Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Two-dimensional numerical simulations of the inertial electrostatic confinement device (IEC) EVSTATI G. EVSTATIEV, RICHARD A. NEBEL, JAEYOUNG PARK, GIOVANNI LAPENTA, ALBERTO MAROCCHINO, LANL — The theoretical works of Barnes and Nebel [1] have shown that a small ion cloud immersed in a uniform background electron density may undergo self-similar oscillations while being in local thermal equilibrium at all times. During the collapse phase of this oscillation the density and temperature of the ion cloud my reach extremely large values thus making this scheme particularly attractive for fusion application. One main purpose of the present experimental and theoretical work is to understand the stability properties of the electron background. Recent experimental results [2] indicate that the formation of a uniform electron background and a parabolic potential of up to 60% of the grid potential is possible. However increasing of the grid potential past a certain value, while keeping all other parameters unchanged, leads to the destruction of the potential well. This instability is studied with the help of the two-dimensional particle-in-cell code CELESTE2D [3]. Results from different injection schemes will be shown and their influence on the stability of the background are presented.

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[2] R.A. Nebel et al. - Phys. Plasma 12, 12701 (2005).
[3] G. Lapenta, Phys. Plsmas, 6, 1442 (1999); J.Computat. Phys., 181, 317 (2002).

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Date submitted: 02 Aug 2005 Electronic form version 1.4