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The Charge-to-Mass Dependence of Solar Energetic Particle Spectral Breaks

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Abstract content

A new generation of instruments during solar cycle 23 made it possible to measure solar energetic particle (SEP) energy spectra for many species over a broad energy interval (˜0.1 to ˜100 MeV/nuc). These observations revealed that most large SEP events have power-law spectra below a few MeV/nuc with rather hard spectral indices, followed by spectral breaks at higher energies. The spectral breaks are ordered by species – the spectra of lighter elements break at higher energy/nuc than those for heavier species. In previous studies Tylka et al. and Mewaldt et al. found the break energies scaled as a power of the charge-to-mass ratio (Q/M) ranging from ˜1 to ˜2. According to the model of Li, Zank, and Rice, the locations of the breaks (in energy/nuc) relative to that for protons depend on the square of Q/M. In this paper we fit fluence spectra from ˜0.1 to ˜100 MeV/nuc using H to Fe data from ACE, SAMPEX and GOES. Combining the break locations with Q/M data from SAMPEX and ACE for ˜10 events, we compare the resulting Q/M-dependence of the break energies with theoretical models and other solar/interplanetary data to investigate the origin of spectral breaks.

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 99-102

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