Opportunity Title: Investigate the Sensitivity of Photonic Technologies to Radiation Effects Using Lasers
Opportunity Reference Code: ICPD-2021-49

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 2/26/2021 6:00:00 PM Eastern Time Zone

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

The research topic is to perform simulated radiation testing using lasers on various photonic materials and devices. Facilities that produce radiation beams sufficient to mimic the space environment are difficult to schedule and expensive to use for testing. Relying on the traditional radiation sources to test a number of new materials will require a very lengthy testing campaign. Lasers have long been used as surrogates for radiation facilities because of their increased availability, cheaper cost, and ability to focus the beam on specific areas of interest on a device. Some laser laboratories, such as the Naval Research Laboratory, have performed sufficient comparative testing to allow them to equate laser outputs from their devices to equivalent outputs from conventional radiation emitters. With these equivalent comparisons, radiation testing of photonic materials and components could be performed much more quickly and less expensively than doing the same testing at a standard radiation emitter.

Example Approaches:

At present photonics technology is being pursued by various commercial and U.S. Government organizations to support 5G, data centers, free-space communications and other applications. In addition there are a number of efforts by the Defense Advanced Research Projects Agency (DARPA)—such as Photonics in the Package for Extreme Scalability (PIPES); Modular Optical Apertures Building Blocks (MOABB); Photonically Optimized Embedded Microprocessors (POEM) (completed); Lasers for Universal Microscale Optical Systems (LUMOS), Dynamic On Demand Analysis Service (DODAS), Field Controllable Modulator Array (FCMA); and others—in this area that are addressing beam steering, timing, and data transmission applications. Previous collaborative U.S. Government and commercial efforts have produced a center for Photonics Integrated Circuit (PIC) manufacture, denoted as the American Institute for Manufacturing Integrated Photonic (AIM-Photonics) and various other capabilities in this technology area. However, despite overwhelming superiority of photonics, (with regards to traditional electronics technology concerning performance and size, weight, and power (SWaP), the radiation effects on photonic materials and systems is not understood and needs to be investigated and modeled before commercial advances in photonics can be reliably converted for use in satellites.

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Relevance to the Intelligence Community:

Identification of photonic materials and systems that can operate in a space radiation environment will provide satellite technology developers with the information needed to focus their efforts. By being able to start development of photonic systems for space with suitable materials, the technology developers will be able to reduce the cost and development time needed to develop photonic systems for satellites. These reductions will allow photonic systems to be deployed earlier on U.S. Government satellites to improve current Intelligence Community missions and enable new mission to be performed.

Key Words: Radiation, Laser, Proton, Ion, Photonic

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** (2)
  - **Computer, Information, and Data Sciences** (17)
  - **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** (2)
  - **Physics** (16)
  - **Science & Engineering-related** (1)
  - **Social and Behavioral Sciences** (27)