Guizhong (Harry) Luo

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EDUCATION

Bachelor of Science - Applied Mathematics, Engineering and Physics (AMEP)
University of Wisconsin - Madison 09/2022 - 05/2026 (Expected)

- **Major:** Mathematics + Physics (Honors) + AMEP
- **Certificate (Minor)**: Integrated Liberal Studies
- **Awards**: Dean's List | UW–Madison Summer Scholarship | Jay C. Halls Scholarship
- **GPA:3.83/4.0**
- **Relevant Coursework:**
  - (Classical, Quantum (Grad), Statistical) Mechanics| Electrodynamics
  - Real Analysis | Linear & Modern Algebra| ODE& PDE| Non-linear Dynamics| Linear Optimization | Matrix Methods
  - Signal Processing | Circuit Analysis | Solid-State

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 constrains 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.
   - A collaborative 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*** (Proj. link) 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*** 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*** 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: Numerical Model*** 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*

- Directed Research on 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.

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, Linux, LaTeX, Raspberry Pi

Languages: English: Proficient, Chinese: Native