# Henry Lin

## Research Interest

I am interested in the intersection of mathematical physics, quantum information science, and computational method. Specifically, I am interested in developing and deploying quantum or hybrid algorithms that focus on quantum simulation of many-body systems and classical computational methods.

## Education

**University of Wisconsin Madison**, Madison, WI

*Master of Science in Physics* *SEP 2024 – MAY 2026*

Relevant Courses: Quantum Computing, Solid State Physics, Numerical Linear Algebra, Algebra, Quantum Algorithms.

**University of Massachusetts Amherst**, Amherst, MA

*Master of Science in Computer Science* *SEP 2023 – MAY 2024*

Relevant Courses: Probabilistic Graphical Model, Machine Learning, Reinforcement Learning, Deep Generative Model, Applied Numerical Optimization.

**University of Massachusetts Amherst**, Amherst, MA

*Bachelor of Science in Computer Science, Physics (Honors), Mathematics* *SEP 2020 – MAY 2023*

Relevant Courses: Complex Analysis, Partial Differential Equations, Intro to Robotic, Algorithms for Data Science, Scientific Computing.

## Awards

**YQuantum hackathon** *2025*

*Yale University*

- Yale Hackathon BlueQubit challenge winner.

**The Blaise Pascal Quantum Challenge** *2025*

*Pascal*

- *Top 15 teams invited to Pascal Quantum challenge under the team name: quaNtumFix.*
- *Project is about Ammonia production with quantum simulations for green agriculture.*

**Bay State Fellowship** *2023-2024*

*University of Massachusetts Amherst*

- Competitive fellowship awarding a teaching assistantship position, providing full tuition waiver, health insurance waiver, and stipend for up to four semesters for a master's degree in computer science.

**High Demand Scholarship** *2022-2023*

*University of Massachusetts Amherst*

- Awarded for academic achievement for STEM undergraduate students.

**Dean's List** *2020-2023*

*University of Massachusetts Amherst*

- Awarded for achieving a semester GPA for 3.5+.

## Experience

### Woods Lab *Fall 2025 –Present*

- Engineer an exchange only system to simulate Kitaev Honeycomb model.

### Soley Lab *Summer 2024 – Summer 2025*

- Used tensor train and adaptive VQE method to simulate a quantum system.

### Krastanov Lab *Fall 2023 - Spring 2024*

- Built a publicly accessible quantum error correct (QEC) wiki that's useful for the QEC community. Learning different QEC codes such as bicycle, LDPC, hypergraph product code, surface code. Learning different decoder such as belief propagation and small-set flip algorithm.
- Worked on implementation for hypergraph product code decoder.

### Information Fusion Lab *Fall 2021 – Spring 2024*

- Used Canny edge detection, hough circle, and histogram equalization to generate the partial masks.
- Used the weak, synthetic labels and creating a custom loss function to guide the model to predict an accurate segmentation mask in an unsupervised manner.
- Achieved a 0.7 dice score on the testing set.

### Undergraduate Research Volunteers Program *Winter 2022-2023*

- Investigated the latent space of encoded texts and images by using CLIP developed by OpenAI and deployed the stable diffusion algorithm to generate the image.
- Used linearly interpolate two concepts in the original text embedding space.
- Used gradient descent to the distance, and then non-linearly interpolate two concepts in the original text embedding space.

### Wang Lab *Summer 2022*

- Worked on single mode Wigner tomography, and my goal was reconstructing the density matrix of a quantum state.
- Read 3 research papers and deployed the techniques such as least-squares fitting, gradient descent, and maximum likelihood estimation in reconstructing the density matrix.

### Early Research Scholar Program *Fall 2021 – Spring 2022*

- Worked with a team of four undergraduate students, and guided by mentors to learn about the research skills in computer science.

- Worked on the project that focuses on the congenital heart diseases from a cardiac MRI. Built a convolutional neural network using Pytorch framework to estimate the volume of a heart.
- Presentated my research findings and poster to the UMass faculties and in the ERSP national conference.

## Paper & Presentation

**Unsupervised Segmentation of Left Ventricle Using Cardiac MRI**
***Henry Lin**, Ke Xiao, James Ko, Madalina Fiterau*
Undergraduate Honors Thesis, 2023

**Single/Two-frame(s) Volume Estimation of the Left Ventricle Using Convolutional NN**
*Nitya Aryasomayajula, **Henry Lin**, Sneha Pullanoor, Dawn Varughese*
- Presented our poster at the virtual national ERSP conference hosted by UCSD.

**Continuous Control of Latent Diffusion Model Through Token Embedding Interpolation**
***Henry Lin**, Pracha Promthaw, Nikhil Gautam, Dmitry Petrov*
- Presented our poster at the URV session hosted by UMass Amherst where faculties and students are invited.

## Teaching

**Physics 201 – General Physics** *Spring 2026*
*University of Wisconsin Madison*

**Math 213 – Calculus and Introduction to Differential Equations** *Fall 2024*
*University of Wisconsin Madison*

**CICS 210 – Data Structure** *Spring 2024*
*University of Massachusetts Amherst*

**CompSci 250 - Introduction to Computation** *Fall 2023*
*University of Massachusetts Amherst*
- Leading a discussion session for a class of 33 students, holding office hours, grading assignments, answering questions on the Piazza forum.

## Certificates

**Qiskit Global Summer School – Quantum Excellence** *2025*
*IBM*
- *Completed all four core labs.*

## Skills

**Programming Languages:** Python, Java, MatLab, JavaScript, HTML/CSS, Julia, Mathematica.
**Frameworks:** PyTorch, Qiskit, Qutip, TensorFlow.
**Languages:** English, Mandarin Chinese.
**Skills:** Problem solving, resilience, self-directed learning, analysis, data visualization, numerical analysis, quantum computing, machine learning, programming.