



Wednesday
April 10, 2013
4:00 pm
Room 1017
Dow Building

Prof. Michael Shay

University of Delaware

Studying the Microphysics of Magnetic Reconnection in the Earth's Magnetosphere and the Solar Wind

Magnetic reconnection plays a fundamental role in plasmas, driving solar flares, heating the solar corona and solar wind, coupling the Earth's magnetosphere to the solar wind, facilitating star formation, and disrupting laboratory fusion devices. Magnetic reconnection reconfigures magnetic topology inside current sheets, releasing magnetic energy in the form of heating, flows, and energetic particles. This multiscale process has global effects and yet occurs in a very thin boundary layer where kinetic plasma physics is important, making it notoriously difficult to study. The rise of petascale computing coupled with multi-spacecraft in-situ observations of the magnetosphere and solar wind have provided a powerful tool to understand the basic physics controlling magnetic reconnection. It is now possible to actively probe the kinetic physics of magnetic reconnection. In this presentation, after reviewing our basic knowledge of magnetic reconnection, I will outline my current research comparing fully kinetic particle-in-cell simulations of magnetic reconnection with satellite observations of the Earth's Magnetosphere and the solar wind. This research seeks to shed light on such fundamental questions as: How is the plasma heated during magnetic reconnection? How quickly does magnetic energy propagate away from the reconnection boundary layer? How does magnetic reconnection dissipate energy during turbulence?

About the Speaker: Michael Shay is an associate professor in the Department of Physics and Astronomy at the University of Delaware with a joint appointment in the Bartol Research Center. His interests focus on the kinetic physics of space plasmas, with applications to magnetic reconnection and turbulence. He uses massively parallel kinetic simulations to study this physics, and is also developing novel multiscale methods to attack these problems. Dr. Shay received the NSF Faculty Career award in 2007, the Francis Alison Society Young Scholars Award in 2008, is the author of over 60 refereed publications and has given 40 invited seminars. Dr. Shay received his PhD in 1998 from the University of Maryland, College Park, where he also performed his post-doctoral work before joining the University of Delaware in 2005.