

Opportunity Title: Quantum and Optical Sensors

Opportunity Reference Code: IC-17-01

Organization Office of the Director of National Intelligence (ODNI)

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Complete your application – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.

Application Deadline 3/31/2017 11:59:00 PM Eastern Time Zone

Description **Research Topic Description, including Problem Statement:**

Quantum sensors, such as NV centers in diamond, atomic magnetometers, atomic clocks and atom interferometers, offer extremely sensitive instruments that may also be operated outside of a laboratory environment. High-performance optical devices can be a co-technology for these sensors (for example, stabilized lasers and optical frequency combs are used in some atomic clocks) but may also be used as key components in other sensor systems. This topic supports research that will improve the performance of small—from chip-scale to person-portable—quantum and optical sensors, and/or to use the sensors in a proof-of-concept demonstration either in a laboratory or field environment.

Example Approaches:

Projects for this topic can use a variety of approaches to improving the sensors and demonstrating their use. Some interesting techniques are to reduce decoherence or increase quantum sensor response using, for example, dynamic decoupling techniques, different atomic transitions, various laser modulation formats, quantum techniques such as squeezed laser light, or by multiplexing several sensors. New manufacturing techniques or materials and coatings may also improve both quantum and optical sensor performance and may reduce their size and make the sensors more manufacturable. Demonstrations should show the advantages of the sensor over traditional sensors—for example, improved resolution of molecular spectroscopy using the output of a chip-scale frequency comb, increased sensitivity of an atom interferometer gravimeter to changes in nearby mass distributions, or longer GPS-free operation times of acoustic beam-forming using miniature atomic clocks. These suggestions are not meant to limit proposed approaches or applications but only to give a broad sense of the scope of the topic.

Eligibility • **Citizenship:** U.S. Citizen Only



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- Requirements**
- **Degree:** Doctoral Degree.
 - **Discipline(s):**
 - **Business** ([11](#) )
 - **Chemistry and Materials Sciences** ([12](#) )
 - **Communications and Graphics Design** ([6](#) )
 - **Computer, Information, and Data Sciences** ([16](#) )
 - **Earth and Geosciences** ([21](#) )
 - **Engineering** ([27](#) )
 - **Environmental and Marine Sciences** ([14](#) )
 - **Life Health and Medical Sciences** ([45](#) )
 - **Mathematics and Statistics** ([10](#) )
 - **Other Non-Science & Engineering** ([13](#) )
 - **Physics** ([16](#) )
 - **Science & Engineering-related** ([1](#) )
 - **Social and Behavioral Sciences** ([28](#) )