

Study of Coronal Loop Structures during the 2024 Total Solar Eclipse: Preliminary Results

Sayak Chakraborty*¹, S. Krishna Prasad¹

¹Aryabhata Research Institute of Observational Sciences (ARIES), Manora Peak, Nainital,
Uttarakhand, India 263001

Email: sayak.kolkata@gmail.com

The solar corona hosts a variety of dynamic phenomena, including transient disturbances and oscillatory motions associated with its complex magnetic structures. The total solar eclipse of 8 April 2024 provided a unique opportunity to investigate the temporal behaviour of the extended corona using high-cadence observations in visible light.

In this work, we present a preliminary analysis of coronal observations obtained in the 5303 Å emission line, corresponding to the forbidden [Fe XIV] green coronal line, using specialised solar coronal instrumentation during the eclipse. A sequence of high-cadence observations is analysed to investigate spatial and temporal variations in the observed coronal emission. Preliminary results reveal pronounced temporal variability associated with structured regions of the extended corona, including prominent loop-like features. Several regions exhibiting enhanced variability have been identified for further investigation of their temporal behaviour.

The present study aims to characterise the temporal properties of these coronal structures and explore their possible connection with dynamic processes in the solar corona. Further analysis will focus on the temporal evolution and frequency characteristics of selected structures and on assessing the robustness of any short-timescale variations identified in the observations. These preliminary findings demonstrate the potential of high-cadence eclipse observations in the 5303 Å coronal emission line for studying fine-scale temporal variability in the extended solar corona and provide a basis for more detailed investigation of coronal dynamics.