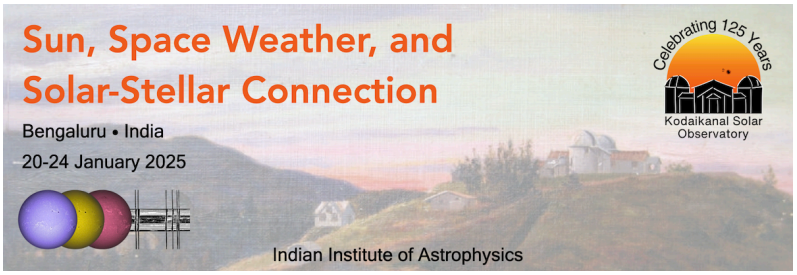

Contribution ID: **12** Type: **Contributed talk**

Unveiling the Dynamics and Genesis of Small-scale Fine Structure Loops in the Lower Solar Atmosphere

Tuesday, January 21, 2025 10:00 AM (15 minutes)

Recent high-resolution solar observations have unveiled the presence of small-scale loop-like structures in the lower solar atmosphere, often referred to as unresolved fine structures, low-lying loops, and miniature hot loops. These structures undergo rapid changes within minutes, and their formation mechanism has remained elusive. In this study, we conducted a comprehensive analysis of two small loops utilizing data from the Interface Region Imaging Spectrograph (IRIS), the Goode Solar Telescope (GST) at Big Bear Solar Observatory, and the Atmospheric Imaging Assembly (AIA) and the Helioseismic Magnetic Imager (HMI) onboard the Solar Dynamics Observatory (SDO), aiming to elucidate the underlying process behind their formation. The GST observations revealed that these loops, with lengths of ~3.5 Mm and heights of ~1 Mm, manifest as bright emission structures in Hα wing images, particularly prominent in the red wing. IRIS observations showcased these loops in 1330 Å slit-jaw images, with TR and chromospheric line spectra exhibiting significant enhancement and broadening above the loops, indicative of plasmoid-mediated reconnection during their formation. Additionally, we observed upward-erupting jets above these loops across various passbands. Furthermore, differential emission measurement analysis reveals an enhanced emission measure at the location of these loops, suggesting the presence of plasma exceeding 1 MK. Based on our observations, we propose that these loops and associated jets align with the minifilament eruption model. Our findings suggest a unified mechanism governing the formation of small-scale loops and jets akin to larger-scale X-ray jets.

Contribution Type

Theme

Solar Magnetism in High-Resolution

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