Ho **Nam** Nguyen

PhD student with a strong research background in Quantum Computing and applied Machine Learning, seeking roles where I can leverage my expertise towards impactful projects.

Relevant Experiences

Graduate Student Researcher **01/2021 - Present**

Machine Learning for Quantum State Discrimination 01/2024 - Present
UC Berkeley/Lawrence Berkeley National Laboratory, CA

- Implemented matched filtering and a small deep learning model on noisy signals to achieve **97-98%** qubit state classification accuracy while reducing readout time by **25%**.
- Collaborated with experimentalists to deploy the lightweight model on an FPGA for real-time classification with only **52 ns** latency, enabling mid-circuit measurements.
- Currently exploring RNNs for detecting qubit decay, the primary remaining error.

Reinforcement Learning for Quantum Gate Design 01/2021 - 11/2023
UC Berkeley, CA

- Led and executed all aspects of the project, including constructing a physics simulator, implementing the DDPG algorithm for continuous controls, and reporting the findings.
- Achieved **30%** shorter entangling gates while maintaining fidelity above **99.9%**.
- Engineered a pre-trained context-aware agent, delivering **99.9%** fidelity solutions to hardware drifts up to **4%**, while offering up to **8x** faster fine-tuning for larger drifts.

Graduate Student Instructor: Machine Learning Algorithms **01 - 05/2024**
UC Berkeley, CA

- Facilitated weekly discussions and tutorials for **20** Master students.
- Implemented **10+** core optimization methods such as SGD and simulated annealing, followed by deep learning models like CNNs, RNNs, VAEs, and GNNs.
- Provided **9** homework assignments tailored to chemistry and molecular science.
- Spotlighted recent advancements such as sequence-to-sequence and transformers.

Graduate Student Research Assistant: AI for quantum control **06 - 08/2021**
Lawrence Berkeley National Laboratory, CA

- Developed an OpenAI-compatible gym for simulating the dynamics of superconducting transmon qubits under external control pulses.
- Implemented two Q-learning algorithms to learn both discrete and continuous pulses.
- Achieved a **3x** reduction in gate duration for single-qubit operations, while sustaining a fidelity of **99.9%**.

Student Researcher: Model-fitting with λ-statistics for pulsar search **06 - 08/2018**
Perimeter Institute, Canada

- Investigated a λ-statistics-based model-fitting algorithm on time-series data.
- Validated the algorithm's efficacy on a simplified toy model featuring 2D timestreams.
- Provided the groundwork for the full pulsar search problem with 3D timestreams.

Research Intern: Validation of material budget in the CMS tracker **06 - 08/2017**
CERN, Switzerland

- Modified existing C++ code and added Python scripts to extract azimuthal coordinate information for radiation length analysis in the Compact Muon Solenoid (CMS) tracker.
- Identified non-constant radiation length values in the tracker's edge modules, offering initial insights for further improving the accuracy of the material budget estimation.

Contact

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github.com/honamnguyen
linkedin.com/in/honamnguyen
google scholar

Education

2019 - Present
Ph.D. in Physics
UC Berkeley, CA

2018 - 2019
M.S. in Physics
Perimeter Institute, Canada

2014 - 2018
B.S. in Physics & Astro
Stony Brook University, NY
Summa Cum Laude
Honors College

Skills

Programming
- Python
- Mathematica
- MATLAB
- C/C++ (limited)

Machine Learning
- Scikit-learn
- PyTorch
- Tensorflow (limited)
- RLlib

Quantum Computing
- Qiskit
- Cirq
- Qulacs
- QuTiP
- Stim

Language
- English (Proficient)
- Vietnamese (Native)
- Spanish (Intermediate)

Publications

Reinforcement learning pulses for transmon qubit entangling gates. arXiv:2311.03684 (2023) (to be published on MLST)
H. N. Nguyen*, F. Motzoi, M. Metcalf, K. B. Whaley, M. Bukov, M. Schmitt.*

Machine learning for continuous quantum error correction on superconducting qubits. New J. Phys. 24, 063019 (2022).
I. Convy, H. Liao, S. Zhang, S. Patel, W. P. Livingston, ***H. N. Nguyen****, I. Siddiqi, K. B. Whaley.*

Measuring the Small-Scale Matter Power Spectrum with High-Resolution CMB Lensing. Phys. Rev. D 99, 023502 (2019).
H. N. Nguyen*, N. Sehgal, M. S. Madhavacheril.*

Science from an Ultra-Deep, High-Resolution Millimeter-Wave Survey. arXiv:1903.03263 (2019).
N. Sehgal, ***H. N. Nguyen****, et al.*

The Simons Observatory: Science goals and forecasts. Journal of Cosmology and Astroparticle Physics 02 056 (2019).
Simons Observatory Collaboration (including ***H. N. Nguyen****).*

CMB-S4 Science Book, First Edition. arXiv:1610.02743 (2016).
K. N. Abazajian et al (including ***H. N. Nguyen****).*

Talks

05/2024: Reinforcement learning pulses for transmon qubit entangling gates. *Shenzhen International Quantum Academy*.
03/2023: Designing quantum gates using deep reinforcement learning. *APS March Meeting 2023*. Las Vegas, NV.

Teaching

Graduate Student Instructor *at University of California, Berkeley*
01/2024 - 05/2024: CHEM 277B. Machine Learning Algorithms
01/2021 - 05/2021: PHYS C21. Physics and Music
08/2020 - 12/2020: CS C191. Quantum Information Science and Technology
08/2019 - 12/2020: PHYS 8A/8B. Introductory Physics

Teaching Assistant *at Stony Brook University*
08/2015 - 12/2015: SSO 101. Science and Society 101

Service and Leadership

05/2024	**Reviewer** for Engineering Research Express	
01/2022 - 05/2023	**Instructor** for SwingCal course by UC Berkeley Swing Dancing Club	UC Berkeley
02/2021	**Teacher** at Splash! Berkeley Taught a lesson on Neural Networks to local highschool students.	UC Berkeley
08/2016 - 05/2018	**Faculty Director Advisory Board** at College of Science and Society Towards improvement of the student experience within the college.	Stony Brook University
08/2015 - 05/2018	**Resident Assistant** at Mount College, Campus Residences	Stony Brook University
08/2015 - 05/2016	**Undergraduate College Fellow** at College of Science and Society	Stony Brook University

Awards

2018 – 2019	**Perimeter Scholars International Award** Full support for one-year master study at Perimeter Institute	University of Waterloo
2018	**John S. Toll Prize** One of 2 outstanding seniors in Physics and Astronomy	Stony Brook University
2018	**Chancellor's Award for Student Excellence** One of 249 recipients in all 64 SUNY campuses	State University of New York
2016, 2017	**URECA Summer Research Award** Towards summer research at Stony Brook University	Stony Brook University
2015	**Honors College Scholarship** Membership to the highly selective Honors College program	Stony Brook University
2013	**Honorable Mention** 14th Asian Physics Olympiad (APhO)	Indonesia