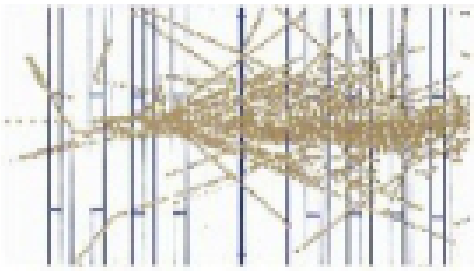

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Performance of the PAMELA Silicon-Tungsten Imaging Calorimeter in Space

Wednesday, May 28, 2008 12:00 PM (20 minutes)

Summary

The Payload for Antimatter-Matter Exploration and Light Nuclei Astrophysics (PAMELA), primarily designed to directly measure antiparticles (antiprotons and positrons) in the cosmic radiation, was launched successfully on June 15th, 2006, and, since then, it is in continuous data taking. The calorimeter of the PAMELA apparatus has been designed to identify antiprotons from an electron background and positrons from a background of protons with high efficiency and rejection power. It is a sampling silicon-tungsten imaging calorimeter, which comprises 44 single-sided silicon sensor planes (380 μm thick) interleaved with 22 plates of tungsten absorber (0.74 X0 each). It is the first silicon-tungsten calorimeter to be launched in space.
In this work we present the in-orbit performance of the calorimeter, including the measured identification capabilities. We show that the calorimeter provides a proton rejection factor of ~10^5 while keeping a high efficiency in selecting electrons and positrons, thus fulfilling the identification power needed to reach the primary scientific objectives of PAMELA. We show also that, after almost two years of operation in space, the calorimeter is still performing nominally.

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