

Opportunity Title: Solid-state magnetometer for planetary magnetic field mapping

Opportunity Reference Code: 0133-NPP-NOV23-JPL-PlanetSci

Organization National Aeronautics and Space Administration (NASA)

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Application Deadline 11/1/2023 6:00:59 PM Eastern Time Zone

Description The postdoc will aid in the development of a solid-state magnetometer intended for vectorized magnetic field measurements of planetary bodies and their moons. The focus of the work will be the design and development of the microelectronic device at the heart of the instrument. The proposed sensing device is to be made of silicon carbide (SiC) due to its robustness extreme environments; however, the postdoc will investigate other wide bandgap semiconductor devices such as diamond and GaN which may also be available for study. Devices made from SiC are almost entirely made for power electronics that can be used in high temperature and high radiation environments. The research involved in this study will lead to the first ever SiC device fabricated strictly for magnetometry with application in harsh planetary environments. The magnetometer functions by measuring changes in device current for changes in external magnetic field due to the spin dependent transport phenomenon attributed to the presence of intrinsic, deep level, atomic scale defects within the SiC semiconductor. The postdoc will investigate the structure, geometry, doping, and size of the device to optimize the magnetic field sensing capability. Using the knowledge gained, the postdoc will then aid in the design and fabrication of custom SiC devices. The postdoc will also be involved in determining the optimal way to introduce additional point defects within the semiconductor to boost sensitivity while preserving the reliability of the device. The applicant should be highly knowledgeable in spin dependent transport in microelectronics and have experimental experience in areas such as spin dependent recombination, spin dependent tunneling, electrically detected magnetic resonance, or even quantum computation. The applicant should also have some understanding of defect engineering (e.g. point defect creation) and radiation effects in semiconductors. It is highly desired that the applicant have a strong interest in hands-on development of instrument systems with experience in low-noise circuit design/layout techniques and be familiar with MATLAB and LabVIEW programming languages.

Location:

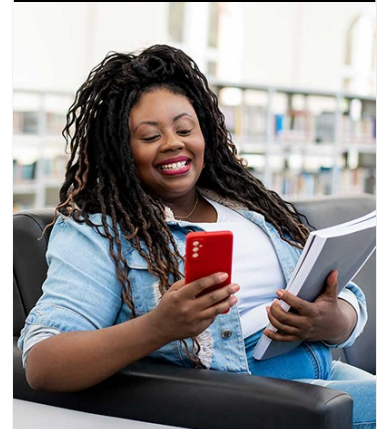
Jet Propulsion Laboratory
Pasadena, California

Field of Science: Planetary Science

Advisors:

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Applications with citizens from Designated Countries will not be accepted at this time, unless they are Legal Permanent Residents of



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the United States. A complete list of Designated Countries can be found at: <https://www.nasa.gov/oiiir/export-control>.

Eligibility is currently open to:

- U.S. Citizens;
- U.S. Lawful Permanent Residents (LPR);
- Foreign Nationals eligible for an Exchange Visitor J-1 visa status; and,
- Applicants for LPR, asylees, or refugees in the U.S. at the time of application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

Eligibility Requirements • **Degree:** Doctoral Degree.