

Opportunity Title: Detecting needles in haystacks – how can quantum sensors help improve security screening?

Opportunity Reference Code: ICPD-2020-35

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://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 2/28/2020 6:00:00 PM Eastern Time Zone

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

Whilst there is a wide variety of proven technologies for screening people and items for the presence of explosives and weapons threats and other contraband, deployment of these established technologies can become impractical from the perspective of efficiency as the requirement scales. For example, while baggage X-ray machines can screen hundreds of items an hour, larger, purpose-built machines can typically only screen a few tens of vehicles or containers per hour. Similarly, airport-style screening of people and their possessions cannot easily be scaled to work at major sports stadia and concert venues where peak flows of people are much greater.

Globally, governments, industry and academia expend considerable effort identifying and commercializing innovative improvements to established technologies such as X-ray, metal detection, passive millimetre-wave, radar, explosives trace detection.

How might innovations in quantum technologies – especially quantum sensors – be harnessed to offer alternative approaches? In particular, how might quantum techniques offer new, more efficient and/or effective ways of detecting threat items that are several to many orders of magnitude smaller than the volume being screened – the proverbial problem of “finding a needle in a haystack”?

Example Approaches:

Potential applications / problems include:

- Screening vehicles (cars, vans, lorries, buses, coaches, etc.) for explosives and weapons threats and other contraband
- Screening shipping containers, pallets and other bulk cargo/freight/delivery items for explosives and weapons threats and other contraband
- Screening individuals and their possessions for very small contraband / threat items (e.g. sim cards, USB sticks, razorblades)
- Screening groups – or even crowds – of people collectively (rather than individually) for the presence of explosives and weapons threats



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Relevance to the Intelligence Community:

The main focus is on security benefit (aviation security, protection of national infrastructure, crowded places, customs and border protection), though it is likely that any developments might also prove valuable to other intelligence community needs.

Key Words: Detection of Explosives, Weapons, Contraband, Security Screening of Vehicles, Containers, Cargo, Deliveries, Pallets, Security Screening of Crowds

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** ([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** ([2](#))
 - **Physics** ([16](#))
 - **Science & Engineering-related** ([1](#))
 - **Social and Behavioral Sciences** ([27](#))