Opportunity Title: MgB2 Kinetic Inductance Devices for NASA Space Science Applications
Opportunity Reference Code: 0255-NPP-MAR26-JPL-TechDev

Organization National Aeronautics and Space Administration (NASA)

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How to Apply All applications must be submitted in Zintellect

Please visit the NASA Postdoctoral Program website for application instructions and requirements: How to Apply | NASA Postdoctoral Program (orau.org)

A complete application to the NASA Postdoctoral Program includes:

1. Research proposal
2. Three letters of recommendation
3. Official doctoral transcript documents

Application Deadline 4/2/2026 6:00:59 PM Eastern Time Zone

Description **About the NASA Postdoctoral Program**

The NASA Postdoctoral Program (NPP) offers unique research opportunities to highly-talented scientists to engage in ongoing NASA research projects at a NASA Center, NASA Headquarters, or at a NASA-affiliated research institute. These one- to three-year fellowships are competitive and are designed to advance NASA's missions in space science, Earth science, aeronautics, space operations, exploration systems, and astrobiology.

Description:

This research revolves around utilizing novel superconducting materials for enhancing or enabling scientific instruments. The research group has revolutionized magnesium diboride (MgB2) thin films, a superconductor with bulk transition temperature of 39 K. The existence of these films has generated significant interest for a number of applications including THz mixers, single photon detectors, non-linear kinetic inductance devices, and low loss transmission lines for CMB and sub-mm detector arrays moving to shorter wavelengths (higher frequency). Infusing this material into an instrument for any one application ensures that progress can be made towards nearly all other applications, exponentially increasing the impact of the work. The end goal of this work is to make the high critical temperature material commonplace with other superconducting materials. In order to do this, there are a number of micro- and nanofabrication challenges that need to be overcome and some material parameters (e.g. RF losses) need to be extracted. Before this work was realized MgB2 thin films were non-uniform and limited to small area substrates. The process developed at JPL is extremely uniform over a 4" wafer (scalable to 6") and as smooth as elemental metal films. The process has been patented provisionally and multiple high impact papers are in preparation to disseminate this research.

There are two distinct roles a post-doc candidate could contribute to this work. A post-doc can champion a single device or application using the

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MgB2 films, or the right candidate could champion the fabrication techniques and capabilities to achieve maturity similar to other superconducting materials for a wide array of devices. The devices that could be considered under this task include high frequency kinetic inductance devices including transmission lines, parametric amplifiers, and frequency converters. There are also potential applications for an MgB2 Kinetic Inductance Bolometer (also called Thermal Kinetic Inductance Detector or TKID) for high background imaging. These detectors would operate from 1-25 K depending on a particular application and could achieve background limited detection. Finally, there exist ultra-thin film hot spot detectors such as nanowire single photon detectors and THz mixers that could have applications at higher temperature using this novel material. As all of these devices have a place in the NASA technology portfolio, any one could be proposed for an NPP appointment. The fabrication techniques to develop all of these devices overlap significantly and so an entire appointment could also envelope fabrication alone. It is up to the candidate's background and aspiration to propose the best scope of work.

Field of Science: Technology Development

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 the United States.?A complete list of Designated Countries can be found at: https://www.nasa.gov/oiir/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

Questions about this opportunity? Please email npp@orau.org

Point of Contact Mikeala

Eligibility Requirements

- **Degree:** Doctoral Degree.