

Source and Loss Processes of Antiprotons of the Equatorial Inner Magnetosphere

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Significant fluxes of antiparticles in the Earth magnetosphere has been predicted on theoretical considerations. At several hundred kilometers of altitudes antiprotons are expected due to nuclear reactions of the high energy primary cosmic rays (CR) with the constituents of terrestrial atmosphere. Extraterrestrial antiprotons are themselves are of secondary in origin due to nuclear reactions of the CR particles in passing through 5-7 g/cm² of interstellar matter encountered during their lifetime in the Galaxy. We expect that the fluxes of magnetospheric antiprotons are greater compared to interstellar fluxes as the fluxes get accumulated due to confinement in the magnetic field. Computations of the antiproton fluxes at 50 MeV to several GeV energies due to the CR particle interactions with the residual atmosphere at altitudes of ~ 1000 km over the Earth's surface are performed. The calculations for the flux intensities, energy spectrums, and radial distributions are obtained applying the diffusion theory and the Chirikov process for the non adiabatic behaviour. The estimates shows that the magnetospheric antiproton fluxes (at L~ 1.2) are greater by an order of magnitude compared to the interstellar fluxes measured at energies < 1 GeV. However, the contributin of these particles of magnetic origin to the interestellar fluxes measured in balloon experiments at high latitudes is not significant.

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