



U.S. NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

NSF 24-086

Dear Colleague Letter: NSF-NIH Pathfinder Supplements on Quantum Sensors for Biomedical Science

May 06, 2024

Encourages supplemental funding requests from current NSF recipients to support research activities in quantum sensors and biomedical science.

Dear Colleagues:

The National Science Foundation (NSF) and the National Institutes of Health (NIH) have a mutual interest in innovative research on quantum technologies that can advance biomedical science. This shared interest aligns with the National Quantum Initiative as described in the National Science and Technology Council's strategy on Bringing Quantum Sensors to Fruition (<https://www.quantum.gov/wp-content/uploads/2022/03/BringingQuantumSensorsToFruition.pdf>). In particular, the NSF Directorate for Engineering (ENG), the NSF Directorate for Mathematical and Physical Sciences (MPS), the Directorate for Biological Sciences (BIO), and the National Institute of Biomedical Imaging and Bioengineering (NIBIB) of the NIH are collaborating to promote the advancement of quantum sensors for biomedical research in clinical settings.

This Dear Colleague Letter (DCL) announces an opportunity for researchers currently supported by NSF to request supplemental funding to extend their research on quantum sensing toward biomedical and clinical applications. Following consultation with a cognizant NSF program officer, supplemental funding may be requested to support postdoctoral fellows or graduate research associates to perform research that integrates developers of new quantum technologies with potential end-users for the anticipated sensors and devices.

Priority will be given to supplemental funding requests that identify meaningful research collaborations that connect current NSF-funded teams with researchers in biomedical or clinical research settings. Joint efforts on research, development, and demonstration of quantum sensing and imaging tools, or other instantiations of quantum technology are sought. The nature of existing or proposed partnerships should be articulated in the description of the supplemental funding request and can be substantiated with letters of

collaboration consistent with the [NSF Proposal & Award Policies & Procedures Guide \(PAPPG\)](#).

BACKGROUND:

The National Quantum Initiative (NQI) Act calls for coordinated efforts to accelerate quantum information science (QIS) and technology research in the United States. The National Science and Technology Council Subcommittee on Quantum Information Science, with input from NSF and NIH, identified a need for deliberate collaborations to combine fundamental and applied research on quantum technologies, for example on use-cases for quantum sensors.

Quantum sensing is broadly defined as fundamental sensing and imaging science based on quantum phenomena. Due to the unique and peculiar properties of various quantum states, quantum sensors have the potential to exhibit sensing and imaging capabilities beyond current classical limitations. Such highly sensitive quantum sensors are greatly needed in various applications, including but not limited to national security, communication, and defense. In addition, the impact of such sensors on biomedical applications may result in breakthroughs in medicine and health care. However, there is a significant gap between quantum sensing research and its clinical application in biomedical technologies due to limited opportunity and support to foster collaborations between researchers from science and engineering, and forefront clinicians. This DCL intends to bridge such a gap by supplemental funding mechanisms to establish collaboration between those communities. This DCL seeks to encourage the submission of supplemental funding requests for existing NSF awards to promote convergence between quantum sensing research and clinical research to demonstrate advances in biomedical science and promote new collaborations, cross-training, and exchange of expertise via:

- i. the support for postdoctoral researchers and/or graduate students currently working on developing quantum sensors to co-design and test prototype quantum sensors in building collaboration with identified biomedical or clinical researchers, such as, but not limited to researchers supported by past or current NIH grants; or
- ii. the initiation of new collaborative research between quantum sensing researchers and clinicians including the development of workshops or collaboration-building events that promote convergence in quantum sensing and imaging in biomedical research and health science.

While NSF encourages collaborations with researchers funded by NIH, the supplement may not be used to pay for costs that are already being funded by NIH awards.

HOW TO APPLY

Before submitting a supplemental funding request, PIs are strongly encouraged to consult the NSF Program Directors for their current award. Details of a proposed collaboration should be discussed in advance with the identified collaborator. All supplemental funding requests will be subject to NSF's merit review process, as described in the PAPPG.

1. Concept Outline

1.1. Prior to submission of a supplemental funding request, PIs must submit a brief 1-page **Concept Outline (CO)**. The Concept Outline for case (i) should include 1) Project Title, 2) Parent award number and title, 3) identified (potential) collaborators in biomedical and clinical fields such as those supported by NIH, 4) a summary of the proposed research, outlining specific aims/objectives, methods, intended clinical application in biomedical research, and anticipated outputs. The Concept Outline for case (ii) should be similar to case (i), except item 4) should provide a summary of the proposed theme and activities of workshop or collaboration-building events.

1.2. The Concept Outline must be submitted via email to bioqusense@nsf.gov and include the Program Director on the parent award in the email. For FY24 funding consideration, the Concept Outlines must be received by **June 10, 2024**. In future years, the Concept Outline must be submitted by the first Monday in May for consideration for that fiscal year.

1.3. In accordance with areas of mutual interest between NSF and NIH, the submitted Concept Outline will be shared with the group of NSF and NIH Program Directors to provide an initial topic alignment assessment to determine the invitation to submit a formal supplement funding request. Supplemental funding requests can only be submitted after invitation by the cognizant NSF Program Officer. The email inviting submission must be included in the supplemental funding request. Uninvited requests for supplemental funding will be returned without review.

2. Supplement Funding Request

Supplemental funding requests should be submitted after invitation by the cognizant Program Directors.

2.1 All NSF supplemental funding requests must follow the guidance specified in PAPPG Chapter VI.E.5. The supplemental funding requests must include a description of the proposed work, including details on how to establish the collaboration and a detailed scientific or engineering justification of clinical application. A detailed work plan for supporting postdoctoral fellows and graduate students should be included, if appropriate. In addition, it should include a brief description of the mentoring plan for the collaborating PI's postdoctoral researchers and/or graduate students. The request must include, as a supplementary document, a copy of the email inviting submission of the supplemental funding request.

2.2. Details of a proposed collaboration should be discussed in advance with the identified collaborators in biomedical and clinical fields. The collaboration plan should be clearly stated, with an emphasis on the translation of the quantum sensors to clinical application. Submitted supplemental funding requests may be shared with Program Directors at NIH.

2.3. For option (ii), the supplemental funding requests must also include details of the following information: objective, scheduling, intended participants, and expected outcome. The request should provide a clear and detailed description of the planned activities. Emphasis should be placed on the collaborative nature of these activities, aligning them closely with the central theme of the workshop or collaboration-building events. The focus should be on exploring and elucidating the significant impact of quantum sensors in clinical applications. This approach will ensure that the workshop's objectives are directly addressed and that participants are engaged in meaningful discussions and explorations related to this cutting-edge topic.

2.4. At least one full year on the current NSF award to be supplemented must remain at the time of submission. Projects in a no-cost extension period are not eligible for this funding opportunity. It is not allowed to increase the salaries of existing staff on a project with a supplement.

2.5. Supplement budget requests must reflect the actual needs of the proposed project and should not exceed 20% of the of the total funding for the original award. Funding is subject to limitations of available funds for supplemental funding, and requests will be subject to the NSF's merit review process, as described in the PAPPG.

WHEN TO APPLY

The Concept Outline is to be submitted by **June 10, 2024**, and every first Monday of May thereafter.

NSF Program Directors will send invitations for formal supplement requests based on the received Concept Outlines and provide a due date at that time.

Questions about this DCL may be directed to bioqusense@nsf.gov

C Denise Caldwell
Acting Assistant Director
Directorate for Mathematical & Physical Sciences (MPS)

Susan Margulies
Assistant Director
Directorate for Engineering (ENG)

Susan Marqusee
Assistant Director
Directorate for Biological Sciences (BIO)