



Contribution ID: 4

Type: **Poster**

Unravelling the stratification of the chromospheric magnetic field using the $H\alpha$ line

The $H\alpha$ line is widely used to study solar chromosphere, but polarimetric studies to infer magnetic fields are scarce. This is partly due to no polarimetric studies of $H\alpha$ line utilizing 3-D radiative transfer, and earlier 1-D radiative transfer studies suggested a significant contribution of the photospheric fields. By analyzing spectropolarimetric data of a small pore simultaneously recorded in the $H\alpha$ and CaII8542 lines, Mathur et al. (2023) found that line core of the $H\alpha$ line probes chromospheric magnetic field. In this study, we analyze spectropolarimetric observations of a complex active region recorded simultaneously in the $H\alpha$ and CaII8662 lines. The sunspot exhibits multiple structures, 4 umbras and a lightbridge, and a region where CaII8662 line core is in emission, a signature of localized heating. Consistent with the Mathur+2023, we found that the magnetic field inferred from the $H\alpha$ line core is consistently smaller than that inferred from inversions of the CaII8662 line at $\log\tau_{500}=-4.5$, however, in contrast with Mathur+2023, uncorrelated. The field strength and morphology inferred in the heating region from the inversions at $\log\tau_{500}=-4.5$ is comparable to that of at $\log\tau_{500}=-1$. In the heating region, the WFA over $H\alpha$ line core and full spectral range are similar in strengths and morphology and uncorrelated with fields at $\log\tau_{500}=-1$. Thus, we suggest that line core of the $H\alpha$ line always probes the chromospheric magnetic field at higher heights than that probed by Ca2IR triplet, making $H\alpha$ line spectropolarimetry a valuable diagnostic for studying chromosphere, especially in regions with localized heating.

Primary authors: MATHUR, Harsh (Indian Institute of Astrophysics); KRISHNAPPA, Nagaraju (Indian Institute of Astrophysics); Dr YADAV, Rahul (University of Colorado); JOSHI, Jayant (Indian Institute of Astrophysics)

Session Classification: Coffee break and poster session 1

Track Classification: Energy and mass transfer throughout the solar atmosphere and structures within