Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Laboratory Studies of Nonlinear Alfvén Interactions and Decay Instabilities[1] S. DORFMAN, T. CARTER, S. VINCENA, P. PRIBYL, G. ROSSI, UCLA, R. SYDORA, U Alberta, Y. LIN, Auburn U — Alfvén waves, a fundamental mode of magnetized plasmas, are ubiquitous in lab and space. The non-linear behavior of these modes is thought to play a key role in important problems such as the heating of the solar corona, solar wind turbulence, and Alfvén eigenmodes in tokamaks. In particular, theoretical predictions show that these Alfvén waves may be unstable to various decay instabilities, even at low amplitudes ($\delta B/B < 10^{-3}$). The present work, conducted at UCLA's Large Plasma Device, represents the first fundamental laboratory study of the non-linear Alfvén wave interactions responsible for Alfvén wave decay instabilities. Experiments include the first laboratory observation of the Alfvén-acoustic mode coupling at the heart of the Parametric Decay Instability [1]. More recently, efforts have focused on the non-linear decay of a KAW into daughter modes with frequencies and wave numbers that suggest co-propagating KAWs. The observed process is parametric, with the frequency of the daughter modes varying as a function of pump amplitude. Efforts are underway to fully characterize this set of experiments and compare with decay instabilities predicted by theory and simulations.

[1] S Dorfman and T Carter, Phys. Rev. Lett. 110, 195001 (2013).

[1]Supported by DOE, NSF, and DOE FES and NASA Eddy Postdoctoral Fellowships

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Date submitted: 23 Jul 2015 Electronic form version 1.4