

ALEX RUBIN

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EMPLOYMENT

Research Assistant / Teaching Assistant at University of California, Davis

Davis, CA – September 2022 - present

- Carried out research on color centers in silicon and silicon carbide, with applications in quantum nanophotonics.
- Built lab automation system in Python, allowing for execution of quantum optics experiments and saving of results to a database with searchable metadata.
- Taught discussion-labs for Physics 7 undergrad students, 10 hours per week.

Control Software Engineer at Amazon AWS Center for Quantum Computing

San Francisco, CA – August 2021 - September 2022

- Second largest contributor to our flagship Python library enabling researchers to run experiments on superconducting quantum circuits, visualize the results, and persist them to a database. Described by my manager as “prolific”.
- Developed generalizations to our abstraction of a data analysis pipeline to expand the number and types of plots, data, and fitted models that can be produced and saved.
- Wrote drivers for instruments which interfaced with the quantum hardware.
- Reviewed code written by experimental scientists implementing experiments to tune up and benchmark superconducting quantum systems.
- Organized and led quantum computing journal club for the software team.

Software Infrastructure Engineer at Whisper.AI

San Francisco, CA – February 2020 to August 2021

- Wrote automated tests of user interface features and audio performance of hearing aids.
- Maintained and extended CI infrastructure supporting dozens of engineers using CircleCI and Buildkite.
- Implemented MySQL database schema on Google Cloud Platform for warehousing data from automated hardware tests, and Javascript D3 dashboards for visualization.
- Maintained a suite of Python CLI tools and underlying libraries to enable firmware and audio DSP engineers to manipulate hearing aid settings as part of their development flow.

R&D Engineer at PsiQuantum

Palo Alto, CA – September 2018 to February 2020

- Designed and carried out experiments for optical and electrical investigation of components of an integrated photonic quantum computer at cryogenic temperatures.
- Developed CMOS-compatible on-chip thermometer for high-accuracy cryogenic temperature measurement in the vicinity of thermally-tuned photonic elements.
- Wrote specifications for custom lab equipment, including 3D models. Worked with vendors for design review and procurement.
- Designed cryogenic system for high-throughput measurement of electro-optic coefficient in thin films.

- Contributed to in-house Python libraries for automating optical, electrical, and cryogenic lab equipment and processing experiment data.
- Developed automated measurement routines for aligning fiber arrays to on-chip coupler gratings.
- Helped architect software control system for large-scale integrated silicon photonic system.
- Developed indium soldering process for mounting silicon chips to carrier plates for good thermalization in a cryostat.
- Supervised a summer intern and his project to automate an experiment to measure thermal conductivity of silicon samples.

Laser Test Engineer at Trumpf Photonics

Cranbury, NJ – June 2017 to September 2018

- Designed, constructed, and carried out tests of high-brightness AlGaAs diode lasers to characterize efficiency, beam properties, and reliability.
- Automated tests with Python and LabVIEW. Designed SQL schema for storing test data, and Python tools for generating Excel test reports for lab members.
- Initiated research project to conduct micro-measurement of laser diode facet temperature using the thermo-optic effect.
- Supervised an intern and their project to build a system for measuring beam quality of high-divergence diode output.
- Supervised an intern and their project to build and program an Arduino-based controller of a pulsed laser power supply.

R&D Laser Engineer at Photonics International

Ronkonkoma, NY – March 2015 to June 2017

- Assembled and aligned dozens of prototypes of high power Q-switched DPSS lasers. Characterized laser performance and experimentally optimized optical design.
- Assisted with design/assembly of prototype All Normal Dispersion (ANDi) picosecond fiber laser based on literature.
- Conducted final product design reviews. Wrote assembly procedures and bills of material.

PUBLICATIONS

- Efficient quantum algorithms for testing symmetries of open quantum systems ([link](#))

CONFERENCE PRESENTATIONS

Quantum 2.0, Denver, CO – June 19, 2023

- Digital Tavis-Cummings Simulation on Superconducting Quantum Hardware with Error Mitigation ([link](#))

OTHER RESEARCH

Nanophotonics Design and Computation Group at Princeton University – Summer 2018

- Used adiabatic theory to simulate mode evolution in a slowly varying waveguide in MATLAB, for the purpose of optimizing broadband coupling to a ring resonator for nanophotonic frequency comb design.

Quantum Information Sciences & Tech. Group at Stony Brook University – Spring 2015

- Assembled, aligned and obtained lasing in a Ti:Sapphire laser for trapped ion experiments.

- Aligned an SPDC single-photon source based on PPKTP and characterized its quantum efficiency as a function of crystal temperature.

EDUCATION

University of California, Davis

- Doctor of Philosophy (Ph.D.), physics
- September 2022 – present.
- Advisor: Marina Radulaski

Stony Brook University

- Bachelor of Science in physics and mathematics (dual major)
- September 2010 – May 2015