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## The Heavy Nuclei eXplorer

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The Heavy Nuclei eXplorer (HNX) is a new instrument proposed as a NASA Small Explorer by NASA Goddard Space Flight Center, University of California, Berkeley, Washington University in St. Louis, and the Jet Propulsion Laboratory. HNX will investigate the nature of the reservoirs of nuclei at the cosmic-ray sources, the mechanisms by which nuclei are removed from the reservoirs and injected into the cosmic accelerators, and the acceleration mechanism. HNX will measure, for the first time, the abundance of every individual element in the periodic table from carbon through the actinides, providing the first measurement of many of these elements. Several thousand ultra-heavy galactic cosmic ray (UHGCR) nuclei with atomic number  $Z \geq 30$  will be recorded, including about 50 actinides. To measure UHGCR with unprecedented statistics and individual element resolution over its full measurement range, HNX will use two large instruments, the Extremely-heavy Cosmic-ray Composition Observer (ECCO) using sophisticated glass detectors and the Cosmic-ray Trans-Iron Galactic Element Recorder (CosmicTIGER) using electronic detectors evolved from SuperTIGER. HNX will be accommodated in the SpaceX DragonLab orbiting laboratory that will also return it to Earth for post-flight processing of the ECCO detectors. HNX measurements will determine whether GCR are accelerated from new or old material, and find their age. The measured mix of R-process and S-process material will determine the mix of nucleosynthesis processes responsible for the UHGCRs and investigate how UHGCR elements are selected for acceleration. The measured secondary to primary ratios will give the mean integrated pathlength traversed by UHGCRs before observation. The scientific motivation of HNX and details of its instruments will be discussed.

### Collaboration

– not specified –

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