Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Nonlinear frequency shift of electrostatic waves in general collisionless plasma: unifying theory of fluid and kinetic nonlinearities[1] ILYA Y. DODIN, CHANG LIU, Princeton University, PPPL — The nonlinear frequency shift is derived in a transparent asymptotic form for intense dissipationless Langmuir waves in general collisionless plasma (arXiv:1505.03498). The formula describes both fluid and kinetic effects simultaneously. The fluid nonlinearity is expressed, for the first time, through the plasma dielectric function, and the kinetic nonlinearity accounts for both smooth distributions and trapped-particle beams. Various known limiting scalings are reproduced as special cases. The calculation avoids differential equations and can be extended straightforwardly to other nonlinear plasma waves.

[1]The work was supported by the NNSA SSAA Program through DOE Research Grant No. DE274-FG52-08NA28553 and by the DOE contract DE-AC02-09CH11466.

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Date submitted: 20 Jul 2015 Electronic form version 1.4