

# Sam Fine

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## EDUCATION

### The University of Chicago

Math B.S.; Computer Science M.S.; Grad GPA: 3.78

2021 - 2025

Chicago, IL

## PUBLICATIONS & PREPRINTS

A. Kamen, **S. Fine**, B. Bhattacharyya, F. Chong, A. Goldschmidt. Comparing and correcting robustness metrics for quantum optimal control. arXiv: [2602.10349](https://arxiv.org/abs/2602.10349).

## RESEARCH EXPERIENCES

### Quantum Error Correction for Correlated Noise

June 2025 - Present

Advised by [Liang Jiang](#)

Chicago, IL

- Designed and simulated fault-tolerant error correction protocols for correlated noise.
- Developed machine-learning based decoders for higher-order errors in qLDPC codes.

### [Robust Quantum Optimal Control](#)

May 2025 - Feb 2026

Advised by [Fred Chong](#)

Chicago, IL

- Discovered and repaired a discretization error in a standard robustness metric for quantum optimal control.
- Studied the theoretical and practical trade-offs between control complexity and error susceptibility.

### Fermilab Mu2e Internship

June - Aug 2024

Advised by [Andrei Gaponenko](#)

Batavia, IL

- Developed the model of the [Mu2e experiment's](#) extinction monitor detector.
- Wrote and refactored C++ code that captured the complex geometries and constraints of the detector.

### Higgs Boson Self-Coupling Classification

Jan 2023 - Jan 2024

Advised by [Philipp Windischhofer](#)

Chicago, IL

- Built and applied neural networks to extract highly-compressed, information-preserving statistics about Higgs boson self-coupling events from Large Hadron Collider datasets.

### SLAC Technology Innovation Directorate Intern

2020 - 2021

Advised by [Emilio Nanni](#)

Stanford, CA

- Studied the physics of the [Cool Copper Collider](#): an advanced  $e^+e^-$  linear collider concept in the TeV class.
- Explored efficient normal-conducting particle accelerator design and built the website.

### [Designed & Built a 300 KeV Cyclotron](#)

2016 - 2021

Advised by [Martin Breidenbach](#)

Stanford, CA

- Co-led project to build a 300 KeV cyclotron.
- Designed, constructed and tested vacuum, radiofrequency, ion source and detector systems.

## PROGRAMMING SKILLS & INTERESTS

**Languages:** Python, Julia, C++

**Libraries:** Stim, [Piccolo.jl](#), NumPy, QuTiP, PyTorch

**Interests:** Backpacking; Biking; Reading