BOSTON UNIVERSITY

SPACE PHYSICS SEMINAR

T. T. Koskinen

University of Arizona

Sunsets on Saturn – a new perspective on the upper atmosphere from Cassini UVIS occultations

Thursday, March 20, 2014
725 Commonwealth Ave.
Refreshments at 3:30pm in CAS 500
Talk begins at 4:00pm in CAS 502

Abstract:
Despite significant advances in our understanding of Saturn's upper atmosphere since the Pioneer and Voyager missions, many important questions remain. For example, the observed temperatures in the thermosphere are much higher than expected from solar heating only and the missing energy source is still unknown. This problem is common to all of the giant planets in the solar system, and the solution could also be relevant to many extrasolar giant planets. Past studies indicate that breaking gravity waves, redistribution of auroral energy by circulation, and electrodynamics may help to explain the high temperatures. There are, however, almost no observations available to directly study such dynamics in the upper atmosphere and only a few observations of even the density and temperature profiles above the stratosphere. In this sense, solar and stellar occultations observed by Cassini UVIS that probe the atmosphere from the stratosphere to the exobase provide much needed constraints on the photochemical and dynamical models. In particular, the spatial and temporal coverage of the data potentially allows for the identification of trends indicative of dynamics and energy deposition. The analysis of these observations, however, poses unique challenges that can lead to significant confusion over their interpretation. I will review some of these challenges and present results from more than 20 occultations that map the temperature and density structure in Saturn's upper atmosphere.