

The Trans-Iron Galactic Element Recorder for the International Space Station (TIGERISS)

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TIGERISS is an Ultra-Heavy Galactic Cosmic Ray (UHGCR) detector to be proposed to the NASA Astrophysics Pioneers program capable of measuring the abundance relative to ^{26}Fe of every element from ^5B to ^{82}Pb . It is evolved from the LDB TIGER and SuperTIGER balloon instruments and the Heavy-Nuclei Explorer SMEX, and compared to its predecessors, TIGERISS will have a greatly improved capability to definitively identify UHGCR nuclei. This has been demonstrated in component accelerator tests at CERN, including silicon strip detectors in place of scintillators. The geometry factor for TIGERISS is estimated to be from 1.1 to $1.7\text{ m}^2\text{ sr}$ depending on the ISS attachment point, compared to $0.6\text{ m}^2\text{ sr}$ for TIGER. Within one-year TIGERISS would observe $\sim 27\text{ }^{56}\text{Ba}$ nuclei, a 20% statistically significant result comparable to the current SuperTIGER data set. Not requiring corrections for atmospheric interactions and scintillator saturation effects the TIGERISS results would be cleaner, and they would also make preliminary measurements to higher charges that will test models for cosmic-ray origins and acceleration. TIGERISS will measure UHGCR nuclei resulting from neutron-capture nucleosynthesis in heavy stars, supernovae, and binary neutron-star mergers and will probe the relative contribution of r-process elements to the cosmic rays.

Keywords

ultra-heavy cosmic-ray nuclei; particle detectors; space station

Collaboration

other (fill field below)

other Collaboration

TIGERISS

Subcategory

Experimental Methods & Instrumentation

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