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Poster

4. Eruptions in the solar atmosphere

Two Episodes of Magnetic Reconnections During a Confined Circular-ribbon Flare

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We analyze a unique event with an M1.8 confined circular-ribbon flare on 2016 February 13, with successive formations of two circular ribbons at the same location. The flare had two distinct phases of UV and EUV emissions with an interval of about 270 s, of which the second peak was energetically more important. The first episode was accompanied by the eruption of a mini-filament and the fast elongation motion of a thin circular ribbon (CR1) along the counterclockwise direction at a speed of about 220 km s^{-1}. Two elongated spine-related ribbons were also observed, with the inner ribbon co-temporal with CR1 and the remote brightenings forming $\sim$ 20 s later. In the second episode, another mini-filament erupted and formed a blowout jet. The second circular ribbon and two spine-related ribbons showed similar elongation motions with that during the first episode. The extrapolated 3D coronal magnetic fields reveal the existence of a fan-spine topology, together with a quasi-separatrix layer (QSL) halo surrounding the fan plane and another QSL structure outlining the inner spine. We suggest that continuous null-point reconnection between the filament and ambient open field occurs in each episode, leading to the sequential opening of the filament and significant shifts of the fan plane footprint. For the first time, we propose a compound eruption model of circular-ribbon flares consisting of two sets of successively formed ribbons and eruptions of multiple filaments in a fan-spine-type magnetic configuration.