FEDERAL QUANTUM OPPORTUNITIES AND OUTLOOK: RESEARCH, WORKFORCE, AND TRANSLATION

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LEWIS-BURKE AND SIAM

Lewis-Burke has represented SIAM in Washington since 2001

- Regularly engage with Suzy Weekes and SIAM leadership (President and VP for Science Policy)
- Coordinate Committee on Science Policy meetings and activities
- Coordinate Policy Fellows program to enhance early-career involvement in advocacy
- Staff ad hoc SIAM task forces (e.g. 2020 COVID TF, 2021 Climate Change and Clean Energy TF, 2023 Future of Computing TF)

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Report on Future Research Directions for the National Sci Foundation in the Era of COVID-19

The Society for Industrial and Applied Mathematics (SIAM) presents the following recommenda future research directions at the National Science Foundation (NSF) in light of the COVID-19 par SIAM is an international community of over 14,000 members from academia, industry, and gov Members come from many different disciplines, but all share an interest in applying current tec of mathematics and computational science to solve real-world problems.

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Research and Education Priorities to Address Climate Change, Boost Environmental Resilience, and Advance Clean Energy

Initially Distributed June 2021 and Updated August 2021

The Society for Industrial and Applied Mathematics (SIAM) presents the following recommendations for Congress and federal agencies on areas of research and education related to climate change, environmental resilience, and clean energy that would benefit from involvement of the applied mathematics and computational science community. SIAM is an international community of over 14,000 members from academia, industry, and government. Members come from many different disciplines, but all share an interest in applying and developing state-of-the-art techniques of mathematics and computational science to solve real-world problems.

FEDERAL CONTEXT FOR QUANTUM

Continued Biden Administration Priority on Emerging Tech

- Driven by national security, competition, and economic development goals - bipartisan
- Agencies implementing landmark *CHIPS and Science* legislation – set quantum as one of ten critical emerging technologies
- Many programs infused with emphasis on equity and social impact, building research capacity at emerging institutions, and targeting disadvantaged populations

Elections Leave Funding and Legislation Uncertain

- Debt ceiling deal, *Fiscal Responsibility Act,* includes budget caps in FY 2024 and 2025
  - FY 2024 Minibuses contained substantial cuts
  - FY 2025 Resolution will depend on November elections outcomes – Continuing Resolution until December 20
- Bipartisan push to reauthorize the National Quantum Initiative Act – time is running out!
- Trump could bring back more quantum focus, Harris likely to continue Biden level of emphasis

RELEVANT CROSS-CUTTING FEDERAL THEMES

Intersections with Major Biden Priorities

- Trustworthy **artificial intelligence (AI)**
- Maintain **global security and stability**
- Bolster industrial innovation and future **economic competitiveness**
- **Reduce barriers and inequities**
- Strengthen, advance, and use **America's unparalleled research** to achieve our Nation's great aspirations
- **Better health outcomes** for every person
- Step up to the global challenge of **meeting the climate crisis.**

- Quantum Information – computing, networking sensing
- Foundational Research
- Growing Translational Capabilities
- Broadening research community
- Use-inspired and solutions-driven research
- Regional innovation
- Institutional, geographic, and demographic diversity
- Workforce development
- Infrastructure needs

NATIONAL QUANTUM INITIATIVE ACT REAUTHORIZATION

Original NQIA Passed in 2017, Overdue to be Reauthorized

- Launched National Quantum Initiative and interagency activities led by WH Office of Science and Technology Policy
- NSF Quantum Leap Challenge Institutes and research and workforce activities
- DOE Quantum Centers and networking infrastructure
- NIST industry consortium and standards development

Reauthorization in Process – Continuation and New Initiatives

- Draft Approved by House Science, Space, and Technology Committee November 2023
  - Senate working on their version – will be based on House draft
- Continues initiatives from initial NQIA and adds more focus on education and workforce, engineering, translation, and infrastructure
- Creates new NSF Education and Workforce Hub and Translational Accelerators, officially authorizes ExpandQISE
- Adds new agencies – NASA Centers
- New NIST Centers on quantum sensing and quantum engineering
- DOE traineeship, foundry, and instrumentation programs

NATIONAL SCIENCE FOUNDATION (NSF)

Quantum Information Science proposed for $294 M in FY 2025

Quantum Initiative Rolls Along

- Currently recompeting Quantum Leap Challenge Institutes
- Emphasis on capacity building at emerging research institutions – ExpandQISE
- $2.5 M TAQS awards for small team efforts on rotating topics (currently sensing)
- Infrastructure interest - National Quantum Virtual Laboratory, midscale award funded for national quantum nanofab at CU Boulder

Directorate Activities

- Engineering Research Visioning Alliance taskforce on Quantum-enabled Technologies (March 2024)
- Computing Community Consortium Update to Next Steps in Quantum Computing (May 2023)
- BIO, ENG, and MPS Partnership with NIH on quantum sensors for biomedical applications

Technology, Innovation, and Partnerships (TIP) Directorate continues to develop

- Regional Innovation Engines (NSF Engines) program under competition now – interest in quantum
- New programs - Assessing and Predicting Technology Outcomes, Responsible Design and Development of Emerging Technologies
- TIP Roadmap - Quantum not one of four emerging tech areas to be emphasized with special programs, but will still be part of general programs (ExLENT, EPIC, etc.)