

Opportunity Title: Atomic Nuclear and Optical Clock Integration

Opportunity Reference Code: ICPD-2025-45

Organization Office of the Director of National Intelligence (ODNI)

Reference Code ICPD-2025-45

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:**

Optical clocks can outperform traditional microwave clocks by factors of 100 – 1000 in stability and have become some of the most precise measurement devices ever built. However, current precision optical clocks are mostly laboratory-sized. While recent work by multiple groups around the world attempts to reduce the size of fieldable systems, the concepts being pursued are still trailer or full-instrument rack in scale, at best. Significant miniaturization is necessary to achieve scalable, portable devices needed for these applications. Recent demonstrations have shown that ion optical clocks are particularly well suited to an integrated platform. Recent advances in research and development of nuclear based timekeeping devices have also sparked interest in new applications of these types of clocks. Work related to this new technology is encouraged.

Example Approaches:

Research for this topic may include a variety of methods to demonstrate a path to a fully integrated clock.

Relevance to the Intelligence Community:

Timing holdover in the absence of GPS, is a serious challenge. One way the DoD/IC is looking to address this is via portable and ultra-stable clocks. We aim to develop a clock capable of holding ns stability for month duration. The envisioned sensor will provide quality data to a resolution capable of supporting DOD's Alternative Positioning and Navigation applications.

Key Words: Quantum Sensor; Integrated Photonics, Atomic Sensors; Ion; Nuclear/Atomic Clock, Optical Clock



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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 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](#))