[구SE-13] Developments of the Wide Wavelength Range Polarimeter of the Domeless Solar Telescope at the Hida Observatory

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We are developing a new universal spectropolarimeter on the Domeless Solar Telescope (DST) at the Hida Observatory to realize precise spectropolarimetric observations in a wide range of wavelength in visible and near infrared. The system aims to open a new window of plasma diagnostics by using Zeeman effect, Hanle effect, Stark effect, impact polarization, and atomic polarization for measuring the external magnetic field, electric field, or an anisotropy in the excitation of the atoms.

The polarimeter is a successor of formerly developed polarimeter on DST, which make possible to observe a polarization in a photospheric spectral line with polarimetric accuracy of 10-2 (Kiyohara et al. 2004). The new system consists of a 60cm aperture vacuum telescope, a high dispersion vacuum spectrograph, polarization modulator / analyzer composed of a rotating waveplate whose retardation is constant for a wide range of wavelength and Wallaston prism, and a fast and large format CCD camera or IR camera. Spectral images in both orthogonal polarizations are taken simultaneously with a frame rate of ~20Hz while the waveplate rotates continuously in a rate of 1rev./sec. Thus It takes 5 ~ 60 sec to observe polarization with accuracy of 10-3 in a wide wavelength range (400 - 1100nm). We also examined a polarimetric model of the telescope with accuracy of 10-3 to calibrate instrumental polarization on some wavelengths. In this talk, I will focus on the performance of the instrument.

[구SE-14] The Role of Magnetic Topology in the Heating of Active Region Coronal Loops

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We investigate the evolution of coronal loop emission in the context of the coronal magnetic field topology. New modeling techniques allow us to investigate the magnetic field structure and energy release in active regions (ARs). Using these models and high-resolution multi-wavelength coronal observations from the Transition Region and Coronal Explorer and the X-ray Telescope on *Hinode*, we are able to establish a relationship between the light curves of coronal loops and their associated magnetic topologies for NOAA AR 10963. We examine loops that show both transient and steady emission, and we find that loops that show many transient brightenings are located in domains associated with a high number of separators. This topology provides an environment for continual impulsive heating events through magnetic reconnection at the separators. A loop with relatively constant X-ray and EUV emission, on the other hand, is located in domains that are not associated with separators. This result implies that larger-scale magnetic field reconnections are not involved in heating plasma in these regions, and the heating in these loops must come from another mechanism, such as smallscale reconnections (i.e., nanoflares) or wave heating. Additionally, we find that loops that undergo repeated transient brightenings are associated with separators that have enhanced free energy. In contrast, we find one case of an isolated transient brightening that seems to be associated with separators with a smaller free energy.