

Comparison of the particle acceleration between pileup shock and converging shock

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On the one hand, observations show that there are proton spectral “breaks” with energy E_{br} at 1-10MeV in some large solar energetic particle (SEP) events. Such as in the 2006 Dec 13 SEP event, which would be associated with the converging interaction between the coronal mass ejection (CME)-driven shock and the Earth’s bow shock. On the other hand, the ground-level enhancement (GLE) events are often associated with the twin CME-driven shock. Observations show that there are “ankle” energy spectral slopes in the generated SEP events. Such as in the the GLE event on 2012 May 17. We suggest that GLE with an energy spectral “ankle” would be responded to the pileup interaction of the twin-shock; The SEP with an energy spectral “break” would be associated with the converging shock interaction. We have done the simulations using the Monte Carlo particle method and have investigated that the results were consistent with the observations separately.

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