Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Kinetic modeling of Raman scattering with adiabatic electron response[1] DAVID J. STROZZI, Lawrence Livermore National Lab (LLNL), DIDIER BÉNISTI, LAURENT GREMILLET, CEA/DAM, Bruyères-Le-Châtel, France — Nonlinearity due to electron trapping in stimulated Raman scattering (SRS) has been studied analytically and via 1-D Vlasov simulations with the ELVIS code. The adiabatic calculation of the electron susceptibility χ [D. Bénisti, L. Gremillet, Phys. Plasmas **14**, 042304 (2007)] has been used to derive the dispersion relation of an SRS-driven plasma wave (from Re[χ]), and an envelope equation (from Im[χ]). Unlike earlier theories, this dispersion relation reflects both that the wave is driven, and that its phase velocity depends on amplitude. The theory agrees well with the frequency measured in simulations. The driven nature of the plasma wave initially produces a large frequency shift, after which the nonlinearity in Re[χ] dominates. The overall downshift exceeds classical formulas (e.g. Morales and O'Neil) when $k\lambda_{De} > 0.35$. Moreover, the frequency **and wave number** of the scattered light wave both vary with amplitude, keeping SRS closer to resonance than it would be if only the frequency varied. The detrapping of electrons when the wave amplitude decreases may give electrostatic turbulence: the distribution increases for some velocities above that of the SRS plasma wave.

[1]Work at LLNL performed under US DoE Contract W-7405-Eng-48.

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Date submitted: 18 Jul 2007 Electronic form version 1.4