

# Shawn Geller

GRADUATE STUDENT · CHARACTERIZATION OF QUANTUM DEVICES

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## Summary

PhD student working in quantum information theory, specializing in characterization of quantum systems. I have used ideas from representation theory, statistical inference, and information theory towards this goal. I also use numerical simulations to study statistical inference methods.

## Work Experience

### National Institute of Standards and Technology

Boulder, CO

RESEARCH ASSISTANT, KNILL GROUP

January, 2019 - Present

- Developed theory for adaptive measurement strategies for application to repeated fluorescence measurements, for example in trapped-ion systems.
- Worked with Ion storage group at NIST to characterize measurement fidelity of an ion system under repetitive fluorescence measurement.
- Worked with Kaufman Lab at JILA to characterize indistinguishability of a neutral atom array.
- Worked with Aumentado group at NIST to characterize entanglement in coupled mechanical oscillators.

### University of Colorado

Boulder, CO

RESEARCH ASSISTANT, DESSAU GROUP

May, 2018 - January, 2019

- Performed characterization of various materials, using methods such as XRD, ARPES, SNOM

### University of Colorado

Boulder, CO

TEACHING ASSISTANT

August, 2017 - May, 2018

- Taught recitation sections of introductory electrodynamics and introductory mechanics.

### National Institute of Standards and Technology

Boulder, CO

RESEARCH ASSISTANT, KNAPPE GROUP

August, 2015 - August, 2016

- Performed testing of Rubidium atomic magnetometers and gradiometers.
- Designed PCBs for lasers to heat an array of atomic magnetometers.

## Education

### University of Colorado

Boulder, CO

PH. D. IN PHYSICS

Expected May 2023

### University of Colorado

Boulder, CO

M. S. IN PHYSICS

Aug. 2017 - May 2021

### Reed College

Portland, OR

B. A. IN PHYSICS

Aug. 2011 - May 2015

- Phi Beta Kappa

## Publications

### [1]

S GELLER, DC COLE, S GLANCY, E KNILL

"Improving quantum state detection with adaptive sequential observations" Quantum Science and Technology 7 (3), 034004

### [2]

SD ERICKSON, JJ WU, PY HOU, DC COLE, S GELLER, A KWIATKOWSKI, S GLANCY, E KNILL, DH SLICHTER, AC WILSON, D LEIBFRIED

"High-fidelity indirect readout of trapped-ion hyperfine qubits" Physical Review Letters 128 (16), 160503

### [3]

S KOTLER, GA PETERSON, E SHOJAEI, F LECOCQ, K CÍČAK, A KWIATKOWSKI, S GELLER, S GLANCY, E KNILL, RW SIMMONDS, J AUMENTADO, JD TEUFEL

"Direct observation of deterministic macroscopic entanglement" Science 372 (6542), 622-625

[4]

D SHENG, AR PERRY, SP KRZYZEWSKI, S GELLER, J KITCHING, S KNAPPE

"A microfabricated optically-pumped magnetic gradiometer" Applied Physics Letters 110 (3), 031106

## Presentations

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### SQuInT 2022

FUTURE CONTRIBUTED TALK, IMPROVING QUANTUM STATE DETECTION WITH ADAPTIVE SEQUENTIAL OBSERVATIONS

*Berkeley, CA*

*Oct. 20-22 2022*

## Software Projects

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### [https://github.com/usnistgov/perm\\_hmm](https://github.com/usnistgov/perm_hmm)

STATE INFERENCE USING PARTIALLY OBSERVABLE MARKOV DECISION PROCESSES

*March, 2022*

Developed for the paper "Improving quantum state detection with adaptive sequential observations" arXiv:2204.00710 [quant-ph], ran on NIST cluster. Primary software tools used: PYTHON, PYTORCH, NUMPY