Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

2D MRI-induced turbulence in high β PIC simulation GIANNANDREA INCHINGOLO, THOMAS GRISMAYER, GoLP/IPFN, Instituto Superior Tecnico, Universidade de Lisboa, Lisbon, Portugal, NUNO F. LOUREIRO, Plasma Science and Fusion Center, MIT, Cambridge, USA, RICARDO A. FONSECA, DCTI/ISCTE - Instituto Universitario de Lisboa, Lisboa, Portugal, LUIS O. SILVA, GoLP/IPFN, Instituto Superior Tecnico, Universidade de Lisboa, Lisbon, Portugal
— The magnetorotational instability (MRI) is a crucial mechanism of angular momentum transport in a variety of astrophysical scenarios, as accretion disks nearness neutron stars and black holes. The MRI has been widely studied using MHD models and simulations, in order to understand the behaviour of astrophysical fluids in a state of differential rotation. When the timescale for electron and ion collisions is longer than the inflow time in the disk, the plasma is macroscopically collisionless and MHD breaks down. This is the case of the limit of weak magnetic field, i.e., as the ratio of the ion cyclotron frequency to orbital frequency becomes small. Leveraging on the recent addition of the shearing co-rotating frames equations of motion and Maxwell's equations modules in our PIC code OSIRIS 3.0, we intend to present our recent results of the analysis of MRI in collisionless plasma. Increasing the scale of our simulations, we will show the first ab-initio PIC simulations of a 2D turbulence induced consistently during the saturation regime of the MRI. We will demonstrate the existence of a minimum scale λ_{kink} that determine the comparison of a drift-kink instability in the plasma. This instability will activate the turbulence during the saturation regime of the MRI.

Giannandrea Inchingolo
Inst Superior Tecnico (IST)

Date submitted: 14 Jul 2017 Electronic form version 1.4