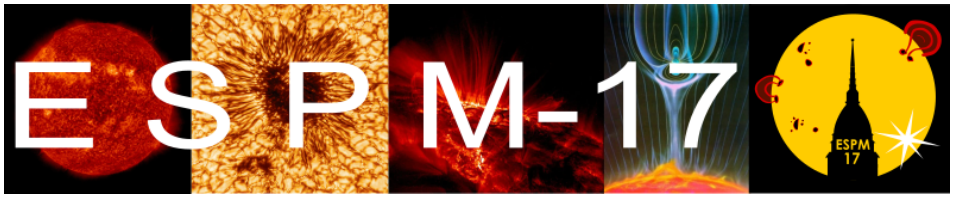

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Observational Analysis of Line Formation Heights in the Flaring Chromosphere

Solar flares can induce many changes in the Sun's atmosphere, primarily due to the energy deposited in the lower atmosphere by particles accelerated from a magnetic reconnection site in the corona. The majority of this energy is deposited in the chromosphere, although the method of this energy transport is not yet agreed on. Radiation hydrodynamics models predict that an electron beam via the standard thick target model would result in a distribution of the source height in different wavelengths, which should be visible when viewed from an angle. 1D models predict an offset of ~400km between Ca II K (formed in the upper chromosphere and H⊠ (mid-chromosphere). Here we show observational analysis of solar activity over an active region from the Daniel K. Inouye Solar Telescope (DKIST). Images in Hβ and Ca II K across a C-class solar flare were analysed, specifically over a ribbon formed in the umbra of a sunspot around peak of the impulsive phase. Subsections of these images were taken around this ribbon and cross correlation was performed on a sub-pixel level, yielding a lag or physical offset 0.32" or ~ 230km between the images in Hβ and Ca II K. No other cross correlation calculations produced a lag of the same significance, suggesting that it formed with a non-trivial distance between the two line formation heights. This analysis will build on previous works to investigate the transportation of energy through the solar atmosphere.

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