Structure and Dynamics of Eruptive Prominences on the Quiet Sun

Yingna Su*†[1], Adriaan Van Ballegooijen[1], Katharine Reeves[1], Patrick Mccauley[1], and Edward Deluca[1]

[1]Harvard-Smithsonian Center for Astrophysics (CfA) – 60 Garden street Cambridge, MA 02138, United States

Abstract

In this presentation, we will briefly review our work on observations and magnetic field modeling of the quiescent prominence that erupted on 2010 December 6. We find that the height and location of the field line dips in our non-linear force free field model with twisted flux rope can roughly replicate those of the observed prominence. The model suggests that the observed asymmetric emission on the two sides of the filament channel is due to the fact that bright features on the northern side of the channel are the lower legs of the field lines that turn into the flux rope. We also find that asymmetric reconnection induced by the asymmetric distribution of the magnetic fields on the two sides of the filament may cause the observed rolling motion at the early phase of the eruption. Then we will present preliminary results on the investigation of one polar crown prominence that erupted on 2012 March 12. This prominence is viewed at the east limb by SDO/AIA and displays a simple vertical-thread structure. Bright U-shape (horn-like) structure is observed surrounding the upper portion of the prominence before the eruption and becomes more prominent during the eruption. When viewed on the disk, STEREO-B shows that this prominence is composed of series of vertical threads and displays a loop-like structure during the eruption. We focus on the magnetic support of the prominence by studying the structure and dynamics before and during the eruption using observations from SDO, Hinode, and STEREO. We will explore magnetic field modeling of this prominence using the flux rope insertion method. We will also present preliminary analysis on the thermodynamics of the prominence, namely DEM analysis of the cavity surrounding the prominence, as well as column density measurements.

Keywords: Prominence, Magnetic field, Eruptions

*Speaker

†Corresponding author: ynsu@head.cfa.harvard.edu