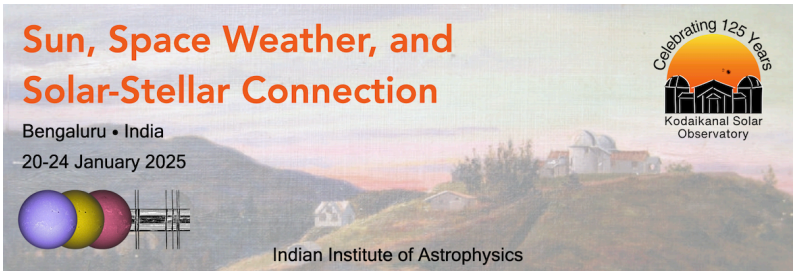

Contribution ID: **51** Type: **Contributed talk**

Magnetic Field and Plasma Diagnostics Using Infrared Spectral Lines: Forward Modeling

Tuesday, January 21, 2025 8:55 AM (15 minutes)

Regular measurements of the magnetic field in the solar corona are critically lacking, hindering investigations of key physical processes involved in coronal heating, solar wind generation, and explosive eruptions such as flares. Using a CME model of the Predictive Science Inc., we synthesized observations from the upcoming COronal Solar Magnetism Observatory (COSMO) Large Coronagraph (LC), which provides multiwavelength spectroscopic and polarimetric coronal measurements. We present maps of the magnetic field and plasma parameter distribution predicted based on the Zeeman effect and the known relationship between intensity ratio and plasma density, using the synthesized Stokes parameters of the Fe XIII 10747/10798 Å line pair. We examined the accuracy of magnetic field and density diagnostics during the pre-eruption and eruption stages, respectively, with different sets of instrumental parameters such as exposure time, spatial resolution and spectral resolution. Considering that the ionization and recombination processes do not have ample time to drive the ionic populations to their equilibrium state during CME propagation, especially at the CME front, and that the MHD model assumes the condition of equilibrium ionization (EI), we also performed the non-equilibrium ionization (NEI) calculation to obtain the ionic fractions by solving time-dependent ionization equations. This allows us to achieve a more physically realistic simulation of observation and diagnosis.

Contribution Type

Theme

Solar Magnetism in High-Resolution

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