural networks can provably learn better than fully-connected networks in terms of sample complexity; see our report

Quantum autoencoder for data compression: project participated in MIT Quantum Hackathon 2021; our team implemented a quantum autoencoder and applied the model to compress MNIST handwritten digit data and H3 molecular ground states; code is available here

Activities

Clubs: MIT-Harvard Quantum Machine Learning Journal Club; Vietnamese Students Association at MIT

Honor societies: Tau Beta Pi (MIT Engineering), Eta Kappa Nu (MIT EECS), Sigma Pi Sigma (MIT Physics)

Sports & music: soccer, guitar, rock bands, backpacking trips

Relevant coursework

MIT: Quantum Mechanics III, Statistical Physics, Real Analysis, Probability Theory, Machine Learning, Software Engineering, Applied Discrete Math, Design and Analysis of Algorithms, Computer Systems Engineering.
Grad-level: Quantum Computation, Quantum Information Science, Theory of Computation, Statistical Learning Theory, Theory of Solids I, Quantum Field Theory I, Quantum Technology and Devices, Quantum Complexity Theory