Session 2

Does the Hα Stokes V profiles probe the chromospheric magnetic field? An observational perspective

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The Hα line is one of the most widely used spectral lines to study the solar chromosphere. However, polarimetric studies to infer the magnetic fields are sparse. One of the reasons could be that it has been shown using 1-D radiative transfer calculations that the photospheric magnetic fields have a significant contribution to the Hα Stokes V profiles. Recent works, however, have revealed that 3-D radiative transfer is necessary to model the Hα line core, though the works have only modeled the Stokes I. In this context, we explore the potential of the Hα Stokes V profiles in inferring the chromospheric magnetic field using simultaneous spectropolarimetric observations of the Hα and the Ca II 8542 Å lines obtained from the SPINOR instrument of the DST. We analyzed the topology and the strength of the LOS magnetic field (B) inferred from the weak field approximation (WFA) of the Hα line and compared it with the inversions of the Ca II 8542 Å line. We found that the map of the B inferred from the WFA of the Hα line core ($\pm$0.35 Å) shows morphology similar to that of at the chromospheric layers (log τ 500 = $-$4.5). The map of the B from the WFA about the line wings ([$-$1.5, $-$0.6] and [+0.6, +1.5] Å) and the full spectral range ($\pm$1.5 Å) shows morphology similar to that of at the photospheric layers (log τ 500 = $-$2). At the location of a pore we observed that the field strengths (|B|) inferred from the WFA about the Hα line core are weaker than those obtained at log τ 500 = $-$4.5 through the inversions of the Ca II 8542 Å line. Our results suggest that |B| retrieved with the WFA applied to the Hα line core is from higher chromospheric layers compared to that retrieved using the inversions of the Ca II 8542 Å line.