



HAO Colloquium Series

(Refreshments served)

Speaker: Sarah Gibson, HAO/NCAR

Time: 1:30–2:30 pm

Date: Wednesday, March 21, 2012

Location: CG1-South Auditorium

Title: Magnetism and the Invisible Man: The Mysteries of Coronal Cavities

Abstract:

Magnetism defines the complex and dynamic solar corona. Twists and tangles in coronal magnetic fields build up energy and ultimately erupt, hurling plasma into interplanetary space. These coronal mass ejections (CMEs) are transient riders on the ever-outflowing solar wind, which itself possesses a three-dimensional morphology shaped by the global coronal magnetic field. Coronal magnetism is thus at the heart of any understanding of the origins of space weather at the Earth. However, we have historically been limited by the difficulty of directly measuring the magnetic fields of the corona, and have turned to observations of coronal plasma to trace out magnetic structure. This approach is complicated by the fact that plasma temperatures and densities vary among coronal magnetic structures, so that looking at any one wavelength of light only shows part of the picture. In fact, in some regimes it is the lack of plasma that is a significant indicator of the magnetic field. Such a case is the coronal cavity: A dark, elliptical region in which strong and twisted magnetism dwells. I will elucidate these enigmatic features using the results of an international collaboration to observe coronal cavities in multiple wavelengths and from a variety of observing vantages, and show how magnetic flux rope models provide a self-consistent picture of the cavity, its sub-structure, and its dynamic evolution as a CME. Moreover, I will make use of unprecedented measurements of coronal magnetism, now being obtained by HAO's Coronal Multichannel Polarimeter (CoMP), to demonstrate the presence of twisted magnetic fields within cavities.