

ALEX MEIBURG

✉ ameiburg@ucsb.edu  [Timeroot](https://github.com/Timeroot)  <http://ohaithe.re/>  [alex-meiburg-1b4b6573](https://www.linkedin.com/in/alex-meiburg-1b4b6573)

EDUCATION

California Institute of Technology

Dual B.S., Physics / Math

2014 – 2018

Pasadena, California

University of California, Santa Barbara

PhD Candidate, Physics

2018 – 2024 (Expected)

Santa Barbara, California

PUBLICATIONS

Hartree-Fock for Gaussian State Matrix Product States | arXiv:2112.02088

Dec 2021

- Adapted Hartree-Fock iteration for computing ground states to Majorana formalism
- Applied this to Gaussian Fermionic Matrix Product States (GFMPs)
- This new algorithm enabled studying finite-size effects on superconductors at much larger scales

Hardness of Positive Semidefinite Permanents | arXiv:2111.03142

Nov 2021

- Began with studying exact formulae for quantum state tomography (Bayesian estimation)
- Used quantum techniques to get rigorous hardness results on quantum state tomography
- Relationship to permanents resolved a standing open problem in complexity theory

BQP-Complete Constraint Problems | arXiv:2101.08381

Jul 2021

- Motivated by the CSP dichotomy theorem, set out to classify types of quantum constraint problems
- Extended existing list (P, NP, MA, QMA) by adding three new classes (BQP, QCMA, coRP)
- Proved that all quantum CSPs can be realized on qubits

Climate Temperature Record Backfilling | doi:10.1175/jcli-d-18-0698.1

Sep 2019

- Computer vision to analyze satellite IR for temperature estimates
- Formed part of new, comprehensive climate surface temperature record

INVITED TALKS

Caltech - (BQP-Complete Constraint Problems)

Sept 2021

UT Austin - (Hardness of PSD Permanents)

Dec 2021

UCSB - (Hardness of PSD Permanents)

Jan 2021

INTERNSHIPS

Estimating Surface Reflectance from Live Video—Facebook Reality Labs

Summer 2019

- Built on SLAM system for surface reconstruction
- Infrared video channel used with lighting model to find surface reflectance
- Improved photorealistic relighting of scanned scenes

Geomagnetic Signals for Localization—Facebook Reality Labs

Summer 2018

- Steel elements in architecture deform Earth's magnetic field
- Added magnetic layer to SLAM system: calibration and Gaussian process regression
- Achieved localization within 10cm in large office buildings

Reducing TLS Noise in MKID Telescopes—NASA/Jet Propulsion Laboratory

2016-2018

- Found that TLS noise, modelled capacitively, could be cancelled out with dual-resonator
- Modelled and optimized in HFSS, manufactured and tested
- Wrote accompanying CUDA to accelerate readout
- 2-year work formed undergraduate senior thesis

COMPETITIONS & OTHER ACTIVITIES

- CSAW CTF 5-time Finalist
- picoCTF, 1st Place
- Bloomberg CodeCon 2-time Finalist
- "Quattris" Game on Steam
- Quantiacs 5-time winner
- Hack-a-Sat CTF 2-time finalist
- Julia open-source contributor
- Google Hashcode 2021 Finalist (11th place Qualifier)

COMPETENCIES

Languages: Java, Julia, Python, C, C++, Mathematica

Frameworks: Cirq, Qiskit, Tensorflow, CUDA, SCIP, HFSS