Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Nonlinear Theory of Mode Conversion at Plasma Frequency KAI-BANG WU, JANG-YU HSU, NCKU, PHYSICS DEPARTMENT, NCKU COLLABORATION — The mode conversion occurs when two waves of different physical properties, for example, longitudinal versus transverse, have the same frequency and wave number. The electromagnetic (EM) wave can transfer energy to the electrostatic (ES) wave through mode conversion process near the cut-off layer. The best mode conversion efficiency reaches 50% at the proper incident angle and the plasma density gradient in linear theory. Due to the large amplitude wave during laser heating, the physics can be highly nonlinear. The sinusoidal incident electromagnetic wave can generate high harmonics and dc component. Moreover, in the vicinity of the cut-off and the mode conversion layers, we find, from the numerical code in the finite difference time domain simulation, the DC magnetic field and the localized plasma flow. The frequency mismatch is compensated by the large wave amplitude, and the mode conversion also occurs readily beyond the linear theory would. The converted longitudinal wave is tantamount to the electron density wave. It can modulate the equilibrium density, and results in the density bubble. As a consequence, ions may be accelerated to 4-5Gev at the present-day laser powers.

Jang-Yu Hsu
NCKU

Date submitted: 19 Jul 2010 Electronic form version 1.4