CME-CME interaction near the Earth

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In coronagraph images, it is often observed that two successive CMEs merge into one another and form complex structures. This phenomenon, CME-CME interaction caused by the differences in ejecting times and propagating velocities, can significantly degrade forecast capability of space weather. This can occur anywhere in the interplanetary space as well as near the Sun. Regarding this, we attempt to analyze the cases expecting to merge around 1 AU based on CME arrival times. Based on detailed investigation for merging process by using in-situ observations and model simulations, we can get clues for following questions: 1) How does the solar wind structure change when they are merging? 2) Are there any systematic characteristics of merging process according to the CME properties? 3) Is the merging process associated with the occurrence of energetic storm particles? 4) What causes errors in calculating CME arrival times? Our results can be helpful to understand energetic phenomena not only close to the Sun but also near the Earth.

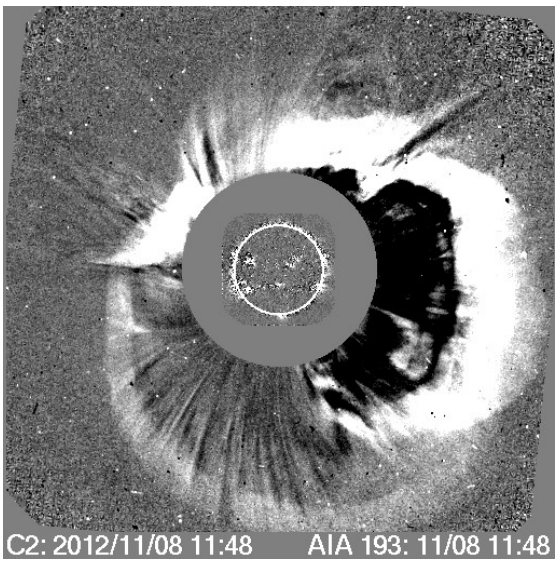

Figure 1. CME observation of LASCO coronagraph

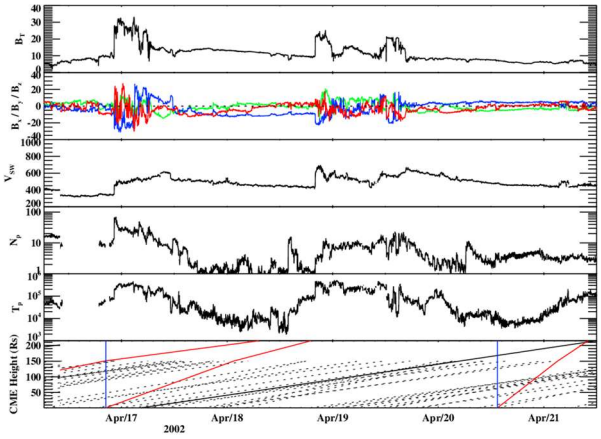

Figure 2. Arrival of CMEs at the Earth

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