HAO Colloquium Series

(Refreshments served)

Speaker: **Stave Bougher, University of Michigan**

Time: **1:30–2:30 pm**

Date: **Wednesday, November 14, 2012**

Location: **CG1-1210 South Auditorium**

Title: **The 2013 Mars Atmosphere and Volatile Evolution (MAVEN) Mission: Status and Science Preparations**

Abstract:

The next US spacecraft mission to Mars, MAVEN, is slated to launch with a window opening on November 18, 2013. After a 10-month cruise, the spacecraft will arrive at the planet around September 16, 2014. A 6-week checkout period will be conducted for the instruments, after which the primary mission phase and data collection will occur for 1-Earth year. The MAVEN spacecraft has a 75° inclination yielding a 4.5-hour orbit, whose precession will provide latitude, local time, and geographic coverage down to periapsis altitudes as low as 150 km. In addition, five 5-day "deep dip" campaigns will be conducted possessing periapsis altitudes down to the homopause (around ~115 km). Eight science instruments are on-board (grouped into three packages) providing in-situ and remote measurements of the thermosphere, ionosphere, exosphere (TIE) and examining the solar wind interaction with the planet.

MAVEN will determine the role that loss of volatiles to space has played through time, providing answers to the following key questions about Mars climate history: (a) What is the current state of the upper atmosphere and what processes control it? (b) What is the escape rate at the present epoch and how does it relate to the controlling processes? (c) What has the total loss to space been through time?

Preparations for science analysis of anticipated MAVEN datasets have begun. In particular, a "pre-launch" modeling effort is underway to predict the TIE structure that will be measured (i.e. volatile reservoir), and to estimate the corresponding neutral and ion escape rates that will be gleaned from measurements obtained during this primary mission. Specifically, interconnected thermosphere-ionosphere-exosphere and plasma models are being used to make these predictions (along the orbit trajectories and globally) for these purposes. At Michigan, we are presently utilizing the Mars TGCM (thermosphere-ionosphere), DSMC (exosphere) and MHD (plasma) codes in a one-way coupling configuration to make these 3-D self-consistent predictions. Examples of these interconnected model outputs will be presented and their implications for Mars neutral and ion escape rates will be discussed.