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Radio and X-ray Observations of Short-lived Episodes of Electron Acceleration in a Solar Microflare

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Solar flares release enormous magnetic energy into the corona, producing the heating of ambient plasma and the acceleration of particles. The flaring process is complex and often shows multiple spatially separated temporal individual episodes of energy releases, which can be hard to resolve based on the instrument capability. We analysed the multi-wavelength imaging and spectroscopy observations of multiple electron acceleration episodes during a GOES B1.7-class two-ribbon flare observed simultaneously with the Karl G. Jansky Very Large Array (VLA) at 1–2 GHz, the Reuven Ramatay High Energy Solar Spectroscopic Imager (RHESSI) in X-rays, and the Solar Dynamics Observatory in extreme ultraviolet (EUV).

We observed a total of six radio bursts. The first three bursts were co-temporal but not co-spatial nonthermal X-ray source and represented multiple electron acceleration episodes. We model the radio spectra by optically thick gyrosynchrotron emission and estimate the magnetic field strength and nonthermal electron spectral parameters in each acceleration episode.

We note that the nonthermal parameters derived from X-rays differ considerably from the nonthermal parameters inferred from the radio and originates in the lower corona. Although co-temporal, the multi-wavelength analysis shows that different electron populations produce multiple acceleration episodes in radio and X-rays.

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