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Radiative Hydrodynamic Modelling Of The Lyman Continuum During Solar Flares

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The Lyman Continuum (LyC; 912Å) is the free-bound transition of a free electron to the ground state of an ambient Hydrogen nuclei. LyC has been shown to be a powerful tool for probing the chromospheric plasma conditions during solar flares. By fitting the LyC spectrum, the departure coefficient of hydrogen, b1, and the colour temperature, Tc, can be determined. Where b1 is a measure of the degree of local thermodynamic equilibrium of a plasma and has been observed to approach unity during flares. When b1 approaches unity, Tc is approximately equal to the electron temperature of the plasma. Observationally, Tc has been observed to increase more at shorter wavelengths during some events suggesting the existence of an optically thin component of LyC at higher altitudes than the optically thick component. We have been analysing LyC profiles from a grid of 1D radiative hydrodynamic RADYN models hosted by QUB that were generated as part of the F-CHROMA project. These model atmospheres were generated for a range of nonthermal heating functions, based on characteristic electron fluxes, spectral indices, and low-energy cutoffs. From the models, we are investigating the temporal evolution of b1 and Tc in response to a range of heating functions. By generating contribution functions for these flare models, we will probe the height at which LyC forms in the solar atmosphere, and under what conditions, with the aim of comparing our predictions with LyC observations from the EUV Variability Experiment on board the Solar Dynamics Observatory.

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