Opportunity Title: Microwave Kinetic Inductance Detector Arrays
Opportunity Reference Code: 0066-NPP-NOV23-JPL-Astrophys

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0066-NPP-NOV23-JPL-Astrophys

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

Description We have been developing Microwave Kinetic Inductance Detectors [1] for long-wavelength astrophysics imaging and spectroscopy applications. We are currently pursuing three efforts in which a postdoctoral researcher could participate.

The first is commissioning, completion of the focal plane, and science with a multicolor MKID-based mm/submm camera for the Caltech Submillimeter Observatory [2]. This is the first major astronomical instrument using MKIDs. It employs antenna coupling and photolithographic bandpass filter to access four spectral bands in each pixel. It covers a 14' FoV with 600 pixels.

The second is the development of MKIDs for FIR/short-submm applications in imaging and spectroscopy. Titanium nitride and other new materials are enabling absorber-coupled MKIDs capable of background-limited sensitivity in these applications. We are doing proof-of-principle tests to demonstrate the sensitivity of such devices.

The third is the development of a parametric amplifier using niobium titanium nitride, which holds the promise of quantum-limited performance from GHz to THz frequencies [3].

References:

[1] P.K. Day, H.G. Leduc, B.A. Mazin, A. Vayonakis, and J. Zmuidzinas. A broadband super-conducting detector suitable for use in large arrays. Nature, 425:817-821, 2003.

[2] Sunil R. Golwala, Clint Bockstiegel, Spencer Brugger, Nicole G. Czakon, Peter K. Day, Thomas P. Downes, Ran Duan, Jiansong Gao, Amandeep K. Gill, Jason Glenn, Matthew I. Hollister, Henry G. LeDuc, Philip R. Maloney, Benjamin A. Mazin, Sean G. McHugh, David Miller, Omid Noroozian, Hien T. Nguyen, Jack Sayers, James A. Schlaerth, Seth Siegel, Anastasios K. Vayonakis, Philip R. Wilson, Jonas Zmuidzinas, Status of MUSIC, the MUltiwavelength Sub/millimeter Inductance Camera, SPIE Conference Series 8452 (2012).

[3] B. Ho Eom, P. K. Day, H. G. Leduc, J. Zmuidzinas, A wideband, low-noise superconducting amplifier with high dynamic range, Nature Physics, 8: 623-627 (2012).

Location:
Jet Propulsion Laboratory
Pasadena, California

Field of Science: Astrophysics

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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

Eligibility Requirements

- **Degree:** Doctoral Degree.