Quynh The Nguyen

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Education

Massachusetts Institute of Technology Cambridge, MA

B.S. in Physics and Computer Science, with minor in Mathematics (GPA: 5.00/5) *Expected June 2022*

Relevant Coursework: Quantum Mechanics I-III, Statistical Physics, Real Analysis, Applied Probability Theory, Machine Learning, Deep Learning, Software Engineering, Computation Structures, Applied Discrete Math, Algorithms I&II, Communication Networks. *Graduate-level courses:* Quantum Information Science I&II, Theory of Computation, Statistical Learning Theory, Theory of Solids I, Quantum Field Theory I

Courses in Spring 2022: Computer System Engineering, Quantum Technology and Devices, Quantum Complexity Theory

Skills

Programming: Python, Java, Matlab, HTML, CSS, RISC-V

Softwares & packages: GitHub, Mathematica, Qiskit, Tensorflow, PyTorch, PennyLane, Picos, CVXPY, Matlab CVX

Languages: English, Vietnamese (native), French

Research Experience

MIT Quantum Photonics Group, supervised by Prof. Dirk Englund and Prof. Seth Lloyd Cambridge, MA

Undergraduate Research Assistant (SuperUROP program) *Feb 2021 - present*

Overview: Conducting research on quantum algorithms and quantum error correction, with applications in machine learning and numerical analysis

- Using machine learning and quantum measure theory tools to study quantum error-correcting codes
- Developing quantum algorithms for group convolutions and equivariant transformations
- Developing quantum algorithms for numerical analysis and integral equations

MIT Quantum Measurement Group, supervised by Prof. Mingda Li Cambridge, MA

Undergraduate Research Assistant *Jan 2019 - Nov 2020*

Overview: Investigated thermal and electrical transport properties of novel quantum materials via high-precision quantum measurements and machine learning

- Assisted in growing single crystalline materials by the salt flux and vapor transport methods and analyzing transport measurement data
- Developed quantum theories relating to energy transport in novel quantum materials
- Used physics-inspired machine learning frameworks to predict material properties

Honors and Awards

Tau Beta Pi and Eta Kappa Nu national honor societies, 2021

Memorial Scholarship, *awarded by MIT FCU*, 2020

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

Gold Medal at *International Physics Olympiad*, Indonesia 2017

Gold Medal at *International Physics Olympiad*, Switzerland 2016

Publications and Preprints

[1] **Q. T. Nguyen**, B. T. Kiani, S. Lloyd, "Quantum algorithm for dense kernel matrices using hierarchical splitting," 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 (under submission)

[3] N. C. Drucker, T. Nguyen, F. Han, X. Luo, N. Andrejevic, Z. Zhu, G. Bednik, **Q. T. Nguyen**, Z. Chen, L. K. Nguyen, T. J. Williams, M. B. Stone, A. I. Kolesnikov, S. Chi, J. Fernandez-Baca, T. Hogan, A. Alatas, A. A. Puretzky, D. B. Geohegan, S. Huang, Y. Yu, M. Li, "Fluctuation-driven, topology-stabilized order in a correlated nodal semimetal," arXiv:2103.08489. (under submission)

[4] Z. Chen, N. Andrejevic, T. Smidt, Z. Ding, Y-T 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. (cited by 6)

[5] F. Han, N. Andrejevic, T. Nguyen, B. Skinner, **Q. T. Nguyen**, Z. Ding, R. Pablo-Pedro, S. Parjan, V. Kozii, A. Alatas, E. Alp, S. Chi, J. Fernandez-Baca, S. Huang, L. Fu, M. Li. "Discovery of Giant, Non-saturating Thermopower in Topological Semimetal at Quantum Limit," *Nature Communications*, 2020. (cited by 20)

Teaching Experience

Teaching Assistant: 6.036 Intro to Machine Learning (Fall 2021). Wrote weekly homework and graded exams for a class of over 400 students; held weekly recitation sessions with 30 students. Received teaching evaluations (on a 1-7 scale) of **7.0** (simulated interest, displayed thorough knowledge, supported learning)

Tutor: 8.06 Quantum Mechanics III (Spring 2022), 6.046 Design and Analysis of Algorithms (Spring 2022), 6.004 Computation Structures (Fall 2021). Provided one-on-one tutoring sessions

Lab Assistant: 6.036 Intro to Machine Learning (Spring 2021). Held recitation sessions with 15 students and office hours

Grader: 8.223 Classical Mechanics II (January 2022), 8.05 Quantum Mechanics II (Fall 2020), 8.044 Statistical Physics I (Spring 2020). Graded weekly homework of 70-100 students

Personal projects

Learning separation between equivariant and fully-connected networks: Final project for the class Statistical learning theory at MIT. I and Bobak Kiani 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 available here

Activities

Sports: Play for MIT intramural soccer teams of East Campus and Random Hall

Clubs: MIT-Harvard Quantum Machine Learning Journal Club; MIT AI Club; MIT Society of Physics Students; Vietnamese Students Association at MIT

Hobbies: Soccer, guitar, classic rock bands, and backpacking trips