The Catholic University of America
Department of Physics
Colloquium
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The Catholic University of America

Acceleration and heating of the solar wind: observations and models

The solar wind is a stream of charged particles that carry electromagnetic fields from the Sun and expand into the Heliosphere at high speed of several hundred km/s. The solar wind is classified in two types according to their coasting velocity: slow and fast. The slow solar wind reaches ~400 km/s is highly variable and dense compared to the fast wind streams, and is associated with coronal streamers. The fast wind is associated with corona holes - regions of low-density plasma, and it is the dominant form of the solar wind during periods of solar minimum activity reaching ~1000 km/s. The solar wind was observed by space probes from 0.29 AU and beyond, and was studied using remote-sensing white light and spectroscopic observations. Observations the slow wind and the fast wind differ in heavy ion composition, and that heavy ion properties, such as temperature, and speed, are often different than protons. The solar wind was modeled in the past with single-fluid MHD equations. However, multi-fluid modeling is required to account for the properties of heavy ions, and study the sources of the solar wind. I will present the results of solar wind models using MHD, as well as 2.5D and 3D multi-fluid models that include heavy ions such as O5+, Mg9+, and He++. I will show results of synthetic observations that use the results of the multi-fluid models facilitating the interpretation of spectroscopic data. I will discuss the impact of the modeling on our understanding of the solar wind acceleration and heating and its coronal sources.

Wednesday, February 25, 2015
4:00pm
106 Hannan Hall
Refreshments will be served at 3:45

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