The Maximum Energy Particles Accelerated by the CME-driven Shock

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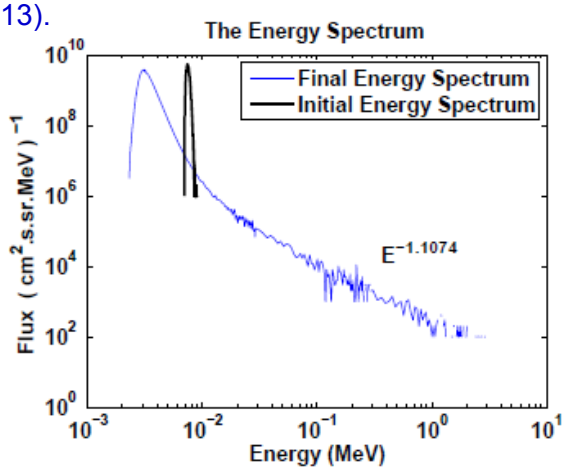
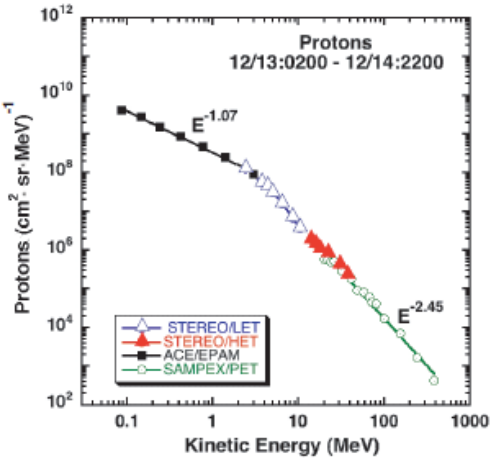
Motivation: There is an agreement on energy spectrum between the simulated result (RAA, Wang, et al. 2012) and the observed result (Mewaldt, et al. ICRC, 2008) in the low energy range below MeV of the 14-Dec-2006 CME-driven shock event. But there still exist a "break" on the energy range from 1MeV to 10MeV in the observed energy spectrum. According to the diffusive shock acceleration (DSA) theory, the "break" is an important problem for challenging the acceleration efficient of maximum energy particles (ApJS, Wang, et al. 2013).



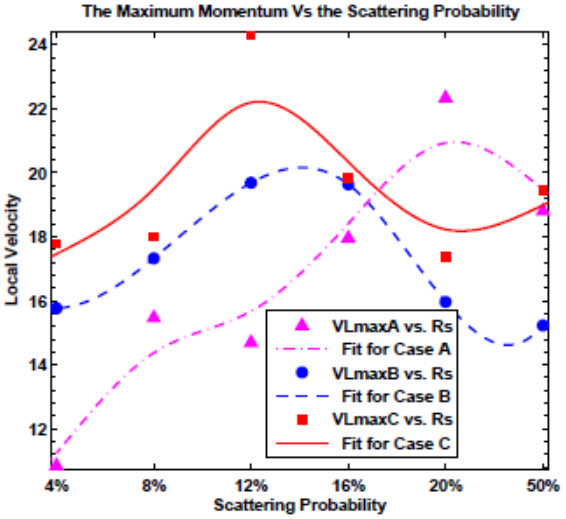
simulated result
(RAA, Wang, et al. 2012)



observed result
(Mewaldt, et al. ICRC,2008)

Simulation Method : We applied the Monte Carlo method (A&A, Wang, et al. 2011) to simulate the CME-driven shock by using different dispersions of the pitch angle scattering distribution. For test the "break" in the energy spectrum, we used different size of the FEB in the Monte Carlo model cases with three Gaussian anisotropic scattering angular distributions, respectively.

Results: According to the simulated results, we find that each case can produce a function of the maximum energy particles at different scattering probability. And each maximum energy particle's function with a different peak at the scattering probabilities from 4% to 50%. And each peak is forwarding to the high scattering probability as the dispersion of the scattering angular distribution decreases. This critical peak of the maximum momentum imply that there exists a cut off of the particle acceleration efficient in the DSA theory. So it would test the "break " of the energy spectrum occurring in CME-driven shock.



ICRC, Wang, et al. 2013

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