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Spencer Lee

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Leveraging numerical methods and quantum optimal control to make quantum computing a reality.

Work & Research Experience

Graduate Research Assistant **Sep 2021 - Present**
Michigan State University *East Lansing, MI*
- Created the Julia software package QuantumGateDesign.jl, for optimal control of quantum systems using smooth pulses. Finds ideal pulses quickly using high-order time steps and second-order optimization.
- Presented lectures, posters, and interactive tutorials at conferences including *WAVES 2022*, *AMS Spring Central Sectional 2023*, and *SIAM Annual Meeting 2024 & 2025*.
- Published in *Journal of Computational Physics* (2026): "High-order Hermite optimization: Fast and exact gradient computation in open-loop quantum optimal control using a discrete adjoint approach."

Project Manager **Jun 2024 - Aug 2024**
Graduate-level Research in Industrial Projects for Students, Tohoku University *Sendai, Japan*
- Led a group of five graduate students from the United States and Japan in developing novel classical parameter-setting strategies for the Quantum Approximate Optimization Algorithm (QAOA).
- Cooperated with researchers from Mitsubishi Electric, the sponsor of the research project.

Long Workshop Participant **Sep 2023 - Dec 2023, Mar 2025 - Jul 2025**
Institute for Pure and Applied Mathematics, University of California, Los Angeles *Los Angeles, CA*
- Collaborated with a diverse group of mathematicians, physicists, and computer scientists from academia and industry on problems in quantum computing (2023) and non-commutative optimal transport (2025).
- Organized a working group exploring optimal-transport-inspired objective functions for quantum control.

Visiting Scholar **Jun 2023 - Aug 2023**
Los Alamos National Laboratory *Los Alamos, NM*
- Accelerated simulation of runaway electrons in Tokamak fusion reactors using GPUs with CUDA.
- Visualized electron behavior using Poincaré plots to identify computationally challenging regions of reactors.

Computing Student Intern **May 2022 - Aug 2022**
Lawrence Livermore National Laboratory *Livermore, CA*
- Used compositional techniques to create high-order integration methods from low-order, symmetric ones.
- Demonstrated by numerical experiments that high-order methods accurately simulate the physics of relevant 2-qubit systems in quantum computers at one-tenth the computational cost of second-order Störmer-Verlet.

Education

PhD in Computational Mathematics, Science, & Engineering **August 2026 (Expected)**
Michigan State University *3.94/4.0 GPA*

Dual Bachelor of Science in Advanced Mathematics and Physics **May 2020**
Michigan State University *High Honors, Honors College, 3.97/4.0 GPA*

Skills

Programming	Julia, Python, C, C++, CUDA, Git, LaTeX, Linux OS, Claude Code, VHDL
Interests	Simulating Physics, Visualizing Information, Applied Research, Computer Graphics
Soft Skills	Leadership, Independent Learning, Communication, Presentation, Teamwork

Awards & Honors

National Science Foundation Graduate Research Fellowship **May 2022 - May 2027**
Michigan State University Rasmussen Fellowship Award **Sep 2021**