

+1 608 949 4893 | Madison, WI, USA | harry.luo@wisc.edu | github.com/HarryLuo0 | linkedin.com/in/gzluo

EDUCATION

BACHELOR OF SCIENCE - APPLIED MATHEMATICS, ENGINEERING AND PHYSICS ([AMEP](#))

University of Wisconsin - Madison

09/2022 - 05/2026 (Expected)

- **Majors:** Mathematics + Physics (Honors) + AMEP
- **Certificate (Minor):** Integrated Liberal Studies
- **GPA:3.83/4.0**

• Core Coursework:

- (Classical, Quantum (Grad), Statistical) Mechanics| Electrodynamics
- Real Analysis | Linear & Abstract Algebra| ODE& PDE| Non-linear Dynamics| Linear Optimization | Matrix Methods
- Signal Processing | Circuit Analysis | Solid-State

PUBLICATION

1. *Energy-Scaled Zero Noise Extrapolation for Gottesman-Kitaev-Preskill Code*

submitted:

GRANTS & AWARDS

- **Trewartha Senior Honors Thesis Research Grant (\$1500)** 11/2025
 - Awarded for senior thesis conducting a theoretical and numerical study of Gottesman-Kitaev-Preskill (GKP) codes under pure-loss decoherence.
- **Jay C. Halls Scholarship (\$500)** 05/2025
 - Awarded on the basis of academic achievements.
- **UW-Madison Scholarship for Summer Studies (\$1000)** 05/2024
 - Awarded to fund summer courses and conduct research off-campus.

PROJECTS

1. *A Strategist's Guide to Campus Dining: A Multifactor Optimization Approach* ([Repo](#)) 08/2025
Top Course Project, ISyE 524 Intro Optimization (advised by Prof. Amanda Smith)
 - A Mixed-Integer Linear Programming (MILP) project for optimizing weekly restaurant choices under constraints of time, money and nutrients.
2. *Simulating and Mitigating Crosstalk in a Multi-Qubit System* ([Repo](#)) 08/2025
Winner project, Quantum + Chips 2025 Hackathon at University of Minnesota.
 - An explorative project using `qutip` to simulate a 3 qubit system coupled under a driving magnetic field, in which we observe “crosstalk”.
 - Simulating crosstalk mitigation phenomenologically using an additional compensation Hamiltonian.
3. *A Finite Element Analysis Solution to the Brachistochrone Problem* ([Repo](#)) 04/2025
Honors project, MATH 521 Analysis (advised by Prof. Chris Rycroft)
 - A numerical solution to the classical Brachistochrone problem using FEA with P2 element discretization.
 - Applied Gaussian quadrature and L-BFGS-B optimization to determine the fastest descent path, achieving close agreement with the analytical solution.
4. *Echos of Deep-time Steps: A Deep Learning Approach to Emerging Patterns of Wear* ([Repo](#)) 01/2025
Group project for [COMAP's Mathematical Contest in Modeling](#) | Successful Participant Award
 - Collaborated on a stochastic model to simulate stair wear patterns based on probabilistic pedestrian behavior and environmental erosion factors. A CNN is then trained on the simulation to analyze the usage pattern of any set of stairs.
5. *Lampreys: The Bachelorettes of Lake Michigan* ([Overleaf](#)) 02/2024
Group project for [COMAP's Mathematical Contest in Modeling](#) | Successful Participant Award
 - Collaborated on modeling the ecological impact of invasive Sea Lampreys in Lake Michigan, focusing on the influence of their adaptive sex ratio via simulating population dynamics.

- Developed a semi-discrete model to integrate continuous **predator-prey dynamics** (modeled using a generalized Lotka-Volterra framework) with the lamprey's annual reproductive cycle.

6. **Badger Solar Car: Simulation-based Optimization Model (Repo)** 01/2024 - present
- Numerical Simulation** of a solar-powered race car built by Badger Solar Racing club, written in Matlab& Simulink.
 - Developing an optimization system for racing performance using **receding horizon control**.
 - Simulates the Electrical and Mechanical components of the car, including Solar Array, Battery Management, Resistive Forces, etc.

WORK & RESEARCH EXPERIENCE

1. **Student Researcher** 09/2024 — Present
Otten Group, UW-Madison *Madison, USA*
- Research in quantum error mitigation. Specifically, **zero-noise extrapolation** study of single-mode **Bosonic Codes**, with a particular focus on GKP codes and its protection on qubits under pure photon loss. **Paper in progress**.
 - Thesis project (in progress): *Quantum Error Mitigation in Bosonic Codes: A Study of Gottesman-Kitaev-Preskill Codes Under Pure Loss*.
2. **Student Researcher** 05/2024 — 09/2024
Quantum Photonics Lab, Nanjing University *Nanjing, China*
- Verified theoretical framework of contextual **quantum Fisher information** through numerical simulations
 - Implemented Python code to compare performance of contextual QFI versus traditional QFI in metrology applications
3. **Academic Mentor** 01/2024 — Present
Center of Academic Excellence, UW- Madison *Madison, USA*
- Tutoring students from diverse backgrounds and learning profiles; topics tutored: Pre-Calc, Calc, General Physics, Classical Mechanics, Electrodynamics, Linear Algebra, ODE.
 - Hosting regular one-on-one mentoring sessions for 18+ months; experience in online& in-person tutoring
4. **Museum Docent** 09/2023 — Present
The Leonard R. Ingersoll Physics Museum, UW-Madison *Madison, USA*
- Conducting regular presentations on cool physics demonstration to diverse audiences from the greater Madison Area.
 - Actively participating in the design and execution of regular physics outreach programs.

CAMPUS INVOLVEMENTS

1. **Race Strategy Lead**, [Badger Solar Racing Club](#) Lead: 09/2024- 05/2025
- Lead the race-strategy team to optimize the performance of a solar racing car for [American Solar Challenge 2026](#) and [Formula Sun Grand Prix](#)
 - Utilized Matlab and Simulink for dynamic modeling, simulation, and optimization of the car's performance.
 - Employed Python for data integration and analysis on the physical properties of Solar Car.
2. **Event Coordinator**, Wisconsin International Students Association 09/2023 - 12/2024
- Engaging in the recruiting, decision-making and brainstorming process of student organization management
 - Served as the club event-organizer, facilitated numerous culture-oriented events in collaboration with different departments across campus.

SKILLS

Programming: MATLAB, Simulink, Mathematica, Python ([QuTiP](#), [Qiskit](#), [NumPy](#), [SciPy](#)), Julia

Tech: Git, HTCondor

Languages: English: Proficient, Chinese: Native