Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Strong electron-scale instability in relativistic shear flows EDUARDO PAULO ALVES, THOMAS GRISMAYER, GoLP/Instituto de Plasmas e Fusao Nuclear - LA, Instituto Superior Tecnico, Portugal, RICARDO FONSECA, DCTI/ISCTE Instituto Universitário de Lisboa, LUIS SILVA, GoLP/Instituto de Plasmas e Fusao Nuclear - LA, Instituto Superior Tecnico, Portugal — Collisionless shear-driven plasma instabilities have recently been shown to be capable of generating strong and large-scale magnetic fields and may therefore play an important role in relativistic astrophysical outflows. We present a new collisionless shear-driven plasma instability, which operates in the plane transverse to the Kelvin Helmholtz instability (KHI). We develop the linear stability analysis of electromagnetic modes in the transverse plane and find that the growth rate of this instability is greater than the competing KHI in relativistic shears. The analytical results are confirmed with 2D particle-in-cell (PIC) simulations. Simulations also reveal the nonlinear evolution of the instability which leads to the development of mushroom-like electron-density structures, similar to the Rayleigh Taylor instability. Finally, the interplay between the competing instabilities is investigated in 3D PIC simulations.

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Date submitted: 12 Jul 2013 Electronic form version 1.4