



Advanced Quantum Testbed at Lawrence Berkeley National Laboratory

The Advanced Quantum Testbed (AQT at LBNL) User Letter of Intent and Proposal Guide - 2020

The Advanced Quantum Testbed is a collaborative research laboratory funded by the U.S. Department of Energy for the advancement of quantum computation based on superconducting circuits. The AQT instrument was commissioned as an open platform to explore and define the future of superconducting quantum computers end-to-end, from quantum processor technology to quantum algorithms. In collaboration with AQT's expert team, testbed users will have full access to hardware and software, participate in its evolution, and advance the science enabled by quantum computing.

Teams from academia, industry, and government laboratories may apply to become AQT users. The length of typical projects is a few weeks to a few months. Access to the testbed and staff is provided at no cost to users for non-proprietary work that will be published in the scientific literature. Information on the current and anticipated capabilities is available [our website](#).

We offer close collaboration with AQT scientists on the execution of user projects, including guidance on efficient compilation of quantum algorithms tailored for AQT hardware, optimization of gate sequence selection, novel control sequences for quantum feedback and noise suppression, potential fabrication of custom quantum processor chips, and other areas.

We are committed to serving and helping create a broad quantum computing community and encourage submissions from diverse and inclusive teams.

Projects may be proposed in the following areas:

- Implementations of Quantum Computation Algorithms or Quantum Simulations
- Quantum Characterization, Validation, and Control Routines
- Novel Control Hardware / Firmware / Software
- Novel Superconducting Quantum Processor Architectures

Due to changes on operating conditions related to COVID-19, we are unable to provide on-site access to users at this time. All user projects will be conducted remotely with assistance from AQT staff. We anticipate being able to offer on-site access no earlier than mid-2021.

How to Apply

Access to AQT is provided through a proposal process, and we encourage prospective users to contact us with any questions at aqt@lbl.gov. The first step is to submit a brief Letter of Intent (LOI) through the [online form at our website](#). The required information for the LOI is described in the Appendix.

Based on the LOI reviews, teams will be invited to submit a full proposal, which consists of a 2-page project narrative and up to 2 additional pages of figures and references. We will provide access to full proposal instructions, templates, and technical guidance from AQT staff upon acceptance of the LOI. Full proposals may not be submitted without an accepted LOI.



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Key Dates

Letters of Intent will be reviewed and approved on a rolling basis. We encourage early submission to provide time to develop the full proposal, and that LOIs be submitted by Friday, September 11, 2020, to ensure full consideration in the initial review cycle.

Full proposals due	Friday, September 25, 2020, 5:00pm Pacific Time
Notification of review outcome	Friday, October 9, 2020
Phase 1 user project window	Monday, October 19, 2020 – Thursday, September 30, 2021

Please note that proposals submissions made past the deadline may not be accepted.

The AQT will open periodically for additional LOI and proposal submissions.

Proposal Selection

LOIs and full proposals will be evaluated for:

- Scientific merit
- Alignment with AQT program goals and utilization of unique resources not available in the commercial domain
- Feasibility with testbed capabilities and resources

LOIs will be screened by AQT staff. Full proposals will be reviewed by a committee of researchers selected for their relevant expertise. Final selection of accepted proposals will be made by AQT leadership.

Required Agreement

A fully executed User Agreement between Lawrence Berkeley National Laboratory and the user's institution is required prior to starting work at AQT. This agreement includes the contractual basis covering the distribution of intellectual property rights. Please contact us with any questions regarding these agreements.



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Appendix: Required Information for Letter of Intent

Overview

Project Title

Project Summary

Provide a one or two sentence high-level summary of the primary significant outcome of the proposed research project

Area of Study (select from list)

Implementations of Quantum Computation Algorithms or Quantum Simulations
Quantum Characterization, Validation, and Control Routines
Novel Control Hardware / Firmware / Software
Novel Superconducting Quantum Processor Architectures
Other (specify)

Project Detail

Please note that text that exceeds the maximums may be truncated prior to forwarding for review.

Project Description and Goals (*max 1,500 characters / ~250 words*)

Briefly describe the scientific or technological motivation and significance of your project in the context of your field of study. Describe your immediate goal in the context of your proposed research as at the Advanced Quantum Testbed.

Requested AQT Quantum Capabilities (*max 1,200 characters / ~200 words*)

Briefly describe how the AQT's quantum system offerings would help you with your proposed project. Please describe your needs primarily in terms of number of qubits, qubit-qubit connectivity, qubit coherence time, available gates, control hardware, and programming stack. If you were to submit a request for a new variant of AQT offerings, please specify.

Requested Form of Interaction with the AQT Team (*max 1,200 characters / ~200 words*)

Please describe the anticipated form of interaction with AQT scientists that would be most productive to successful completion of the project. This could be any combination of, for example, submitting job for remote execution on current hardware, partnering with AQT team to encode and execute quantum circuit, proposing new hardware/software, or other approaches. If you have discussed your project with AQT staff, please provide their names.

Research Team Composition (*max 1,200 characters / ~200 words*)

Describe the size and composition of the team that would actively work on the proposed project.

Project Timeline

Provide an estimated start date and end date within the project window, Oct 19, 2020 – Sept 30 2021.



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Primary Investigator Information

For the PI (or equivalent) on your team, please provide:

- Name
- Title
- Institution
- Email address
- Brief statement on the current status of your quantum computing research