Pre-impulsive hyperhot source as the evidence of magnetic reconnection

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Magnetic reconnection is widely applied to explain eruptive or heating phenomena in both astrophysical and geophysical contents. In solar physics, it has been proposed that all kinds of flares with different scales ranging from Long-duration-events, compact flares, to microflares, can be unified into magnetic reconnection model. In observations, more and more indirect evidence of magnetic reconnection has been discovered, like cusp-shaped structure, plasmoid ejection, reconnection inflow, etc. However, little evidence has been found to be related to the small scale reconnection region.

Recently, Uchida et al. (2001) found a hyperhot source (with temperature up to 80 MK) in the corona before the impulsive phase of a compact flare. The authors suggested that magnetic twist coming up from the footpoints heat the coronal loop top to such a high temperature. By simulating the interaction between two loop systems, we propose that the hyperhot source corresponds to the small scale reconnection region, where a magnetic island may be heated up to a high temperature by resistive dissipation of current sheet. The ejection of the magnetic island is followed by the impulsive phase of the flare. Numerical results do indicate that the temperature maximum preceeds the reconnection rate maximum, where the latter characterizes the impulsive phase of a flare.