Opportunity Title: Increasing the security of wireless communications at the physical layer
Opportunity Reference Code: IC-18-35

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:**

- The security of wireless communications at the physical layer is often considered to be ineffective because of ease with which measures can be circumvented. However, we know that there is potential to significantly increase the cost of interception of wireless communications by a potential eavesdropper by matching transmitter and receiver and/or forcing the eavesdropper to use N-channel techniques.
- The goal of the project will be to examine approaches to increasing physical security of wireless communications through modification of the EM field, and to identify how these techniques can be assessed. It will involve modelling the cost and complexity imposed on any potential eavesdropper and suggest rules for designing to the risk. An important distinction is the probability of detection and the probability of interception (both with and without apriori knowledge) as these are different in range and cost.
- It is essential that theory and modelling stages are linked fully through to tangible evaluation.

Example Approaches:

- Two techniques have been considered: Orbital Angular Momentum (which generates the illusion of high order rotation in the EM field by superposing phased contributions from a circularly disposed array of antenna elements); Direct Digital Modulation (DDM) (also known as

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Direct Antenna Modulation) which uses superpositioning of contributions to the symbols from a linear array of antenna elements so that the constellation is only resolvable on-axis over a range determined by the antenna spacing. An aspect not examined as yet is the potential security advantage of an evanescent Bessel field (or other novel non-radiative fields) for short range communication.

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 👁)