Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Undamped electrostatic plasma waves FRANCESCO VALENTINI, DENISE PERRONE, Dipartimento di Fisica, University of Calabria, FRANCESCO CALIFANO, FRANCESCO PEGORARO, Dipartimento di Fisica, University of Pisa, PIERLUIGI VELTRI, Dipartimento di Fisica, University of Calabria, PHILIP MORRISON, Institute for Fusion Studies and Department of Physics, University of Texas at Austin, THOMAS O'NEIL, Department of Physics, University of California at San Diego, La Jolla, California — Dissipationless wave damping is a characteristic feature of plasma dynamics. However, when the equilibrium particle velocity distribution departs from the usual Maxwellian configuration due to the presence of a small plateau, plasma waves with certain frequency and wavenumber can survive against Landau damping: we name these waves "corner modes" since a significant contribution to the charge density associated to these oscillations mainly come from the sharp corners at the boundary of the velocity plateau. Here we show that these undamped waves can be obtained in a wide region of the $(k;\omega_R)$ plane (ω_R being the real part of the wave frequency and k the wavenumber), away from the well-known "thumb curve" for Langmuir waves and EAWs based on the Maxwellian. The effect of altering the tails of the velocity distribution on the thumb curve is also discussed and a rule of thumb is obtained for assessing how the existence of a plateau shifts roots off of the thumb curve. Suggestions are made for interpreting recent experimental observations of electrostatic waves in nonneutral plasmas. Kinetic Vlasov-Poisson simulations are specifically designed to provide support to the analytical predictions.

Francesco Valentini
Dipartimento di Fisica, University of Calabria

Date submitted: 23 Jul 2012 Electronic form version 1.4