

Opportunity Title: Quantum Control for Quantum Error Correction Fellowship
Opportunity Reference Code: ICPD-2024-12



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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.ornl.gov/icpostdoc/index.html>.

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

Application Deadline 3/6/2024 2:30:00 PM Eastern Time Zone

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

In order for quantum error correction and fault-tolerant quantum computing to work, there are gate fidelity thresholds that must be met, which are highly dependent on properties of the quantum error correcting code chosen. To meet these thresholds, quantum control theory must be developed that directly address those needs. The efficiency and effectiveness of these quantum control protocols must be tailored to the quantum control.

Example Approaches:

The specific needs of quantum error correction do not necessarily imply that all quantum errors are equally bad, but this is highly dependent on the code as well as the readout ancilla preparation protocols. This in turn affects the control protocols that are applied to the qubits themselves. A co-design approach between quantum error correction and quantum control is likely to lead to better (i.e. less overhead) requirements for fault-tolerant quantum computing.

Relevance to the Intelligence Community:

Develop/enhance understanding of quantum computing and quantum key management principles.

Key Words: Quantum computing, quantum control theory, quantum error correction

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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

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Academic Level(s):** Postdoctoral.
- **Discipline(s):**
 - **Chemistry and Materials Sciences** (12 )
 - **Communications and Graphics Design** (6 )
 - **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 )