



**Wednesday**  
**February 20, 2013**  
**4:00 pm**  
**Room 1017**  
**Dow Building**

**Prof. Merav Opher**

**Boston University**

## **Exploring Plasma Effects at the Edge of the Solar System: Magnetic Reconnection in the Heliosheath and Heliopause**

The recent measurements in-situ by the Voyager spacecrafts, combined with the all-sky images of the heliospheric boundaries by the Interstellar Boundary Explorer (IBEX) mission, have radically transformed our knowledge of the boundaries of the heliosphere. Concepts that resisted decades are being revisited due to these puzzling measurements. In particular after the crossing of the termination shock (TS) by V1 and then by V2, one of the first surprises was that both Voyagers found no evidence for the acceleration of the anomalous cosmic rays at the TS as expected for approximately 25 years. Another challenge is the energetic particle intensities that are dramatically different at Voyager 1 and 2. More recently, observations of Voyager 1 indicate that the spacecraft is magnetically connected to the interstellar medium while being inside the heliosheath. In this talk I will review the state-of-the-art of our understanding of the global heliosphere as well as the future challenges. I will review our recent modeling that proposes that reconnection is happening in the heliosheath within the sector region (the region where the solar magnetic field reverses polarity) and review its consequences for the nature of the heliosheath, affecting both the flows and transport of energetic particles. I will comment as well on our current effort to understand the nature of the heliopause.

**About the Speaker:** Merav Opher is an Asst. Professor in the Astronomy Department of Boston Univ. (BU). Her interests are in how plasma and magnetic effects reveal themselves in astrophysical and space physics environments. In particular, in how stars interact with the surrounding media, how the solar system interacts with the local interstellar medium, and the interaction of extra-solar planets with their host stars. Her other interests are in how magnetic disturbances are driven and propagate from the Sun to Earth. Dr. Opher was awarded the NSF CAREER and the Presidential Early Career Award for Scientists and Engineers awards for studies of shocks in interplanetary space. Dr. Opher was a co-author of the Decadal Survey in "Solar and Space Physics: A Science for a Technological Society". She obtained her PhD from the Univ. of Sao Paulo in 1998, was a post-doctoral scholar at UCLA from 1999-2001, and was a Caltech Scholar at JPL and at U Michigan from 2001-2004. Before coming to BU, she was an assoc. professor at George Mason U.