Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Status and future plans for studies of nonlinear Alfvén waves and Alfvénic turbulence in a laboratory plasma T.A. CARTER, D.W. AUERBACH, S. VINCENA, W. GEKELMAN, C. COOPER, P. PRIBYL, Dept. of Physics and Astronomy, UCLA — A program of studying processes associated with large amplitude kinetic Alfvén waves is ongoing on the LAPD at UCLA. The goal of this research is to investigate fully-developed Alfvénic turbulence, driven by injection of waves and a nonlinear cascade. Primary results of the study to date have concerned three-wave interactions and nonlinear processes associated with single large amplitude waves. With single large amplitude waves, substantial electron heating is observed which creates filamentary structure in the plasma temperature, density and potential. The structuring of the background plasma results in the excitation of drift-Alfvén waves. These drift waves then interact with the incident Alfvén wave, causing sideband generation which results in a nearly broadband state at high wave power. The strong damping of Alfvén waves in LAPD that gives rise to the observed heating is problematic for the observation of a turbulent cascade: the damping time competes with the nonlinear energy transfer time. A new toroidal facility at UCLA is being developed which will have much longer plasma length, lower collisionality and higher plasma β than LAPD. A discussion of the possibility of developing a turbulent cascade in this machine will be presented, including mention of new physics studies made possible by higher plasma β.

Troy Carter
Dept. of Physics and Astronomy, UCLA

Date submitted: 18 Jul 2008 Electronic form version 1.4