Opportunity Title: Impulsive Ion Escape at the Sun
Opportunity Reference Code: 0172-NPP-NOV23-GSFC-HelioSci

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0172-NPP-NOV23-GSFC-HelioSci

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

Description A postdoctoral fellow, within the Heliophysics Division (code 672) at NASA/GSFC, would work closely with Drs. de Nolfo and Ireland with a goal of facilitating the analysis and interpretation of impulsive solar energetic particle (SEP) data. Our group has been funded under an HSR/NASA grant through 2019.

Impulsive solar energetic particles (SEPs), with anomalous enhancements of 3He (and often electrons), suggest a unique acceleration process at the Sun. It is the unique conditions “” the small-scale nature of impulsive electron and ion acceleration and escape as it is manifested in detectable electrons and 3He SEPs in space“” that we would like to investigate in this proposal. Two sets of observations make these studies possible for the first time: 1) the high spatial resolution (1“³) and time cadence (12s) EUV observations from the Solar Dynamics Observatory (SDO) and 2) new observations with the Expanded Owens Valley Solar Array (EOVSA). EOVSA observations have revealed the presence of short duration (<1 s) impulsive features at surprisingly high frequencies (up to 15 GHz) that sometimes, but not always, show significant frequency drift. These unique observations have the potential to trace the magnetic topology that enables electron/ion escape, which has, as of today, been hardly explored. By connecting in-situ observations of 3He-rich events to solar sources (e.g. jet-like features) using high-cadence EUV data from SDO and imaging the escape route with new radio observations from EOVSA, we can 1) unambiguously identify associated solar sources with impulsive events, and 2) map the entire process from acceleration to escape. In addition, we plan to investigate how and whether electrons and ions are accelerated at the same location. For the case of non co-spatial acceleration, is the presence of non-thermal electrons required to preferentially accelerate 3He ions as suggested by Temerin & Roth (1992), or is there some other mechanism at play, such as stochastic acceleration from helical turbulence (Fleishman et al. 2013)?

The study will constitute a detailed evaluation of the spatial and temporal evolution of EUV and radio emission as it relates to SEP onsets and composition, providing key constraints on magnetic topology and evolution at the Sun as well as improving our ability to characterize and predict SEPs at Earth. As well as helping to understand an important feature of space weather, this project is timely as it overlaps with the scientific goals of the upcoming Solar Probe Plus and Solar Orbiter missions.

Location:
Goddard Space Flight Center
Greenbelt, Maryland

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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.