Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Toroidal current induced by particle trapping inside a new toroidal laboratory magnetized plasma device with poloidal magnetic field induced by a central conductor TH. PIERRE, CNRS UMR7345 Aix-Marseille Univ. , France, X. CARON, E. GRAVIER, CNRS UMR7198 Univ. Lorraine, France, G. ANTAR, American Univ. Beyrut, Lebanon, XPM TEAM, IJL-P2M TEAM, PHYS. DEPT. TEAM — In the laboratory toroidal device MISTOR, a poloidal field is created by a current (1200 A) flowing along a central toroidal conductor. A security factor q=1 is obtained at radial position r = 5 cm. Helium plasma is produced by electric discharge using a tungsten filament. When Bpol= 0, the whole plasma is turbulent that is a standard in a Simple Magnetized Torus. As Bpol is increased, the turbulence level decreases and a stable plasma is obtained. This is correlated with the decrease of the radial electric field. The confinement time is estimated in the afterglow decaying plasma. It increases from 50 microsec. without poloidal field to 0.5 millisec. when q=1 at mid-radius. The trapping of the particles inside the mirror-traps inherent in this topology (banana orbits) is studied. The precession of the banana orbits seems to be the dominant mechanism. The measurement of the toroidal current using a probe indicates that the electrons experience an oriented toroidal drift along the field lines. Detailed measurements of the EEDF are compared with theory. The influence of detrapping is investigated in order to estimate the bootstrap current induced in this device.

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Date submitted: 12 Jul 2012 Electronic form version 1.4