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Poster

4. Eruptions in the solar atmosphere

Observations of Electron-driven Evaporation in a Flare Precursor

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We investigate the relationship between the blueshifts of a hot emission line and the nonthermal emissions in microwave and hard X-ray (HXR) wavelengths in the precursor of a solar flare on 2014 October 27. The flare precursor is identified as a small but well-developed peak in the soft X-ray and extreme-ultraviolet passbands before the GOES flare onset, which is accompanied by a pronounced burst in microwave 17 and 34 GHz and in HXR 25−50 keV. The slit of the Interface Region Imaging Spectrograph (IRIS) stays on one ribbon-like transient during the flare precursor phase, which shows visible nonthermal emissions in Nobeyama Radioheliograph and RHESSI images. The IRIS spectroscopic observations show that the hot line of Fe XXI 1354.09 Å (log T $\sim$ 7.05) displays blueshifts, while the cool line of Si IV 1402.77 Å (log T $\sim$ 4.8) exhibits redshifts. The blueshifts and redshifts are well correlated with each other, indicative of an explosive chromospheric evaporation during the flare precursor phase combining a high nonthermal energy flux with a short characteristic timescale. In addition, the blueshifts of Fe XXI 1354.09 Å are well correlated with the microwave and HXR emissions, implying that the explosive chromospheric evaporation during the flare precursor phase is driven by nonthermal electrons.