Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Revisiting linear plasma waves for finite value of the plasma parameter[1] THOMAS GRISMAYER, JAY FAHLEN, VIKTOR DECYK, WARREN MORI, UCLA, UCLA TEAM — We investigate through theory and PIC simulations the Landau-damping of plasma waves with finite plasma parameter. We concentrate on the linear regime, $\gamma \gg \omega_B$, where the waves are typically small and below the thermal noise. We simulate these condition using 1,2,3D electrostatic PIC codes (BEPS), noting that modern computers now allow us to simulate cases where $(n\lambda_D^3 = [1e2; 1e6])$. We study these waves by using a subtraction technique in which two simulations are carried out. In the first, a small wave is initialized or driven, in the second no wave is excited. The results are subtracted to provide a clean signal that can be studied. As $n\lambda_D^3$ is decreased, the number of resonant electrons can be small for linear waves. We show how the damping changes as a result of having few resonant particles. We also find that for small $n\lambda_D^3$ fluctuations can cause the electrons to undergo collisions that eventually destroy the initial wave. A quantity of interest is the the life time of a particular mode which depends on the plasma parameter and the wave number. The life time is estimated and then compared with the numerical results. A surprising result is that even for large values of $n\lambda_D^3$ some non-Vlasov discreteness effects appear to be important.

[1]Grant of DOE : DE-FG52-09NA29552

Thomas Grismayer
UCLA

Date submitted: 25 Aug 2010 Electronic form version 1.4