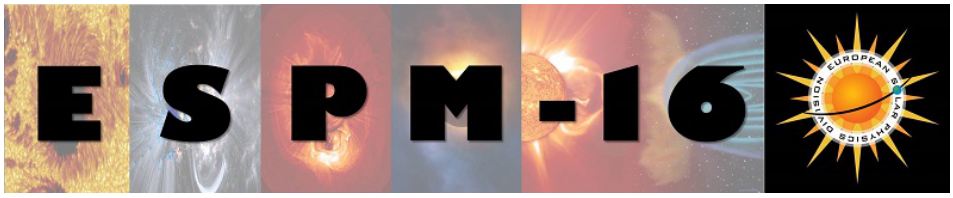

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Lyman-alpha Variability During Solar Flares

Wednesday, 8 September 2021 16:56 (13 minutes)

The chromospheric hydrogen Lyman-alpha line at 1216A is the brightest emission line in the solar spectrum, and yet studies of solar flares at this wavelength have been scarce in the recent literature. Changes in the Sun's Lyman-alpha output can drive changes in the dynamics and composition of planetary atmospheres, and Lyman-alpha is also a significant radiator of solar flare energy providing an important diagnostic of energy release and transport processes. Milligan et al. (2020) published a statistical study of ~500 M- and X-class flares using GOES/EUVS data, showing that although the Lyman-alpha irradiance increases by only a few percent during large events, it can radiate up to 100 times more energy than the corresponding X-rays. Flares that occurred closer to the solar limb, however, were found to exhibit a smaller Lyman-alpha enhancement relative to those on the disk due to opacity and/or foreshortening effects. It was also shown that acoustic oscillations in the chromosphere can be detected through Lyman-alpha flare observations, and that impulsive Lyman-alpha emission, not X-rays, can induce currents in the E-layer of Earth's ionosphere. A follow-up study included B- and C-class flares (Milligan 2021), which although not readily observable in disk-integrated measurements, can be investigated using a superposed epoch analysis. Despite increases of <1% above the solar background, a clear centre-to-limb variation was found in agreement with larger events. These findings should serve as a baseline for the advent of new Lyman-alpha flare observations and advanced numerical simulations that will become available during Solar Cycle 25.

Student poster?

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