Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

The Birth of Kinetic Electrostatic Electron Nonlinear (KEEN) Waves Weakly Driven by the Ponderomotive Force of Crossing Laser Beams in High Energy Density Plasmas Compared to Strongly Driven KEEN Waves[1] MICHEL MEHRENBERGER, IPP, Garching Germany, BEDROS AFEYAN, Polymath Research Inc., ADILA DODHY, ERIC SONNENDRÜKER, IPP, Garching Germany — We vary the amplitude and duration of the ponderomotive force driving KEEN waves in Vlasov-Poisson simulations. We use variable-resolution velocity-grids, so as to maintain accuracy, no matter how small the driven waves get at weak drive. We further accelerate the long time simulations by the use of a large time step which is allowed by a sixth-order time-splitting symplectic scheme. How KEEN waves are born, the fragmentation into vorticlets and their subsequent (sometimes successful and sometimes unsuccessful) merger in the case of weak and/or short duration drives is compared to longer duration and to larger amplitude drives. Our aim is to extract the scaling laws dictating how multiple harmonic, phase locked electric field structures which are the essential feature of KEEN waves are related to the ponderomotive drive properties and how they vary at different locations in the Brillouin diagram. New diagnostics revealing partitioning of phase space, particle orbit statistics and partial mode reconstructions are used to demonstrate the nonstationary and intricate yet robust physics of KEEN wave self-organization in phase space.

[1]This work was supported by DOE OFES HEDP Grant.

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Date submitted: 11 Jul 2014 Electronic form version 1.4