CME INITIATION AND RECONNECTION

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Coronal mass ejections (CMEs) are the most massive explosions in the heliosphere, and the primary drivers of geoeffective space weather. This talk will be focused on fast CMEs, which travel at Alfvenic speeds as high as 2500 km/s. These ejections are associated with solar flares, prominence eruptions, and energetic particles accelerated near the Sun and in interplanetary space. CMEs require sufficient energy storage, in the form of magnetic stress, and rapid release of this energy. Although it is generally agreed that magnetic reconnection is the key to fast CME initiation, different models incorporate reconnection in different ways. One promising model --- the breakout scenario --- involves reconnection in two distinct yet interconnected locations: breakout reconnection ahead of the CME, and flare reconnection behind it. This model has been validated through 2D and 3D MHD simulations and favorable comparison with the observed properties of many fast CMEs. I will discuss what we have learned about the onset and evolution of breakout and flare reconnection from recent high-resolution 2D simulations of CME initiation with adaptive mesh refinement and numerical resistivity.