HAO Colloquium Series

(Refreshments served)

Speaker: **Vlacheslav Merkin, Johns Hopkins University**

Time: **1:30–2:30 pm**

Date: **Wednesday, February 15, 2012**

Location: **CG1-3131**

Title: **Mesoscale structure of the heliospheric current sheet: Initial results of MHD modeling**

Abstract:

Global magnetohydrodynamic (MHD) models have been used for studies of the inner heliosphere for more than 30 years. They have been successful at explaining the MHD structure of large scale solar wind and heliospheric magnetic field phenomena, such as Corotating Interaction Regions (CIRs) and Coronal Mass Ejections (CMEs). At the same time, studying smaller scale structure with global models has remained elusive until recently because of very large disparity in spatial and temporal scales that these models have to cover. An illustrative example is that the ultimate kinetic scale in the solar wind (~10^4 km for the ion inertial length at 1 AU) and the resolution of the current MHD models (one to a few solar radii, i.e. >~10^6 km) are separated by at least two orders of magnitude. The existence of this vast gap in scales suggests that there is much to be learned about the solar wind dynamics that operate on MHD spatio-temporal scales unresolved by current models. In this presentation, we will discuss a new MHD model of the inner heliosphere, based on a well-established Lyon-Fedder-Mobarry (LFM) simulation code. A distinctive feature of this model, which we dubbed LFM-helio, is its high resolving power. It allows simulations of the solar wind with resolution inaccessible to previous models, revealing, in particular, mesoscale (sub solar radius) structure of the heliospheric current sheet, e.g. folds and ripples on its surface. Such phenomena are commonly registered by spacecraft in the solar wind and they manifest themselves as multiple current sheet crossings in spacecraft measurements. Our simulations provide a 3-dimensional simulation context for interpreting such observations.

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