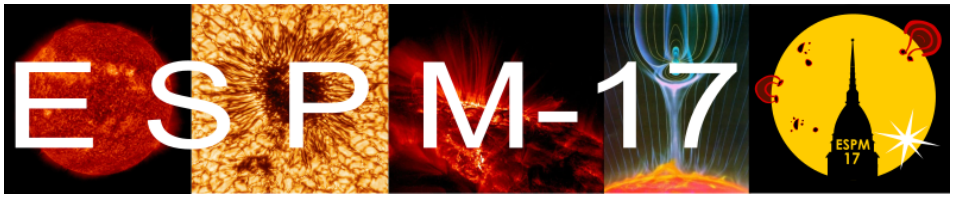

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Ca II K brightness as a function of magnetic field strength and characteristics of the observations

Solar observations have often served as benchmarks of stellar conditions. A particularly illustrative example of the above link is given by the observations in the Ca II H and K lines at 396.847 nm and 393.367 nm, respectively, which are the two deepest and broadest absorption lines in the visible spectrum of the Sun. Although widely observed over the years, several aspects of the emission of these lines are however still not fully understood. This is the case of e.g. the exact relationship between Ca II K emission and magnetic field strength. To the aim of reassessing this relationship, we analysed state-of-the-art observations of the solar atmosphere obtained at the Swedish Solar Telescope with the Crisp Imaging Spectropolarimeter and Chromospheric Imaging Spectrometer instruments on regions characterized by a different ambient magnetic field. On these observations we analyzed the dependence of the Ca II K line brightness on different surrounding conditions of the solar atmosphere and characteristics of the observations, such as spectral bandwidth and spatial scale. The results derived from our study are functional to e.g. high-precision transit photometry applied in exoplanets research, investigation of the solar-stellar connection, and accurate reconstructions of the evolution of the solar magnetism over decadal and centennial time scales.

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Track Classification: Diagnostic tools and numerical methods in solar physics