Contribution ID: **268** Type: **Poster**

Initiation And Early Kinematic Evolution Of Solar Eruptions

Thursday 9 September 2021 11:00 (13 minutes)

We investigate the initiation and early evolution of 12 solar eruptions and conclude: (1) The early evolution of all events consists of a slow-rise phase followed by a main-acceleration phase, the height-time profiles of which differ markedly and can be best fit, respectively, by a linear and an exponential function. This indicates that different physical processes dominate in these phases, which is at variance with models that involve a single process. (2) The kinematic evolution of the eruptions tends to be synchronized with the flare light curve in both phases. The synchronization is often but not always close. A delayed onset of the impulsive flare phase is found in the majority of the filament eruptions (five out of six). This delay and its trend to be larger for slower eruptions favor ideal MHD instability models. (3) The average decay index at the onset heights of the main acceleration is close to the threshold of the torus instability for both groups of events, suggesting that this instability initiates and possibly drives the main acceleration.

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Session Classification: Poster Session 10.5

Track Classification: Session 4 - From Radio to Gamma Rays: Near-Sun Manifestations and Triggering of Solar Flares and Coronal Mass Ejections