

Opportunity Title: Quantum and Optical Sensors

Opportunity Reference Code: ICPD-2019-01

Organization Office of the Director of National Intelligence (ODNI)

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How to Apply **Create and release your Profile on Zintellect** – Postdoctoral applicants must create an account and complete a profile in the on-line application system. **Please note: your resume/CV may not exceed 2 pages.**

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.

Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at: <https://orise.orau.gov/icpostdoc/index.html>.

If you have questions, send an email to ICPostdoc@orau.org. Please include the reference code for this opportunity in your email.

Application Deadline 3/1/2019 6:00:00 PM Eastern Time Zone

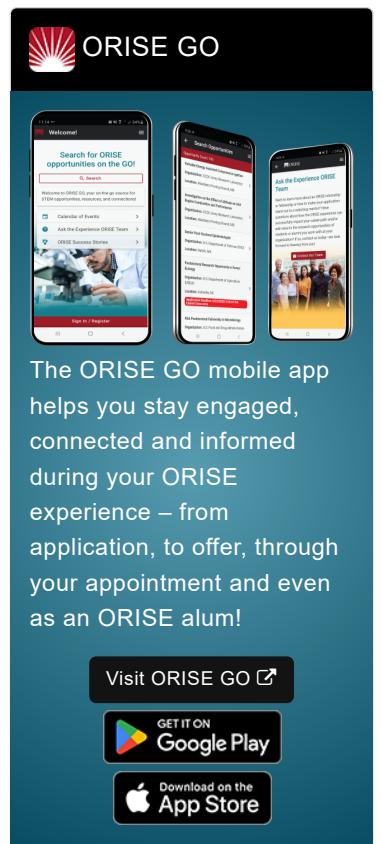
Description **Research Topic Description, including Problem Statement:**

Quantum sensors, such as Nitrogen Vacancy (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, through device improvements and/or suppression of noise affecting the device performance. This topic also supports the use of quantum or novel optical 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 potential advantages of the sensor over traditional sensors—for example, improved imaging resolution using the output of a chip-scale frequency comb, increased sensitivity of an atom interferometer gravimeter to changes in nearby mass distributions, or longer (Global Positioning System) 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.

Key Words: Atomic sensor; optical sensor; quantum; NV centers in diamond; trapped ion; magnetometer; atomic clock; atom interferometer; optical frequency comb; optical waveguide;



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optical fiber; chip scale; electromagnetic field sensing; optical sensing; acoustic sensing; inertial sensing; timing measurements; gravitational measurements; noise suppression; noise characterization

Qualifications **Postdoc Eligibility**

- U.S. citizens only
- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the application deadline
- Proposal must be associated with an accredited U.S. university, college, or U.S. government laboratory
- Eligible candidates may only receive one award from the IC Postdoctoral Research Fellowship Program.

Research Advisor Eligibility

- Must be an employee of an accredited U.S. university, college or U.S. government laboratory
- Are not required to be U.S. citizens

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
 - **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** ([5](#) 👁)
 - **Physics** ([16](#) 👁)
 - **Science & Engineering-related** ([1](#) 👁)
 - **Social and Behavioral Sciences** ([28](#) 👁)