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White-light Emission in the F-CHROMA Grid

Context. Much of a solar flare's energy is thought to be released in the continuum. The optical continuum ("white-light") is of special interest due to the ability of observing it from the ground.
Aims. We aim to investigate the prevalence of white-light emissions in solar flares, what influences them, and what causes them to begin with. We furthermore seek to understand the response of the atmosphere to a flare.
Methods. We utilize the F-CHROMA grid of flare simulations created using the radiative hydrodynamics code RADYN. We probe the spectral index, total energy and low-energy cutoff to draw conclusions about their relationships to white-light emissions. Furthermore, we calculate the 4170 Å continuum emissions, the Balmer and Paschen ratio. Finally, we analyse two particular cases.
Results. 13 of the 83 flares included in the F-CHROMA grid show white-light emissions relative to the pre-flare level that exceed 0.5%. The total energy (or maximum beam flux) seems to be the main factor for deciding whether white-light emissions will be detectable. There is a linear relationship between the Balmer/Paschen ratio and the relative continuum enhancement. Both case studies show the creation of multiple blobs (both hot and cool), as well as H-ionization and subsequent recombination as the most likely reason for Balmer/Paschen continuum emissions.
Conclusions. The parameters of an electron beam impacting the solar atmosphere play a big role in determining several characteristics, such as the white-light emissions and Balmer ratio. White-light emission in the Balmer/Paschen continuum likely result from optically thin hydrogen recombination radiation.

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