UNIVERSITY OF ILLINOIS SYSTEM | FEDERAL RELATIONS

Priorities for Reauthorization of the National Quantum Initiative Act (NQIA)

November 2023

The 2018 NQIA (Public Law 115-368) sought to ensure continued domestic leadership in Quantum Information Science (QIS) and to develop the necessary workforce for this economic sector. It authorized spending across multiple agencies, including the National Science Foundation (NSF), the National Institute of Standards and Technology (NIST) and the Department of Energy (DOE).

The University of Illinois System has deep expertise in QIS research, education and workforce development. The University of Illinois Urbana-Champaign (UIUC) is home to the Illinois Quantum Information Science and Technology Center (IQUIST), is leading the NSF Quantum Leap Challenge Institute for Hybrid Quantum Architectures and Networks (HQAN), is co-leading the NSF-funded National Q-12 Education Partnership, and is a lead partner in the Chicago Quantum Exchange. The University of Illinois Chicago (UIC) is leading a DOE-funded national consortium that will educate the next generation of quantum engineers, and provide pathways into quantum computing workforce for groups traditionally underrepresented in STEM fields.

In this document, we outline key U of I System priorities for the NQIA reauthorization. We believe that a science-first approach that continues the progress made in the first five years, coupled with new programs in education and workforce, will ensure we reach a goal of translation to marketplace, and maintain US competitiveness across quantum S&T and the related areas of photonics and semiconductors. Specifically, we support:

- Expanding the number of NSF centers to ten, increasing the authorized funding level and providing a pathway for renewing the existing NSF centers;
- Funding for the NSF to build quantum testbeds across the US;
- Authorizing the NSF to create a center or hub for quantum education and training programs spanning K-12 and undergraduate education;
- Funding for NIST to launch quantum engineering centers;
- Incorporating education and workforce requirements, along with dedicated funding, across agencies;
- Investing in research facility infrastructure at academic institutions.

Below we provide more detail on these priorities, many of which are included in H.R. 6213, the National Quantum Initiative Reauthorization Act.

The National Science Foundation

We support increasing the number of NSF research centers under the Quantum Leap program from 5 to 10, and allowing for merit-based renewal of the existing centers to ensure maximum return on the original 5-year investment. While Congress has not provided funding at the authorized level of $10M/year for each center, we believe that it would be appropriate to double the authorization level to $20M/year to bring it closer to the $25M/year authorized for DOE centers. We also support funding for the NSF to build quantum testbeds across the US.

We support the creation of an NSF center or hub for quantum education and training, also authorized at $20M/year. The new center will meet the implementation challenges of scaling experiential learning within K-12 and two- and four-year institutions, related teacher training, pedagogy research and workforce analysis. Such a national resource would serve students and teachers nationwide, and build robust connections to the federally funded quantum science centers and programs.

Section 10661 of the CHIPS and Science Act amended the NQIA to include language addressing early quantum education. We support including those provisions in NQIA reauthorization, and ensuring that education and workforce requirements are included throughout the legislation with respect to new centers and activities, along with dedicated funding.

The National Institute of Standards and Technology (NIST)

NIST has pioneered quantum science federal–university partnerships at the University of Colorado Boulder (JILA) and the University of Maryland College Park (JQI), and we support expanding this model to more universities. It is particularly important to connect QIS to other engineering disciplines, including manufacturing and materials science aligned with the CHIPS and Science Act.

The Department of Energy

We support continued funding for DOE research and enabling infrastructure programs that were established in the NQIA, along with new provisions that ensure those programs will include dedicated efforts in education and workforce, coordinated with the NSF education and workforce center. This would leverage the national lab infrastructure across many geographies and benefit American students and communities across the country.

The National Aeronautics and Space Administration (NASA)

We support inclusion of language enabling NASA to establish an institute for space-based quantum science and technology. There is substantial NASA research support for UIUC quantum research programs, and Illinois and the United States would benefit from a focused program on developing space-based quantum assets such as long-range quantum network links. There is also significant opportunity in leveraging microgravity to discover new quantum science.

Infrastructure

The US and Illinois would benefit from investments in research facility infrastructure at academic institutions. This was identified as a key strategic need for ensuring US S&T global competitiveness in a 2012 National Research Council report. Reauthorization of the NQIA should include federal investment or other incentives for initiating capital projects, building open access facilities outside of national laboratories, and long-term staff support across institutions of higher education.