



## **On the Magnetic Topology and Extreme Ultraviolet in Solar Flares with Late Phase**

Jun Chen (1,2), Rui Liu (1), Kai Liu (1), and Yuming Wang (1)

(1) CAS Key Laboratory of Geospace Environment, Department of Geophysics and Planetary Sciences, University of Science and Technology of China, Hefei, China, (2) Institute of Physics and Astronomy, University of Potsdam, Potsdam, Germany

It was recently discovered that some solar flares exhibit a late-phase peak in EUV emission with ‘warm’ temperatures (e.g., Fe XVI 33.5 nm), which is referred to as EUV late phase. In this paper, we carried out a statistical study of 51 M- and X-class flares with EUV late phase (ELP) during 2010–2015. These flares are categorized as circular-ribbon, two-ribbon, and intricate-ribbon flares, based on the flare morphology observed in the chromosphere. It is found that the circular-ribbon flares with ELP often possess a coronal null and the associated fan and spine, which are typically embedded in a dome-shaped quasi-separatrix layer (DQSL) intersecting with a curved plate-shaped QSL (PQSL). The footprints of the PQSL correspond to an extended ribbon enclosed by the circular-shaped ribbon and a remote ribbon. The coronal loops responsible for ELP are found to be closely associated with not only the spine but more generally the PQSL. The majority of two-ribbon flares with ELP are confined, and the two ribbons are not associated with any preexisting QSLs. It is still an open question whether the ELP is primarily due to plasma cooling or additional heating.

Keywords: magnetic topology, flare, extreme ultraviolet late phase