

CREAM: Cosmic Ray Balloon Mission in Antarctica

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The Cosmic Ray Energetics And Mass (CREAM) instrument is configured with state-of-the-art particle detectors to measure cosmic ray composition from protons to iron nuclei over the energy range 1 - 103 TeV in a series of balloon flights. The goal is to observe cosmic-ray spectral features and/or abundance changes that might signify a limit to supernova acceleration. The science instrument will be integrated with a flight support system developed for 100-day flights. Particle charge (Z) measurements will be made with a timing-based detector and a pixelated silicon matrix to minimize the effect of backscatter from the calorimeter. Particle energy measurements will be made with a transition radiation detector for $Z > 3$ and a sampling Tungsten/scintillator calorimeter for $Z \leq 3$. In-flight cross calibration of the two detectors allows better determination of the particle energy. Measurements of relative abundances of secondary cosmic rays (e.g., B/C) as well as primary spectra will allow determination of cosmic ray source spectra at this high energy, where measurements are currently not available. The instrument has been tested and calibrated with a series of beam tests at CERN. The first flight is planned to be launched from Antarctica in December 2004 on a zero pressure balloon. Using two instrument suites, we plan to conduct annual flights on a zero pressure balloon until ultra long duration balloons become available. The status of the instrument suites and the flight plans will be reported.