

The Solar Origin of High-Energy Solar Energetic Particle Events

Tuesday 24 April 2018 14:40 (20 minutes)

One of the remaining questions of solar energetic particle (SEP) events is their links to solar regions and eruptions from them. The solar origin is more strongly found in SEPs at high energies including electrons, and during the early phase. We experience SEP events that apparently contradict our expectation on the onset time, the flux of, and rise time to, the (first) peak, and the angular spread, on the basis of the source location and the properties of the CME. For example, a SEP event from the source region in eastern heliographic longitudes may have a quick onset and sharp rise to the peak. The observed angular spreads of SEP events may be different from what we expect from the estimated CME widths. We try to find these puzzles in terms of the magnetic connection of the CME-driven shock with the observer, using simple models and advanced numerical simulations.

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Session Classification: Early Tuesday Afternoon