Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Alfven Wave Collisions: The Fundamental Building Block of Plasma Turbulence[1] GREGORY HOWES, KEVIN NIELSON, FREDERICK SKIFF, CRAIG KLETZING, University of Iowa — Alfvén waves play a central role in the dynamics of magnetized plasma turbulence. Theoretical studies suggest that the nonlinear interactions that constitute the turbulence occur only between Alfvén waves traveling in opposite directions along the magnetic field. Therefore it is these interactions, often referred to simply as "collisions" between counter-propagating Alfvén waves, that form the fundamental building blocks of plasma turbulence. Today's modern theories of anisotropic magnetized plasma turbulence have been developed based on this intuitive concept of counter-propagating Alfvén wave collisions. We describe here a fundamental study of the properties of these Alfvén wave collisions both in the MHD and kinetic Alfvén wave regimes, employing both asymptotic analytical solutions of the nonlinear interaction between counter-propagating Alfvén waves and supporting gyrokinetic numerical simulations. Intuition from these studies is exploited to support planned laboratory experiments to measure the nonlinear evolution of Alfvén wave collisions on the Large Plasma Device (LAPD) at UCLA.

[1]Supported by NSF Award PHY-1003346

Gregory Howes
University of Iowa

Date submitted: 08 Jul 2011 Electronic form version 1.4