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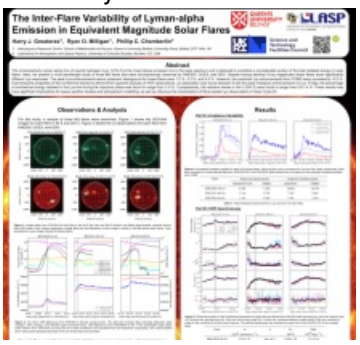
The chromospheric Lyman-alpha line of neutral hydrogen (Lyα; 1216 A) is the most intense emission line in the solar spectrum and is believed to constitute a considerable portion of the total radiated energy in solar flares. Here, we present a multi-wavelength study of three M3 flares that were simultaneously observed by RHESSI, GOES, and SDO. Despite having identical X-ray magnitudes these flares show significantly different Lyα responses. The peak Lyα enhancements above quiescent background for these flares were 1.5 %, 3.3 %, and 6.4 %. However, the predicted Lyα enhancements from FISM2 were consistently <2 %. Examining the properties of the nonthermal electrons derived from spectral analysis of HXR observations, an association was found between δ and the peak irradiance enhancements in Lyα. Finally, the percentage of nonthermal energy radiated in the Lyα line during the impulsive phase was found to range from 1–5 %. Comparatively, the radiative losses in He II (304 A) were found to range from 0.4–0.9 %. These results may have significant implications for space weather studies and atmospheric modelling, and will influence the interpretation of flare-related Lyα observations in Solar Cycle 25.


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