

## Space Weather and Solar Energetic Particle Events: How are they accelerated?

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Solar Energetic Particles events represent an important element of Space Weather. Energetic ions accelerated to tens of MeV-s, or even to relativistic energies, pose a threat to satellites and human activity in space. The current paradigm is that acceleration of ions occurs at shock waves driven by Coronal Mass Ejections (CMEs). The acceleration mechanism still has a number of open questions. Shock acceleration is likely to be the most widespread process of energization in the Universe, that operates at many different astrophysical scenarios. Hence, the understanding of solar energetic particles may help to understand acceleration at other sites (supernovae etc), too.

We are working together with people from the University of Michigan, Ann Arbor, to understand, model, and potentially forecast SEP events. The CME simulations obtained from a 3-dimensional MHD code in Michigan are to be combined with the particle acceleration and transport model developed in Arizona. Our preliminary results suggest that the shock is more likely to be perpendicular than parallel (i.e. angle between the magnetic field and the shock normal must be large).

In the talk we give a brief overview of the CME-s and Solar Energetic Particle events, present our results, and discuss the outstanding problems.