



## **SEP acceleration at evolving CMEs with changing shock geometry**

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**Abstract:** Gradual solar energetic particle (SEP) events are believed to be accelerated at CME driven shocks. Shocks driven by realistic CMEs are neither simply quasi-perpendicular nor quasi-parallel: the geometry and the shock strength may constantly change as the CME evolves. The shock is likely to be quasi-parallel when it forms and becomes more parallel at later stages (e.g. Lee and Tylka 2005). The downstream sheath region immediately behind the shock has a structure of its own, which may play a significant role in the SEP acceleration process. We utilize a numerical scheme adopting a Lagrangian scheme which is designed to handle the evolution of the shock. The scheme follows the moving magnetic field lines, which are wrapped around the expanding CME, and are pushed by the ejecta. We present numerical simulation results and discuss their implications.