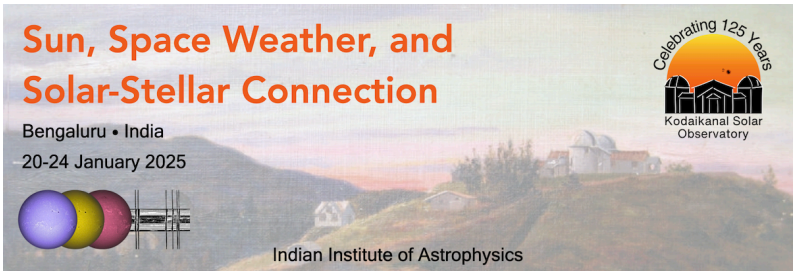

Contribution ID: **137** Type: **Contributed talk**

Dynamics of Photospheric Magnetic Flux Distribution and Variations in Solar RVs: A Study Using HARPS-N Solar and SDO Observations

Thursday, January 23, 2025 10:00 AM (15 minutes)

The distribution and evolution of photospheric magnetic fields in sunspots, plages, and network, and variations in their relative flux content, play key roles in radial velocity (RV) fluctuations observed in Sun-as-a-star spectra. Differentiating and disentangling such magnetic contributions to RVs help in building models to account for stellar activity signals in high-precision RV exoplanet searches. In this work, we employ high resolution images of the solar magnetic field and continuum intensities from SDO/HMI to understand the activity contributions to RVs from HARPS-N solar observations. Using well-observed physical relationships between strengths and fluxes of photospheric magnetic fields, we show that the strong fields (spots, plages, and network) and the weak inter-network fields leave distinguishing features in their contributions to the RV variability. We also find that the fill factors and average unsigned magnetic fluxes of different features correlate differently with the RVs and hence warrant care in employing either of them as a proxy for RV variations. In addition, we examine disk-averaged UV intensities at 1600 and 1700 Å wavelength bands imaged by SDO/AIA and their performances as proxies for variations in different magnetic features. We find that the UV intensities provide a better measure of contributions of plage fields to RVs than the Ca II H-K emission indices, especially during high activity levels when the latter tend to saturate.

Contribution Type

Theme

Solar - Stellar Connections

Primary authors: Ms SEN, Anisha (Indian Institute of Astrophysics); Dr RAJAGURU, S.P.K. (Indian Institute of Astrophysics)

Presenter: Ms SEN, Anisha (Indian Institute of Astrophysics)

Session Classification: The Sun as a Prototype of Stellar Variability