HAO Colloquium Series

(Refreshments served)

Speaker: **Michael Hahn, Columbia University**

Time: **1:30–2:30 pm**

Date: **Wednesday, October 16, 2013**

Location: **CG1 – 1210 South Auditorium (also webcast at http://www.fin.ucar.edu/it/mms/cg-live.htm)**

Title: **Alfven Wave Heating and Ion Temperature Anisotropy in the Solar Corona**

Abstract:

One of the major theories to explain coronal heating is that energy is carried by Alfven waves, which dissipate in the corona. For heating, the waves must damp within about a solar radius. However some theories predict that Alfven waves are not damped until much larger heights. Spectroscopically, waves can be inferred from the non-thermal broadening of emission lines. Using data from the EUV Imaging Spectrometer (EIS), we have shown that Alfven waves are damped at low enough heights in coronal holes to heat the corona, starting from about 1.15 R_sun as measured from Sun center. Moreover, we have quantified the amount of energy carried and dissipated by these waves and shown that the energy is sufficient to heat the corona and drive the fast solar wind. One heating process that may occur is that turbulence can drive some of the wave power carried at low frequencies to high frequencies. High frequency waves and turbulence are predicted to heat minor ions anisotropically with respect to the magnetic field. Such anisotropy is observed in-situ in the solar wind, but has not previously been measured at the base of the corona. We have separated the parallel and perpendicular temperatures and non-thermal velocities by combining EIS spectra with a potential field source surface model for the magnetic field of the Sun. The model allowed us to determine the magnetic field orientation for each spatial position in our data and derive these anisotropic properties.