

A41a Contribution of Reconnection-accelerating Particles to SEPs

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High-energy particles in solar flares sometimes propagate to the interplanetary space and affect the environment around the earth. The origin of the high energy particles, so called solar energetic particles (SEPs), has been considered as the shock acceleration at the propagating front of coronal mass ejections. The reconnection is also an candidate to generate high-energy particles in a solar flare, though its contribution to the SEPs has not been investigated so well.

In this presentation, we performed 3-dimensional MHD simulation of a solar flare and investigated test particle behaviors. Initially we assumed a flux rope in the unstable and equilibrium state and slightly lifted up the middle part of the flux rope for eruption. A flux rope is ejected upward removing and reconnecting with the surrounding magnetic field lines and accelerated to form a shock at the propagation front.

The flux rope eruption forms a current sheet below, in which multiple small-scale plasmoids are formed and ejected upward and downward. This makes a current sheet turbulent and locally enhances inflow to the current sheet and electric-field inside. Test particles move in several current sheets and are stochastically accelerated by enhanced electric-field. Some part of accelerated particles escape from the reconnection site to the upside and propagate through the erupting flux rope to the interplanetary space. Furthermore, we also found that a strongly twisted flux rope is ejected faster, resulting in larger electric-field in a current sheet, a stronger shock at the propagation front and harder acceleration of particles in a solar flare.