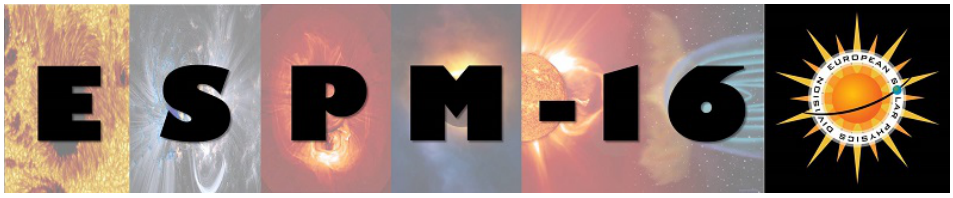

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The Role of Magnetic Reconnection in the Acceleration and Expansion of A Coronal Mass Ejection on 2013 February 27

Monday 6 September 2021 12:03 (13 minutes)

The role of magnetic reconnection in the acceleration of coronal mass ejections (CMEs) has been widely discussed. However, because CMEs are found to have expansion speed which is comparable to propagation speed in the corona, it is still not clear about which portion of the reconnection contributes to the acceleration and expansion separately. To address this question, we analyze a fast CME event on 2013 February 27, associated with clearly observed three-part structure. We find that the CME front undergoes a smooth but long-lasting acceleration in the high corona while the speed of its core remains constant. This acceleration is caused by the additional CME expansion along the radial direction (with acceleration speed of *Ae*). Magnetic reconnection is found to occur after the eruption of the CME and to continue during the CME propagation. We estimate the potential acceleration caused by the drag-based model (*Ad*), in which the CME deceleration due to the solar wind drag is thought to be compensated by the acceleration via reconnection. The comparison between *Ae* and *Ad* reveals that the contribution of the magnetic reconnection in the high corona to the expansion is comparable to or larger than its contribution to the acceleration. The result also brings a view that the expansion shall be considered separately when studying CME dynamics.

Authors: ZHUANG, Bin (University of New Hampshire); Prof. LUGAZ, Noé (University of New Hampshire); Dr GOU, Tingyu (University of Science and Technology of China); Prof. TEMMER, Manuela (Institute of Physics, University of Graz)

Presenter: ZHUANG, Bin (University of New Hampshire)

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