

Opportunity Title: Magnon algorithmics
Opportunity Reference Code: IC-18-38

Organization Office of the Director of National Intelligence (ODNI)

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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.

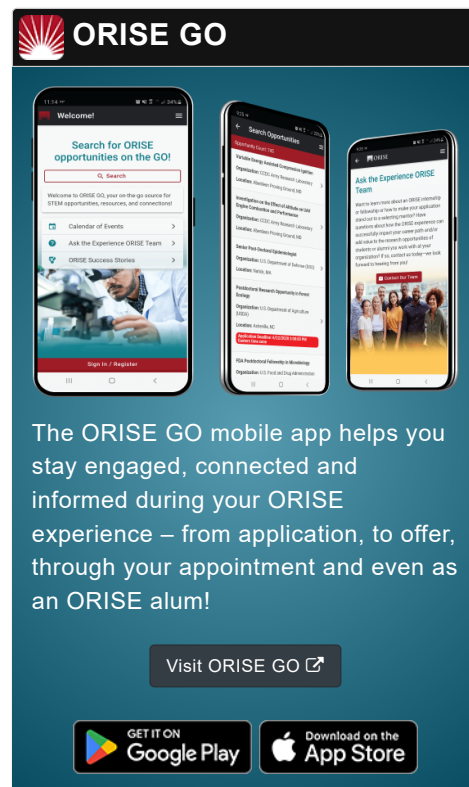
Application Deadline 3/12/2018 11:59:00 PM Eastern Time Zone

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

Magnonic devices using magnetic waves rather than electrical signals are capable of forming circuits with significantly lower power requirements than electronic devices. While magnonic circuits can be used to mimic conventional electronic logic circuits, they have radically different characteristics and the most efficient circuits will not be those which simply transpose existing logic designs. The goals of this research are to develop an understanding of magnonic computation, a classification of existing algorithmic methods, and the development of new algorithms well adapted to the specific character of this class of devices

Example Approaches:

- An initial approach will require a deeper understanding of magnonic circuitry at the functional level, drawing on ideas from signal processing and digital logic. In particular, it would be of value to understand the role of Fourier Transform circuits --- if these can be developed then there is the possibility of transposing ideas from quantum algorithmics as well.



- Magnonic circuits offer the possibility of controlled gates and hence the analogues of Field Programmable Gate Array (FPGA) devices; they also allow superposition in the frequency domain and parallel or Single Instruction Multiple Data (SIMD) type processing.
- A theoretical approach might consider whether there is a new complexity class structure associated to magnonic circuits.
- Application domains include signal processing; signature detection in digital streams; massively parallel search on data sets and streams.

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 )