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Electron transport in impulsive SEP events

Abstract content

Impulsive solar energetic particle (SEP) events often show a high e/p ratio and over-abundance of He3. The underlying acceleration mechanism of particles (electrons and ions) in these events is still unknown. One crucial step in advancing our understanding of the acceleration process is to deduce precisely the injection time of electrons and ions from the observed time-intensity profiles and particle spectra at 1 AU. As such, a detailed transport model is needed. Recently, we developed a Monte-Carlo model to follow electron transport in an impulsive SEP event. In a collisionless plasma like the solar wind, the propagation of electrons follows the Parker Spiral field lines with little pitch angle scattering that is caused by the presence of solar wind turbulence. The effect of the pitch angle scattering is to alter the pitch angles of particles in a random manner. By casting the governing Fokker-Planck equation to a set of equations describing the motion of individual particle, we obtain the time intensity profile, the pitch angle distribution and its time evolution. Using the model, two example impulsive events from WIND 3DP measurements are studied. The injection times of electron are obtained by fitting the observed time intensity profiles and pitch angle distributions as a function of time. These injection times provide crucial clues to understand the underlying acceleration process.

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

Summary

Reference

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