

## PREP Research Associate

This position is part of the National Institute of Standards and Technology (NIST) Professional Research Experience Program (PREP). NIST recognizes that its research staff may want to collaborate with researchers at academic institutions on specific projects of mutual interest and, therefore, requires those institutions to be recipients of a PREP award. The PREP program involves staff from a wide range of backgrounds conducting scientific research across various fields. Individuals in this position will perform technical work supporting the collaboration's scientific research.

### Research Title:

Quantum Transduction Postdoctoral Fellow

### The work will entail:

The Quantum Nanophotonics group has recently demonstrated hybrid systems combining semiconductor optical quantum dots (QDs) and acoustic resonators as a promising platform for quantum information processing and transmission. All aspects of this work are performed 'in house' using NIST's state-of-the-art nanofabrication, molecular beam epitaxy, and low-temperature optical spectroscopy tools. The successful candidate will help lead this project, building on recent accomplishments, towards the goal of generating remote entanglement between superconducting qubits.

### U.S. Citizen Preferred

### Key responsibilities will include but are not limited to:

- Design and construct GHz frequency acoustic resonators in Gallium Arsenide.
- Precision spectroscopy of Indium Arsenide quantum dots (QDs) embedded in acoustical resonators.
- Epitaxial growth and nanofabrication of QD hybrid quantum systems.
- Analyze and interpret the microwave and optical characteristics of the hybrid microwave/optical system.
- Work as a member of a collaborative, interdisciplinary team.
- Provide technical input to research problems which have been recognized as critical obstacles to progress in areas of exceptional interest.
- Prepare and review journal publications, contributing important advancements to quantum optics, quantum networking, optical communications, and optical measurement techniques.
- Attend research conferences and present technical results.

### Qualifications (required)

- Doctoral degree in Physics or closely related field.
- Expertise in spectroscopy on optical two-level systems at cryogenic temperatures, with specific emphasis on the resonance-florescence method.
- Expertise in growth of compound semiconductors using Molecular Beam Epitaxy.
- Experience running and **maintaining** state-of-the-art nanofabrication tools.
- Experience with optical measurement techniques such as coherent detection, confocal microscopy, laser diagnostics, noise characterization, and statistical optics.

- Experience in cryogenic measurements at liquid Helium temperatures
- Experience in finite-element simulation of semiconductor electro-mechanical devices.
- Strong oral and written communication skills.
- Ability to code with code with: MATLAB or Python.
- Experience with maintaining and running a dilution refrigerator.

### **Privacy Act Statement**

**Authority:** 15 U.S.C. § 278g-1(e)(1) and (e)(3) and 15 U.S.C. § 272(b) and (c)

**Purpose:** The National Institute for Standards and Technology (NIST) hosts the [Professional Research Experience Program \(PREP\)](#) which is designed to provide valuable laboratory experience and financial assistance to undergraduates, post-bachelor's degree holders, graduate students, master's degree holders, postdocs, and faculty.

PREP is a 5-year cooperative agreement between NIST laboratories and participating PREP Universities to establish a collaborative research relationship between NIST and U.S. institutions of higher education in the following disciplines including (but may not be limited to) biochemistry, biological sciences, chemistry, computer science, engineering, electronics, materials science, mathematics, nanoscale science, neutron science, physical science, physics, and statistics. This collection of information is needed to facilitate administrative functions of the PREP Program.

**Routine Uses:** NIST will use the information collected to perform the requisite reviews of the applications to determine eligibility, and to meet programmatic requirements. Disclosure of this information is also subject to all the published routine uses as identified in the Privacy Act System of Records Notices: NIST-1: NIST Associates.

**Disclosure:** Furnishing this information is voluntary. When you submit the form, you are indicating your voluntary consent for NIST to use of the information you submit for the purpose stated.