

## **Open postdoc position – Hybrid magnon quantum device**

### **Project description**

The Department of Materials Science Engineering at University of Illinois at Urbana Champaign (UIUC) is posting a postdoctoral researcher position led by Axel Hoffmann on hybrid magnon quantum device. The project will investigate coherent dynamics of propagating magnons in hybrid magnetic devices down to the single quantum regime, and implement these effects in quantum coherent operations with circuit quantum electrodynamics (cQED) systems. The goal is to explore the quantum property of propagating magnons in magnetic films and to develop magnon-based quantum information devices with circuit integration. This work will be enabled by our leading expertise in developing chip-based magnon-superconducting resonator hybrid circuits, novel magnetic materials, high-quality superconducting resonators, and qubit operations.

The position will be based at UIUC but the postdoc will primarily conduct the research work at Argonne National Laboratory with Yi Li and Valentine Novosad. The postdoctoral researcher is anticipated to work collaboratively with groups at both UIUC and Argonne, including advanced materials characterization team, first-principle material calculation team, and quantum information team, in order to cultivate novel magnetic and superconducting material properties and to develop long-coherence and magnetic-field-compatible quantum magnonic systems.

### **Job responsibility**

The postdoc candidate will primarily work on the design, nanofabrication, and microwave characterization of superconducting coplanar resonators, and building hybrid magnonic system with single-crystal YIG spheres or epitaxial YIG thin film devices in order to study the strong coupling behaviors and coherent energy transduction between magnons and photons. The postdoc will work with cryogenic microwave measurement systems and develop new protocols of magnon gate operations in the time domain. In addition, the postdoc will develop experimental systems for magnon characterization in the quantum or near-quantum regime by coupling magnons with superconducting qubits or superconducting quantum system based on kinetic inductance nonlinearity. The research will utilize state-of-the-art nanofabrication facility at Center for Nanoscale Materials and involve powerful cryogenic microwave characterization system, including dilution refrigerator and cryogenic electromagnets, at the Materials Science Division at Argonne and the Materials Research Laboratory at UIUC.

### **Qualification**

The project requires Ph.D. degree in Physics, Electrical Engineering, or related fields.

The project will involve the following research knowledge and skills:

- 1) Magnetization dynamics
- 2) Microwave circuits
- 3) Nanofabrication
- 4) Cryogenic experiments

Optional desired research experience for the position include:

- 5) Superconducting resonators

- 6) Hybrid magnonics
- 7) Magnonics

In addition, the candidate is required to independently conduct research, work in a collaborative environment, give scientific presentations in the academic community including conferences, and publish peer-reviewed papers about the scientific results. The appointment is for one year; renewals for a second and third year are subject to performance.

Start date: immediately available.

To apply, please send the following materials:

1. CV with a publication list (can add Google Scholar link)
2. Contact information of two individuals for letters of reference.
3. A short cover letter about why you feel you are a good match for the project and your motivation (max one page)

Please send the materials to [axelh@illinois.edu](mailto:axelh@illinois.edu), [yili@anl.gov](mailto:yili@anl.gov), and [novosad@anl.gov](mailto:novosad@anl.gov)