Opportunity Title: Heliophysics: Advanced Instrument Development for Particle Compostion Including Plasma and ENA Imagers for Solar Wind and Planetery Magnetosphere Science
Opportunity Reference Code: 0127-NPP-NOV23-GSFC-HelioSci

Organization	National Aeronautics and Space Administration (NASA)
Reference Code	0127-NPP-NOV23-GSFC-HelioSci
Application Deadline	11/1/2023 6:00:59 PM Eastern Time Zone

Description

GSFC is pursuing advanced instrument developments in various areas of solar, solar wind, magnetosphere and planetary sciences. One key category of instruments is time of flight versus energy versus look angle particle analyzers: charged particles for in-situ, and energetic neutral atoms (ENAs) for remote sensing. Simultaneous measurements of time of flight, energy and incoming angle on a per particle basis are used to reconstruct the full particle distributions in the space. High resolutions and dynamic ranges, background/foreground rejections along with miniaturization, low power, and high speed are among the advanced development goals for the next generation instruments.

GSFC allows an end to end instrument development based on excellent science, modeling and calculation of signal and noise, innovative sensor development, front end electronics enabled by radiation hardened ASICs, signal processing and telemetry to final I&T, launch into space data analysis and new discoveries.
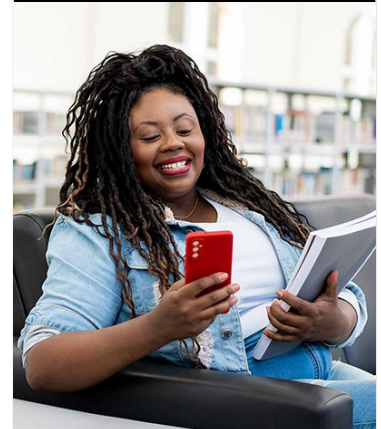
Innovative sensor developments are in progress with HV and particle optics to cover energy ranges from eV to >100MeV: ESA typically are used from eV to 20KeV, energetic particle sensors from 10keV to 10MeV, stacked detectors for higher energies.

The post sensor sections include the detectors (typically foils, MCPs, anodes, SSDs), front end electronics, event classification and memory mapping.

The science challenge is measurement of particle distributions with wide energy range 10eV to >100MeV, wide FOVs, sometimes strong background and foregrounds, at high speed, low power and mass. The technical innovation includes the fundamental measurements of time of flight, energy, position sensing, as well as event classification and memory mapping. These goals were enabled in part by special radiation hardened ASICs and 1D and 2D anodes: the time of flight and CFD chips, the energy and peak detector/discriminators, commandable discriminator banks with DACs, ADCs and housekeeping ASICs. The ASICs are all used synergistically in the instruments enabling the high science performance within the resource constraints Typical performances are: time and position resolutions 1Meg-cps correlated in double or triple coincidence with background rejection.

Location:
Goddard Space Flight Center
Greenbelt, Maryland

Field of Science: Heliophysics Science

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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.