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UV Bursts: Magnetic Reconnection in the Lower Solar Atmosphere

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Observations of the Interface Region Imaging Spectrograph (IRIS) have revealed numerous intense, compact and transient brightenings at typical transition region temperatures (around 100,000 K) in active regions [1]. These so-called UV bursts are characterized by chromospheric absorption lines superimposed on the greatly broadened transition region line profiles, and are believed to result from magnetic reconnection in the lower chromosphere or even the photosphere. Since their discovery, the UV bursts have received a lot of attention as they reveal significantly new insight into the physical process of magnetic reconnection in the partially ionized lower solar atmosphere. UV bursts are markers of active region formation, and they could be associated with various types of magnetic field configurations such as bald patches, null points and quasi-separatrix layers [2,3]. They are also found at light bridges, marking interaction between newly emerged fluxes and the umbral fields [4]. Coordinated observations between ground-based telescopes and IRIS revealed that about half of the UV bursts are associated with the well-known Ellerman bombs (EBs) [5], which has not yet been fully reproduced in RHD or MHD simulations. The relationship between EBs and UV bursts is still under debate. We investigate the spatial and temporal relationship between flame-like EBs and UV bursts using joint near-limb observations between the Big Bear Solar Observatory (BBSO) and IRIS [6]. Some EBs are connected to UV bursts, and the UV bursts have a tendency to appear at the upper parts of the flame-like EBs. The intensity variations of EBs and the corresponding UV bursts match well, though the percentages of intensity changes are different. This indicates that UV bursts and EBs may be formed at different heights during the same reconnection processes.

References
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Figure 1: UV bursts have a tendency to appear at the upper parts of the flame-like EBs [6].