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Cosmic Ray Energetics And Mass: from balloons to the ISS

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The balloon-borne Cosmic Ray Energetics And Mass (CREAM) experiment was flown for ˜161 days in six flights over Antarctica. Elemental spectra were measured for Z = 1 - 26 nuclei over a wide energy range from ˜ 10^{10} to >10^{14} eV at an average altitude of ˜38.5 km with ˜3.9 g/cm^2 atmospheric overburden. Building on the success of the balloon flights, the payload has been reconfigured for exposure on the International Space Station (ISS). The ISS-CREAM instrument is configured with the CREAM calorimeter for energy measurements and four finely segmented Silicon Charge Detector layers for precise charge measurements. In addition, the Top and Bottom Counting Detectors (TCD and BCD) and Boronated Scintillator Detector (BSD) have been newly developed. The TCD and BCD are scintillator based segmented detectors to separate electrons from nuclei using their shower profile differences, while the BSD distinguishes electrons from nuclei by detecting thermal neutrons that are dominant in nuclei induced showers. The ISS-CREAM payload is currently being integrated. After system level qualification tests including EMI/EMC, vibration, and thermal vacuum tests, the payload will be launched from NASA Kennedy Space Center on SpaceX to be installed on the ISS Japanese Experiment Module Exposed Facility. An order of magnitude increase in data collecting power is possible by utilizing the ISS to reach the highest energies practical with direct measurements. The project status, including results from on-going analysis of existing data, and future plans will be presented.

Collaboration

– not specified –

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