Contribution ID : **210** Type : **Poster**

Cosmic Ray Flux in the Presence of a Neutral Background

Friday, 6 July 2007 14:45 (0:00)

Abstract content

The study of cosmic rays (CRs) is a very mature subject developed around the concept of radiative particle flux phi as a mono-variant function of energy E, that is phi = phi(E). This is based on the notion of the cosmos as being filled with cosmic radiation in the form of a collisionless exosphere of plasma. Neutrals, however, are likewise ubiquitous in space and planetary trapped-radiation belts. It will be shown that in the presence of a neutral background of density rho, flux phi is actually bivariant in energy E and rho, creating a surface phi(E,rho). This is an intrinsic property of charged-particle flux, that flux is not merely a function of E but is dependent upon density rho when a background of neutrals is present. The effect is produced by multiple scattering of charged particles off neutral and ionized atoms along with ionization loss where charged and neutral populations interact. For the harder portion of CR spectra, flux is mono-variant but at nonrelativistic energies (below ˜350 MeV) it becomes sensitive to the presence of neutral backgrounds. The dependence of phi(E,rho) upon background neutrals is helpful in dicussing the anomalous CR (ACR) flux made up of ionized components of the heliospheric neutral atmosphere.

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 1 (SH), pages 665-668

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Session Classification : Posters 2 + Coffee

Track Classification : SH.3.6