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Trajectory reconstruction in the Earth Magnetosphere using TS05 model and evaluation of geomagnetic cutoff in AMS-02 data

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Our backtracing code (Geomagsphere), for Cosmic Rays trajectory reconstruction in the Earth Magnetosphere, has been developed using the latest models of Internal (IGRF-11) and External (Tsyganenko 1996 and 2005) field components. Backtracing technique was applied to AMS-02 data to separate Primary Cosmic Rays Particles from Secondary particles. We tested the accuracy of Magnetic Field models (with and without the external field component) comparing them with data from satellite (GOES, 1998 and CLUSTER, 2004). In both periods TS05 reproduces the magnetic field strength with good accuracy. Moreover the specificity of the TS05 model, designed for solar storms, was tested comparing it with data taken by CLUSTER during the last solar active period (from 2011 to 2013). We found a relevant difference on the fraction of AMS-02 cosmic rays identified as trapped and secondary particles, especially during Solar Flare periods (i.e. those occurred in March and May 2012). Finally the backtracing of a wide sample, more than 70 days, of AMS-02 proton data was used to get the real geomagnetic cutoff. We found an increased counting rate of primary particles at high latitudes with respect to the IGRF model. Besides we built a procedure to extract from data the rate of secondary particles.

Collaboration

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