Benjamin T. Chiaro

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"Full stack" quantum computing experimentalist - superconducting qubits

Core qualifications

- Development and execution of multi-qubit quantum algorithms
  - Calibration and characterization of large-scale quantum systems
  - Maintenance, configuration, and operation of experimental apparatus
  - Acquire, analyze, summarize, and report measurement results
  - Interface with theory collaborators
- Characterization of quantum circuit elements:
  - Benchmarking two-qubit logic gates
  - Precision metrology of frequency noise in superconducting qubits
  - Dissipation metrology of superconducting coplanar waveguide resonators
- Scientific programming:
  - python, numpy, scipy, pandas, matplotlib, git
  - Automated data acquisition, analysis, and visualization
  - Numerical simulation of quantum dynamics
- RF test and measurement:
  - Use of custom FPGA based RF system for qubit operation (sideband mixed, homodyne detection)
  - Use of RF characterization tools: VNA, oscilloscope, spectrum analyzer, TDR
  - Familiarity with RF components: amplifiers, attenuators, filters, circulators, terminators, bias-T
- Low temperature physics equipment:
  - Dilution refrigerator and Adiabatic demagnetization refrigerator
  - Vacuum equipment
- Materials science and device fabrication:
  - Process development: UHV reactive sputter, ICP, etching
  - Materials characterization: AFM, SEM, XRD, Wafer bow, SIMS, resistivity, RBS
  - Additional tools used: e-beam deposition, MBE, optical lithography, wet processing, e-beam lithography

Experience

- Graduate Student Researcher - On site at Google quantum hardware lab — 2017 - Present
  University of California - Santa Barbara — Santa Barbara, CA
- Graduate Student Researcher — 2011 - 2017
  University of California - Santa Barbara — Santa Barbara, CA
- Teaching Assistant - Honors experimental physics — 2010 - 2011
  University of California - Santa Barbara — Santa Barbara, CA
- Junior Test Engineer — 2008 - 2010
  Opticomp Corporation — Zephyr Cove, NV
- Student Research Assistant - Atomic collisions group — 2003-2006
  University of Wisconsin - Madison — Madison, WI

Education

- Ph.D. in Physics, Advisor John Martinis — Expected 2020
  University of California - Santa Barbara — Santa Barbara, CA
- Master of Science in Physics, Advisor: John Martinis — 2015
  University of California - Santa Barbara — Santa Barbara, CA
- Bachelor of Science in Physics, Advisor: Chun Lin — 2006
  University of Wisconsin - Madison — Madison, WI

Selected Publications

- **B. Chiaro**, et al. “Growth and preservation of entanglement in a many-body localized system” Submitted (2019).
  - Introduced phase-sensitive measurement techniques to the experimental study of many-body localization.
  - I lead the experiment, performed the measurements, analyzed and summarized the data, lead manuscript preparation, interfaced with theory collaborators.
- **B. Chiaro**, et al. “Dielectric surface loss in superconducting resonators with flux-trapping holes.” Superconductor Science and Technology **29**, 10 (2016).
  - Article included in the “Highlights of 2016” collection of Superconductor Science and Technology.
  - I designed the devices, performed the mask layout, fabricated the devices, made and analyzed the measurements, and wrote the manuscript.
- S. Ohya, **B. Chiaro**, et al. “Room temperature deposition of sputtered TiN films for superconducting coplanar waveguide resonators”, Superconductor Science and Technology **27**, 1 (2014).
  - Achieved record low-power CPW resonator quality factors
  - I assisted with the planning of the experiment, thin film depositions, device fabrication, materials characterization, and lead the resonator measurements.

Public Presentations

- Contributed presentations: APS March Meeting 2012 - 2020
- Invited presentation: Quantum Science Symposium Europe 2018
  Title: “gmon superconducting qubits: a programmable, high fidelity quantum simulation platform”