

Opportunity Title: Magnetic skyrmions for non-volatile memory and computing

Opportunity Reference Code: IC-18-07

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.

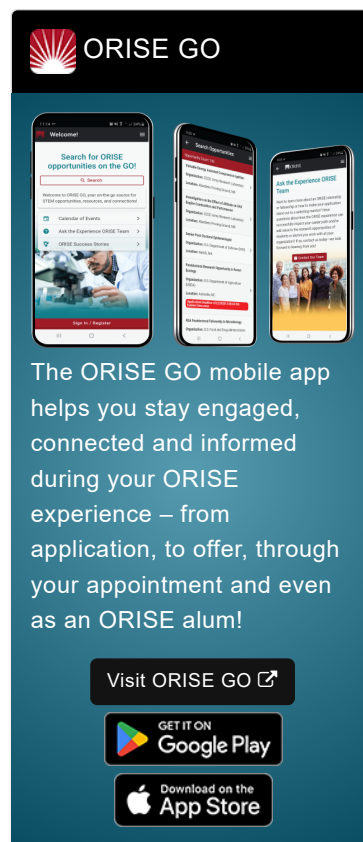
Application Deadline 3/12/2018 11:59:00 PM Eastern Time Zone

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

- Current computer chips consume significant amounts of power and produce significant amounts of heat. This places constraints on the endurance, range, payload, reliability, and detectability of deployed intelligence technologies. Therefore, there is a need for robust, low power, low heat signature electronics. Non-volatile computer chips based on magnetic Skyrmions presents an opportunity to address these issues.
- Magnetic Skyrmions are unique stable magnetic patterns in magnetic materials that are point-like regions of reversed magnetization in an otherwise uniformly magnetized material. They are distinct from magnons which are more properly described as excitations or magnetic waves in these materials. To the extent that these patterns/Skyrmions can be created, detected, and manipulated; they would be useful as bits for memory or computation. Since they are magnetic, these bits would also be non-volatile. Non-volatile chips retain their last state during power loss and only require power during the write or read processes. Such systems are inherently low power and robust and thus produce less heat than transistor based chip technology.

Example Approaches:

- Research designed to harness magnetic skyrmions for non-volatile memory or computation.
- Research on how to manipulate skyrmions.



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- Research on how to realize skyrmions at room temperature.
- Research on how to stabilize skyrmions in various materials.
- Research the combined use of skyrmions and magnons for computing.
- Research how skyrmions and magnons could be used to produce low power, easily switchable, but robust computing elements.
- Research into what materials are best suited for skyrmion-based computing or memories.

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](#) )