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Energetic Solar Particle Charge Behavior During Source Acceleration

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Abstract content

In order to fit observational data of solar particle charge states, two different models have been developed, to study the evolution of charge during their source acceleration. :(1) on basis to high energy electron loss and capture cross sections, from laboratory experiments in atomic and ionized hydrogen gases, under the assumption of an interaction process of two different populations; one which is being accelerated from the thermal background, getting rapidly an exponential (or inverse power law) spectrum, and so becoming an out of the thermodynamic equilibrium population, namely the ion projectiles, and another population which is in thermodynamic equilibrium, namely targets, from a thermal background, with a Maxwellian spectrum. (2) on basis to the extrapolation to high energies of ionization and recombination thermal cross sections in plasmas, which implies that both targets and energetic ions belong to a population in thermodynamic equilibrium in the background plasma, with quasi Maxwellian spectra.. Both models have their intrinsic limitations: high energy cross sections for electron loss and capture are not well know in high temperature plasmas, therefore, the extrapolation of thermal cross sections of ionization and recombination to high energies is not completely justified, since we do not know their exact behavior at those energies. Furthermore, though acceleration begins from a thermal distribution, as soon as particles are getting energy by the acceleration process, they acquire an spectrum which differs from the Maxwellian one, while interacting with the background thermal matter. We present in this work a comparative analysis of both models and discuss their implications.

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 87-90

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