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Geomagnetically trapped, albedo and solar particles: trajectory analysis and flux reconstruction with PAMELA

Thursday 22 October 2015 15:00 (30 minutes)

The PAMELA satellite experiment, operating since 2006 June, is providing precise and detailed measurements of the radiation environment in low Earth orbit, including galactic, solar and under-cutoff cosmic-rays. The analysis of the different components is supported by an accurate trajectory tracing simulation based on a realistic modeling of the Earth's magnetosphere, which enables the investigation of particle propagation in the geomagnetic field and the discrimination between populations of interplanetary and atmospheric origin. The under-cutoff particles are classified into geomagnetically trapped and albedo: the former consist of inner belt particles with trajectories satisfying the adiabatic conditions, confined to the South Atlantic Anomaly (SAA) at PAMELA altitudes; the latter are subdivided into quasi-trapped, concentrating in the equatorial region, and untrapped, spreading over all sub-cutoff latitudes and including both short-lived (precipitating) and long-lived (pseudo-trapped) components. The trajectory information is also exploited to evaluate the angular distribution of Solar Energetic Particle (SEP) fluxes, by estimating the asymptotic directions of approach and the entry points in the magnetosphere. The SEP energy spectra are reconstructed as a function of the pitch-angle with respect to the Interplanetary Magnetic Field (IMF) direction, allowing the investigation of possible anisotropies and thus improving the interpretation of the solar events observed by PAMELA during solar cycles 23 and 24.

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