

PREP Research Associate

This position is part of the National Institute of Standards (NIST) Professional Research Experience (PREP) program. NIST recognizes that its research staff may wish to collaborate with researchers at academic institutions on specific projects of mutual interest, thus requires that such institutions must be the recipient of a PREP award. The PREP program requires staff from a wide range of backgrounds to work on scientific research in many areas. Employees in this position will perform technical work that underpins the scientific research of the collaboration.

Research Title: Experimental Quantum Network Science & Timing Metrology at NIST

U.S. Citizen Preferred

With an eye on the emerging practical quantum network protocols, our efforts push measurement science at the single-photon and network levels. We are seeking a Postdoc with experience in quantum information science, quantum networking, single-photon detection and FPGA programming experience who is interested in working with experts at NIST, Academia & Industry on contributing to Experimental Quantum Network Science and Metrology utilizing our NIST quantum network testbed in Gaithersburg.

Currently, our Quantum Network testbed consists of 6 nodes with more nodes being developed and added. As part of a metropolitan quantum network, we also are connected to the University of Maryland campus through two dedicated dark-fiber links.

Specific Quantum Network Timing Metrology related tasks are:

- Work with NIST researchers, academia, and industry to develop and test quantum networking synchronization methods and protocols.
- Synchronization of network nodes to sub-10 ps levels on metropolitan scales using clock-recovery, two-way time transfer based on single-photon detection and high-accuracy time-precision protocols.
- Characterization of single-photon detectors and sources for the purpose of time transfer.
- Development of software agents that control the synchronization protocols and implement those into our quantum network control manager.
- Prepare scientific publications on performed work.
- Present results to supervisors, management and stakeholders.

The candidate will work on the NIST campus in Gaithersburg, Maryland, work with experts in the field of quantum information science at NIST, our collaborators in academia and industry, and will have the opportunity to make use of cutting-edge equipment, such as photon-number resolving detectors and extremely high-quality single-photon sources and will be part of and work on the ongoing effort to develop new measurement science and devices for quantum networks, including sources, detectors, memories, transducers, metrology, and protocols.

Key responsibilities will include but are not limited to:

- Participate in and lead new and ongoing research in quantum network synchronization science and metrology.
- Lead and take part in multiple projects.
- Participate and present at internal and external meetings on findings and research results.
- Independent data analysis that leads to conclusions on tested hypotheses and uncertainty traceability.
- Invent and lead new ideas for the benefit of NIST's mission and US economy.

Qualifications

- Must have a PhD.
- Must be able to work in a team-driven environment.
- Must have an independent work attitude.
- Background and experience in quantum information science and quantum networking.
- Proven experience using single-photon sources and detectors for quantum measurements.
- FPGA programming experience is highly desired for this position.
- Experience with automation of measurement equipment using Python.
- Extensive programming skills in Matlab and/or Python for software integration, data analysis and data acquisition.
- Strong oral and written communication skills.
- Demonstrated ability to conduct independent, collaborative, multi-disciplinary research.
- Must have an aptitude and patience to perform precision measurements.
- U.S. citizenship is preferred for this position.

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.