



## HAO Colloquium Series

(Refreshments served)

**Speaker:** Yuhong Fan, HAO

**Time:** 1:30–2:30 pm

**Date:** Wednesday, October 17, 2012

**Location:** CG1-2139, Captain Mary Room

**Title:** MHD Simulations of the Eruption of Coronal Flux Ropes

### **Abstract:**

I present MHD simulations of the eruption of coronal flux ropes and the initiation of coronal mass ejections (CMEs). It is found that the eruption of the flux rope in the corona is triggered when the flux rope rises to a critical height where the corresponding potential field declines with height at a sufficiently steep rate, a mechanism consistent with the onset of the torus instability. The simulations show that S (or inverse S) shaped current sheets develop along topological structures identified as Quasi Separatrix Layers (QSLs), during the quasi-static phase before the eruption. Reconnections in the current sheets effectively add twisted flux to the flux rope, allowing it to rise quasi-statically to the critical height and then the dynamic eruption ensues. It is found that the resulting coronal magnetic field evolution can explain some of the commonly observed features associated CMEs and their precursor structures. Finally I also show an MHD simulation that models qualitatively the magnetic field evolution of the eruptive flare occurred on December 13, 2006 in the strong emerging  $\delta$  sunspot region NOAA 10930 observed by the Hinode satellite.