Opportunity Title: Propagation Studies of Ultra-Heavy Galactic Cosmic Rays (UHGCR)
Opportunity Reference Code: 0222-NPP-NOV23-GSFC-Interdisc

Organization National Aeronautics and Space Administration (NASA)

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

Description Though there has been significant progress in the last several decades, the origin of galactic cosmic rays continues to remain a mystery. The widely accepted picture is that GCRs originate within OB associations and are further accelerated by subsequent nearby supernova shocks, or shocks from stellar winds of massive precursor stars or colliding binaries. According to this scenario, GCRs consist of an admixture of material of old interstellar gas and dust, wind outflow, and ejecta from core-collapse supernovae. Recent abundance observations from SuperTiger and ACE support this picture. Indeed, gamma-ray observations also suggest that hadrons are accelerated in at least some supernova remnants. In order to fully understand the origin of GCRs, and especially UHGCRs, the galactic cosmic ray source composition requires that GCRs measured at Earth are propagated back to the interstellar source. However, this picture may get more complicated once UHGCRs with Z>40 are measured, where significant contributions from merging neutron-stars are predicted. These studies directly relate to future proposed missions including HNX and TIGERISS.

The current NPP will take advantage of the sophisticated and comprehensive propagation tool, GALPROP, to estimate source abundances. As part of the project, ultra-heavy cosmic ray cross sections will be updated from recent accelerator measurements. In addition, GALPROP accounts for solar modulation effects which can be further constrained by Voyager data. In addition to comparing GALPROP results to measurements, the post doc will also have the opportunity to participate in hardware and future mission development and/or further develop simulations. The NPP will work closely with several scientists at NASA Goddard Space Flight Center with expertise in GCR measurements and with scientists at Stanford University with expertise in running and updating GALPROP.

Location:
Goddard Space Flight Center
Greenbelt, Maryland

Field of Science: Interdisciplinary/Other

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Eligibility Requirements	• **Citizenship:** LPR or U.S. Citizen • **Degree:** Doctoral Degree.