

Solar Energetic Particles (SEP), Solar Modulation and Space Radiation: New Opportunities in the AMS-02 Era

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The PAMELA experiment

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The nine years of data taking in space of the PAMELA experiment are providing interesting information concerning the origin and propagation of both galactic and solar cosmic rays.

The precise measurement of the energy spectra of protons, helium and light nuclei and their isotopes, electrons and positrons, as well as of their arrival distribution allows for a careful study of the mechanisms of production, acceleration and propagation of cosmic rays in the galaxy and in the heliosphere.

The study of the time dependence of the various components of the cosmic radiations clearly shows solar modulation effects as well as charge sign dependence of these effects. PAMELA measurement of the energy spectra during solar energetic particle events fills the existing energy gap between the highest energy particles measured in space and the ground-based domain. Furthermore, providing pitch angle measurements, it allows the study of the effects of particle transport within interplanetary space over a broad range in energy. Moreover, by sampling the particle radiation in different regions of the magnetosphere, PAMELA data provide a detailed study of the Earth's magnetosphere.

This talk illustrates the scientific results obtained by the PAMELA experiment and their relevance for the study of SEP, solar modulation and Earth's magnetosphere.

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