

**PREP Research Associate
CHIPS Funded Project.**

This position is part of the National Institute of Standards (NIST) Professional Research Experience (PREP) program. NIST recognizes that its research staff may wish to collaborate with researchers at academic institutions on specific projects of mutual interest and thus requires that such institutions be the recipients of a PREP award. The PREP program requires staff from a wide range of backgrounds to work on scientific research in many areas. Employees in this position will perform technical work that underpins the scientific research of the collaboration.

Research Title:

High speed metrology for magnetoelectronic devices and models: Research Associate

The work will entail:

This position focuses on developing film-level optical methods of measuring the Heisenberg exchange parameter in thin films relevant to the magnetic random-access memory (MRAM) industry. These measurements will be correlated with detailed measurements of device performance made on devices fabricated at NIST, and these correlations will be used to develop better models of device switching. In addition, the Associate will work on the development of electrical methods for estimating the attempt time of MRAM bit cells. In each of these projects the Associate will work closely with NIST staff, but the Associate must be self-motivated in designing and executing measurements, developing robust data analysis methods with proper statistical validation, and reporting these results to the group and via publication. This is a fast-paced, high impact, short-term research position with a maximum duration of 12 months. Note that this is an in-person position located in Boulder, CO.

U.S. Citizen Preferred

Key responsibilities will include but are not limited to:

- Designing, building, maintaining, and using optical measurement systems based on inelastic light scattering
- Developing high speed electronic (microwave) measurements, including pulsed, harmonic, sampled and real-time measurement methods using microwave sources, arbitrary waveform generators, and oscilloscopes
- Analyze heterogeneous data sources including optical spectra, read- and write-error rate datastreams, real-time and sampled high speed electronic traces.
- Analyze temperature-dependent magnetization data using advanced atomistic fitting models
- Fabricating magnetoelectronic devices using optical and electron beam lithography, reactive and physical ion etching methods.
- Presenting results at internal meetings, and occasional meetings with external stakeholders.
- Ensuring that results, protocols, software, and documentation have been archived or otherwise transmitted to the larger organization.

Qualifications

- A Ph.D. in Physics, Electrical Engineering, or related field. Several years of post-degree experience in relevant areas preferred.

- Experience with the design and fabrication of magnetic nanostructures including magnetron sputter and e-beam evaporative deposition or molecular beam epitaxy, electron-beam and photo-lithography
- Experience with characterization tools including SQUID, Ferromagnetic Resonance Spectroscopy, MOKE, x-ray reflectometry, secondary-ion mass spectrometry.
- Demonstrated experience with micromagnetic simulation tools including MuMAX
- Demonstrated experience in temperature-dependent magnetic simulations, in particular atomistic simulations of the temperature-dependence of magnetization
- Experience developing novel data acquisition platforms to acquire DC and RF data at scale.
- Familiarity with scripting languages including Python and their implementation on GPU clusters for data analysis.
- Ability to develop tools needed to analyze large datasets using Python, MATLAB, or similar programming environments.
- Strong oral and written communication skills.
- Track recording of publishing in peer reviewed scientific journals.

Privacy Act Statement

Authority: 15 U.S.C. § 278g-1(e)(1) and (e)(3) and 15 U.S.C. § 272(b) and (c)

Purpose: The National Institute for Standards and Technology (NIST) hosts the [Professional Research Experience Program \(PREP\)](#) which is designed to provide valuable laboratory experience and financial assistance to undergraduates, post-bachelor's degree holders, graduate students, master's degree holders, postdocs, and faculty.

PREP is a 5-year cooperative agreement between NIST laboratories and participating PREP Universities to establish a collaborative research relationship between NIST and U.S. institutions of higher education in the following disciplines including (but may not be limited to) biochemistry, biological sciences, chemistry, computer science, engineering, electronics, materials science, mathematics, nanoscale science, neutron science, physical science, physics, and statistics. This collection of information is needed to facilitate the administrative functions of the PREP Program.

Routine Uses: NIST will use the information collected to perform the requisite reviews of the applications to determine eligibility, and to meet programmatic requirements. Disclosure of this information is also subject to all the published routine uses as identified in the Privacy Act System of Records Notices: NIST-1: NIST Associates.

Disclosure: Furnishing this information is voluntary. When you submit the form, you are indicating your voluntary consent for NIST to use of the information you submit for the purpose stated. By applying to a CHIPS-funded PREP opportunity, you also acknowledge that participation in the project requires signing a Non-Disclosure Agreement (NDA) prior to beginning any work.