

DEVCOM Army Research Laboratory

SPECIAL NOTICE FOR

LPS Qubit Collaboratory (LQC)



W911NF21S0009-Special Notice-1

Issued by:

U.S. Army Contracting Command-Aberdeen Proving Ground

Research Triangle Park Division

P.O. BOX 12211

Research Triangle Park, NC 27709-2211

Funding Opportunity Title: LPS Qubit Collaboratory Special Research Topics Announcement

Funding Instrument Type: Grants, Cooperative Agreements, Procurement Contracts

Funding Opportunity Number in Grants.gov: **W911NF21S0009-SPECIALNOTICE-1**

Description:

The purpose of this Special Notice under the DEVCOM Army Research Laboratory (ARL) Broad Agency Announcement (BAA) (W911NF21S0009), under Opportunity **W911NF21S0009-SPECIALNOTICE-1**, is to advance fundamental understanding of the operation of superconductor qubits and strategies to accelerate learning of fundamental concepts in quantum computing.

Synopsis:

The U.S. Army Combat Capabilities Development Command (DEVCOM), Army Research Laboratory (ARL)-Army Research Office (ARO) is looking for proposed research and development solutions under the Broad Agency Announcement (BAA) W911NF21S0009-2 for Basic and Applied Scientific Research in Quantum Computing. The title for this Special Notice is "LPS Qubit Collaboratory Special Topics." Upon receipt, compliant proposals will be reviewed through a technical and programmatic process in accordance with the evaluation criteria referenced in the W911NF21S0009-2 LQC BAA to determine which proposal may be awarded Grant, Cooperative Agreement, or Procurement Contract under this topic.

This Broad Agency Announcement (BAA) which sets forth research areas of interest to the DEVCOM Army Research Laboratory- Army Research Office (ARL-ARO) and the National Security Agency (NSA) is issued under paragraph 6.102(d)(2) of the Federal Acquisition Regulation (FAR), and 10 U.S.C. 4001, 10 U.S.C. 4021, and 10 U.S.C. 4022 which provides for the competitive selection of basic research proposals. Proposals submitted in response to this Special Notice and selected for award are considered to be the result of full and open competition and in full compliance with the provision of Public Law 98-369, "The Competition in Contracting Act of 1984" and subsequent amendments.

The Department of Defense agencies involved in this program reserve the right to select for award; all, some, or none of the proposals submitted in response to this announcement. The participating DoD agencies will provide no funding for direct reimbursement of proposal development costs. Technical and cost proposals (or any other material) submitted in response to this announcement will not be returned. It is the policy of participating DoD agencies to treat all proposals as sensitive, competitive information and to disclose their contents only for the purposes of evaluation.

The Government reserves the right to cancel this special notice without award for any reason or for no reason. Issuance of this notice does not commit the Government to pay for any preparation costs incurred in compiling a response. **As a general matter, all requirements referenced in BAA W911NF21S0009-2 apply to this effort.**

LPS Qubit Collaboratory Special Announcement Research Topics

Proposals are sought for three research topics for this Special Announcement.

1. Fundamental Studies of Superconducting Qubits
2. Next Generation Josephson Junctions
3. Accelerated Learning of Quantum Information Concepts

Proposals are sought from a small number of research groups to collaboratively investigate outstanding research challenges in these three research topic areas. In addition to addressing the technical aspects of the research thrust, white paper and proposal responses should include:

- a. A statement of need describing the specific outstanding challenge that is address by the research activity
 - b. Identify the key collaboration partners and means of support that enable their efforts;
 - c. Description of the collaboration approach including anticipated meeting schedule and plans to share methods, procedures, samples, data, and personnel;
 - d. Milestones and metrics to effectively assess success of the proposed research activity;
 - e. Facilities and equipment available and/or needed to complete the proposed research.
1. **Fundamental Studies of Superconducting Qubits:** To improve the performance of superconducting qubits, sources of noise must be identified, quantified, modeled, and mitigation strategies implemented. Furthermore, two-qubit gates, leading to a multiqubit system, need to be improved. Proposed research should include one or more of the following activities:
 - a. Develop tools to quantify sources of energy loss and dephasing which limit superconducting qubits or mitigation strategies to reduce sources of noise;
 - b. Develop theoretical models that accurately describe measured observations across a range of experimental conditions;
 - c. Propose and develop a high fidelity two-qubit gate for superconducting qubits with the capability of an expandable architecture resulting in a five physical qubit processor.
 2. **Next-Generation Josephson Junctions:** State-of-the-art superconducting qubits are ubiquitously created using sub-micron sized Josephson junctions (JJ) using aluminum/aluminum oxide/aluminum devices made with double angle evaporation. High performing JJs that can be used in transmon, fluxonium, tunable couplers, or novel qubits are needed to expand the quantum circuit design space. Proposed research must include demonstration of prototype devices and incorporation into qubits on low-loss substrates such as float zone silicon or sapphire. Possible research activities include:
 - a. Wafer-scale materials synthesis;
 - b. Fabrication methods to produce mesa or lateral JJ devices;
 - c. Novel superconducting qubits enabled by innovative JJs such as JJs with tunnel barriers fabricated from semiconductors or non-magnetic quantum materials, multi-terminal JJs, or vertical JJ stacks;
 - d. Josephson junctions requiring single device assembly such as 2D materials and nanowires will not be considered.
 3. **Accelerated Learning of Quantum Information Concepts:** There is a pressing need in Quantum Information Science & Technology (QIST) for a broader talent base at all degree levels with practical experience related to the design and operation of specific qubit technologies. This experience includes maintenance, implementation, and optimization of the unique operational environments associated with any given qubit technology. Research proposals should develop innovative approaches that foster the realization of an all-encompassing future quantum workforce through practical hands-on laboratory experiences and training methodologies. This topic will explore a range of training methodologies and teaching timelines that align with one or more of the following categories:
 - d. Deeply immersive undergraduate QIS laboratory training with superconducting or semiconductor-based qubits that provide focus to one or more of the following:
 - i. Designing a small-scale quantum processor with up to three-qubits that has potential to complete single qubit experiments such as Rabi, Ramsey, and Hahn-Echo experiments; double qubit operations such as creating Bell Pairs; and three qubit algorithms such as Teleportation and Deutsch-Jozsa algorithms;

- ii. Hands-on experiences that culminate in operating qubits to perform coherent measurements;
- e. Condensed re-training programs designed to provide the necessary skills to perform and analyze coherent qubit measurements;
- f. Training and certification programs for quantum technicians supporting design, maintenance, installation, optimization, and/or troubleshooting of dilution refrigerators, vacuum systems, or other environments needed to support qubit operation, along with components facilitating coherent qubit measurements.

Incubator projects within the Accelerated Learning of Quantum Information Concepts thrust should focus on the development and initial testing and evaluation of proposed methods applicable for the training and retraining of technical individuals that have a range of experiences and knowledge. A small laboratory class consisting of a few students would be sufficient for initial testing. The full implementation and execution of the proposed approach in a larger setting may be funded upon successful completion of the incubator phase and a determination to proceed to the Collaboratory phase has been made. All phases of development are expected to be performed collaboratively with the LQC and its personnel.

In addition to the required information outlined above, white paper responses to the Accelerated Learning of Quantum Information Concepts topic should also include:

- f. Innovative training approach(es) with hypotheses to test in a hands-on experimental research lab that will provide insight towards optimizing the curriculum and delivery approach;
- g. A defined target audience, anticipated length, and anticipated type of educational institution required to implement the proposed training method in practice.

White Paper & Proposal submission:

White Paper and Proposals must be submitted in accordance with the preparation and submissions instructions under BAA W911NF210009-2. Proposals will be evaluated under the evaluation criteria of the same BAA

Submission Dates and Times:

White Papers (Required): 15 December 2025

White Papers must be submitted electronically via e-mail to *usarmy.rtp.devcom-arl.mesg.qcbox@army.mil* and received at the Army Research Office. The email subject line should contain the following: **W911NF21S0009-2 LQC White Paper**. Feedback on the White Papers will be e-mailed directly to the proposed principal investigators. White Papers received after the deadline will not be evaluated for this announcement.

Proposals:

White Papers encouraged to submit full Proposals are also recommended to submit their proposals before 3 March 2026 for consideration within program planning and budget planning cycles of the fiscal year.

Points of Contact:

Questions of a technical nature or a programmatic nature shall be directed as specified below:

Technical Program Point of Contact (ARO):

Dr. T.R. Govindan

Army Research Office

Email Address: t.r.govindan.civ@army.mil

Questions of a business nature shall be directed to the contact info, as specified below:

Email address: *usarmy.rtp.devcom-arl.mesg.qcbox@army.mil*

Comments or questions submitted should be concise and to the point, eliminating any unnecessary verbiage. In addition, the relevant part and paragraph of the Broad Agency Announcement (BAA) should be referenced