

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
 - Productive interaction 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, 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
 - 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
 - Additional tools used: ICP etching, e-beam deposition, MBE, optical lithography, wet processing, e-beam lithography
 - Materials characterization: AFM, SEM, XRD, wafer bow, SIMS, resistivity, RBS

EXPERIENCE

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|--|-------------------|
| • 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 Arts in Physics, Advisor: John Martinis | 2014 |
| 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 to *Science*, (2019).
 - Introduced phase-sensitive measurement techniques to the experimental study of many-body localization
 - Lead the experiment, performed the measurements, analyzed and summarized the data, lead manuscript preparation, communicated and iterated with theory collaborators
- F. Arute, et al. “Quantum supremacy using a programmable superconducting processor” *Nature* 574, (2019).
 - Contributed to experimental infrastructure and unitary tomography
- **B. Chiaro**, et al. “Dielectric surface loss in superconducting resonators with flux-trapping holes” *Supercond. Sci. Technol.* 29, 10 (2016).
 - Article included in the “Highlights of 2016” collection of Superconductor Science and Technology
 - Article included in focus issue on “Materials for high coherence quantum circuits”
 - 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”, *Supercond. Sci. Technol.* 27, 1 (2014).
 - Achieved record low-power CPW resonator quality factors
 - 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 - 2019
- Invited presentation: Quantum Science Symposium Europe 2018
Title: “gmon superconducting qubits: a programmable, high fidelity quantum simulation platform”