

Solar Energetic Particles (SEP), Solar Modulation and Space Radiation: New Opportunities in the AMS-02 Era #2

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What Governs the Longitudinal Spread of Solar Energetic Particles?

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The launch of the STEREO spacecraft has ushered in a new era of studying solar energetic particle (SEP) events from multiple vantage points simultaneously. Surprising results, such as ^3He -rich SEP events extending over 100 degrees in longitude and 25 MeV protons being detected over 360 degrees within 30 minutes of the start of an SEP event, have challenged our understanding of the transport of SEPs through the inner heliosphere. In an effort to study the roles energy and rigidity play in the longitudinal spread of SEPs, we have examined >40 multi-spacecraft events with measureable 10 MeV/nuc oxygen intensities. We fit the observed fluences of H, He, O, and Fe as a function of the spacecraft magnetic footprint separation from the solar source to obtain centers and widths of the distributions. We find no substantial organization with the elements' charge-to-mass ratios, but some dependence on particle energy. These results will be discussed along with their implications for the dominant mechanism(s) for the longitudinal distribution of SEPs.

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