Opportunity Title: Bio-Manufacture of Quantum Technology
Opportunity Reference Code: ICPD-2025-05

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 3 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 2/28/2025 6:00:00 PM Eastern Time Zone

Description

Research Topic Description, including Problem Statement:

Quantum 2.0 technologies have great potential. However, extensive engineering is required to deploy these cold-atom technologies. This confounds exploitation. Biological systems are thought to employ quantum mechanisms (e.g. magnetosensing in bird migration). This must happen in a wet and warm biological environment. If we can understand biological quantum sensing, it will be possible to do two new things. Firstly, the construction of new quantum sensing technologies, such as bio┐ magnetometers. Secondly, the bio-mechanisms that sustain quantum superposition (in wet and warm environments) may be emulated in biomimetic manufacturing to simplify and accelerate exploitation of quantum 2.0 technologies.

Example Approaches:

There are a number of biochemical chassis known to be responsive to magnetic fields, e.g. fluorescent proteins (Hayward 2024 preprint) and cryptochrome flavoproteins (Hore 2024). These biochemical systems allow structure-function relationships to be explored to define the mechanisms exploited by biology to leverage quantum superposition as a biological resource. Mechanistic insights can then be engineered in to novel biomaterials, such as new bio-parts (e.g. de novo designed proteins, Hsien-Wei Yeh 2023) or more complex bio-systems (e.g. persistent environmental surveillance, Tang 2021).

Key Words: Quantum biology, magnetometry, spin-dependent biochemistry

Qualifications

Postdoc Eligibility

- U.S. citizens only

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- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the appointment start date
- 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

Point of Contact Keri Tarwater

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12)
  - **Communications and Graphics Design** (3)
  - **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** (11)
  - **Other Non-Science & Engineering** (2)
  - **Physics** (16)
  - **Science & Engineering-related** (1)
  - **Social and Behavioral Sciences** (30)