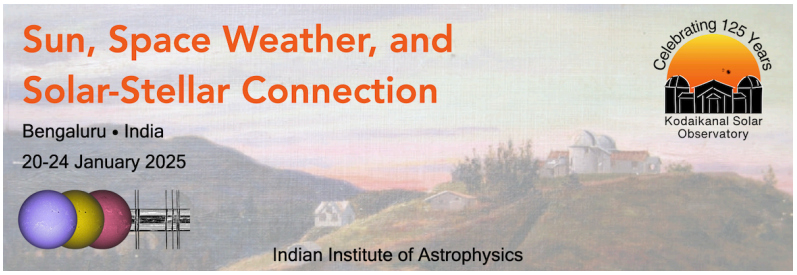

Contribution ID: **160** Type: **Poster**

Coronal Seismology using Fundamental and Overtones in Transverse Oscillations of Coronal Loops

The solar corona is a dynamic environment that contains various magnetic structures, such as coronal loops, coronal holes, polar plumes, etc. These structures are perturbed by energetic activities such as solar flares, coronal mass ejections, and magnetohydrodynamic waves, leading to oscillations that serve as indirect tools for investigating the properties of the coronal atmosphere. In this study, we identify the fundamental mode and overtones in the transverse oscillations of two coronal loops associated with an active region. We analyze intensity observations from the Atmospheric Imaging Assembly (AIA) onboard the Solar Dynamics Observatory (SDO). Our investigation reveals fundamental oscillation periods of approximately 17.0 minutes for the first loop and 15.2 minutes for the second loop. The first coronal loop exhibits oscillations in both the first and second overtones, with periods of about 6.9 minutes and 4.3 minutes, respectively. In contrast, the second loop was detected only in the first overtone, which has a period of approximately 7.7 minutes. The period ratios of the fundamental to first overtones for these loops are 1.24 and 0.99, respectively, while the ratio of the fundamental to the second overtone for the first loop is 1.33. These deviations from unity in period ratios provide critical insights into estimating the density scale height and loop expansion factor. Our results indicate a density scale height of 11 Mm for the second loop and a loop expansion factor of 1.5 for the first loop. This suggests that the properties of coronal loops significantly influence the loop expansion factor, more so than the longitudinal density stratification typically associated with sigmoidal active regions.
Additionally, by correlating the lengths of the coronal loops with their oscillation periods, we estimated the average magnetic field strength within these loops to be in the range of 20-30 G. We also present statistical studies that evaluate the consistency of magnetic field measurements using coronal seismology and extrapolation techniques.

Contribution Type

Theme

Solar Magnetism in High-Resolution

Primary authors: MAURYA, RamAjor (National Institute of Technology, Calicut); Mrs K, Safna Banu (National Institute of Technology, Calicut)

Presenter: MAURYA, RamAjor (National Institute of Technology, Calicut)