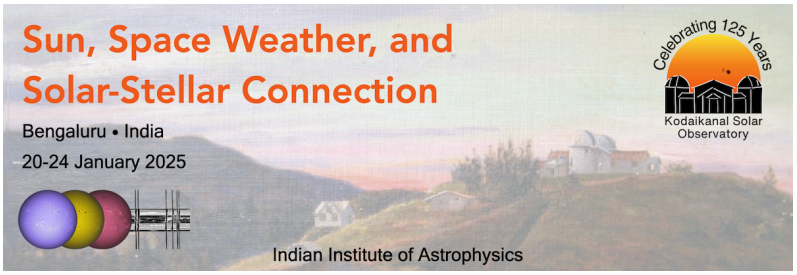

Contribution ID: **124** Type: **Poster**

Effect of spatial inhomogeneities on the scattering polarization profiles of the solar Ca I 4227 A line

Scattering of anisotropic radiation by atoms in the solar atmosphere generates linear polarization in spectral lines such as the Ca I 4227 Å line. Spectro-polarimetric observations of this line, particularly near the solar limb, reveal significant linear polarization. Modeling this line is essential for understanding the sensitivity of scattering polarization to atmospheric parameters and extracting magnetic field information through the Hanle effect. Traditionally, one-dimensional (1D) semi-empirical plane-parallel models have been widely employed for such modeling. In some cases, vertical columns from three-dimensional (3D) magnetohydrodynamic (MHD) simulations of the solar atmosphere have also been utilized to enhance realism. In this study, we investigate the influence of spatial inhomogeneities on the scattering polarization profiles in the Ca I 4227 Å line. To achieve this, we construct inhomogeneous 1D atmospheric models by tracing a large number of rays through a near-limb region of the Bifrost 3D MHD simulation cube (at $\mu = 0.3$), interpolating the 3D atmospheric parameters along these rays. We then perform 1.5D polarized non-local thermodynamic equilibrium (non-LTE) radiative transfer calculations to obtain the emergent Stokes profiles (I, Q/I) in these various inhomogeneous atmospheres, focusing on the non-magnetic regime (resonance scattering).

Contribution Type

Theme

Solar Magnetism in High-Resolution

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