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General anisotropy
30 min. invited talk

Three-dimensional anisotropic transport of solar energetic particles in the inner Heliosphere: observations and transport modeling

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Solar energetic particles carry fundamental information about their source region and their acceleration and propagation processes. Their intensity-time profiles, anisotropies, and energy spectra are determined by the combined effects of acceleration at the Sun and in interplanetary space, injection time profile, and coronal and interplanetary propagation. However, by the time the energetic particles have reached Earth, the effects of acceleration, release and transport generally cannot be uniquely unfolded when observed with only one spacecraft. We report results from multi-spacecraft observations (ACE/Wind with STEREO) for a number of particle events which occurred in the current solar maximum, and present applications of recently developed numerical models to simulate the pitch-angle dependent three-dimensional propagation of energetic particles in the Heliosphere. Based on observations of the lateral gradients between the various spacecraft we discuss the transport of the particles parallel and perpendicular to the interplanetary magnetic field. First results of a recent extension of our model to include the effects of anisotropic distribution functions and adiabatic focusing to 1st-order Fermi acceleration at an interplanetary shock wave will be discussed and compared with predictions from diffusive shock acceleration theory.