



SPACE PHYSICS SEMINAR

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“Imaging Saturn’s Magnetosphere—Solar Wind-Driven and Rotational Dynamics on the Large Scale”

Thursday, September 6, 2012

Refreshments at 3:30pm in CAS 500

Talk begins at 4:00pm in CAS 502

Abstract:

The Outer Planet Gas Giants, Jupiter and Saturn, both rotate faster than Earth (between 10 and 11 hour periods), and have strong internal magnetic fields that stand off the solar wind, and populated with plasmas derived from their moons. At Saturn, the Cassini mission has been shedding light on the behavior of this vast rotating magnetosphere. Because the magnetosphere is so large (roughly 20 times the scale of Earth's magnetosphere) and we have only one spacecraft (unlike Earth, where we have multiple probes distributed throughout the system), the understanding of in-situ plasma data is complicated by not knowing what is happening remote from Cassini: is a change in particle intensity (or plasma density or temperature) a temporal change, or a consequence of crossing a spatial boundary? What is happening elsewhere in the magnetosphere? Some of this mystery is resolved by the images provided by the Cassini Magnetospheric Imaging Instrument's Ion and Neutral Camera--MIMI/INCA. This energetic neutral atom (ENA) imager takes global images of the hot plasma distribution in Saturn's magnetosphere by measuring the trajectories and energies of energetic atoms created as magnetically trapped, energetic ions charge exchange with the cold neutral gas (water vapor) that suffuses much of the magnetosphere. The resulting ENAs no longer experience the magnetic forces that confined them as ions, and much like photons radiate away from their source regions. By constructing movies of this emission at a fraction of an hour time resolution we can reveal rotational and solar wind compression driven magnetospheric dynamics. These images also provide a means to connect magnetospheric dynamics with simultaneously imaged Saturn auroral features."