

Opportunity Title: Technology Development: Ultrasensitive Detector Arrays for Space-Based Astrophysics

Opportunity Reference Code: 0086-NPP-NOV23-GSFC-TechDev

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0086-NPP-NOV23-GSFC-TechDev

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

Description This work focuses on ultrasensitive detector design, fabrication, characterization, and integration into suitable optical systems. Current research includes the development of superconducting transition edge sensors and superconducting integrated circuits for microcalorimeters of high-resolution x-ray detection and sensitive bolometers for measurements of submillimeter and millimeter wavelengths. We are exploring techniques for arraying the detectors in large formats, including superconducting bumpbond arrays and novel micromachining and wafer bonding concepts. Circuits are constructed to examine the aspects of the implementation of cryogenic arrays, such as thermal stability, interpixel crosstalk, robustness, and uniformity. Single pixel optimization is also pursued, including novel noise suppression geometries, linearity studies, polarization sensitivity, and use of multiple sensors to enable position sensitivity and increased dynamic range within a single pixel. Our group is developing absorber structures for the x-ray and far-infrared focal plane arrays, characterizing their optical properties, and demonstrating their integrability into detector structures. We are designing and building microwave structures for coupling bolometers to antenna structures and cryogenic filter structures compatible with large format arrays of ultrasensitive detectors. For more mature technologies, our group collaborates with GSFC instrument scientists to deploy testbed instruments at ground-based observatories. We also explore new technologies including magnetic calorimeters and hot electron bolometers as possible detector elements for space-based astrophysics.

Location:

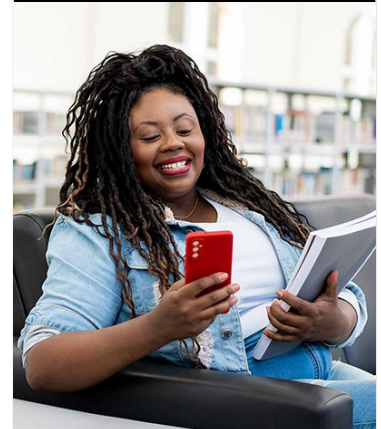
Goddard Space Flight Center
Greenbelt, Maryland

Field of Science: Technology Development

Advisors:

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301-286-9162

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>.



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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.