

Opportunity Title: Space object hypervelocity impact electromagnetic pulse

radio frequency detection and measurement

Opportunity Reference Code: IC-18-19

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://orau.org/icpostdoc/>.

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

Application Deadline 3/12/2018 11:59:00 PM Eastern Time Zone

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

More than half of all satellite electrical failures remain unexplained. One possible cause could be micrometeoroid and orbital debris hypervelocity impact (HVI) on satellites. Beyond any physical damage that impact might cause, an HVI forms an ionized plasma near the spacecraft. Recent studies have shown this plasma generates radio frequency (RF) electromagnetic pulses (EMPs) potentially capable of causing catastrophic electrical damage to spacecraft and their components. The RF radiation can cause a high energy, short duration electrical field several orders of magnitude larger than spacecraft are typically designed to withstand. It is feasible that a large EMP incident could cripple or even completely disable a satellite. The ability to detect and characterize HVI-induced EMPs on-orbit would inform satellite design.

Example Approaches:

This investigation could include designing simulations and experiments for the purpose of characterizing:

- RF field radiation produced by impact type – metal to metal, paint to plastic, meteoroid to solar panel or radiator, etc.
- Variability of RF strength and duration produced by different



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velocities and sizes of high velocity impacts.

- Near and far field strength and possible spacecraft effects of the RF spectrum emitted by different categories (e.g., sizes and material combinations) of impacts.
- Other environmental effects including RF propagation, thermal, plasma density, plasma content, and other characteristics especially in different orbital regimes (i.e., LEO, HEO, GEO, MEO, etc.)

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 )