



## **Design concept for the High Energy Particle Sensor (HEPS) for NPOESS**

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The High Energy Particle Sensor (HEPS), an instrument in the Space Environment Sensor Suite (SESS) on the National Polar-orbiting Operational Environmental Satellite System (NPOESS), will measure protons and He from 10 MeV/n to  $>300$  MeV/u and heavier ions through Ni at corresponding energies with a geometrical factor of  $\sim 1$  cm<sup>2</sup> ster. It will thus provide useful data on Solar Energetic Particles (SEP), Galactic Cosmic Rays (GCR) and Anomalous Cosmic Rays (ACR). In particular, HEPS is designed so as not to saturate at the highest fluxes of SEPs thus far observed. With the NPOESS polar orbit, HEPS can use the geomagnetic field to study the charge states of the different particle populations, as previously demonstrated on the SAMPEX mission. For example, GCRs are fully stripped, ACRs are mainly singly charged while SEPs are partially stripped. The charge state of SEPs is a diagnostic of the ion source population. HEPS will be based on the Angle Detecting Inclined Sensors (ADIS) system. A prioritized sample of events will be pulse-height analyzed and processed on-board. Owing to the simplicity of the ADIS analysis, events will be identified by charge and binned on-board by the HEPS central processor unit for telemetry to the ground. HEPS will have single element resolution with sigma  $< 0.25$  e.