Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Chaotic motion of charged particles in toroidal magnetic configurations XAVIER LEONCINI, BENJAMIN CAMBON, Centre de Physique Theorique, Aix-Marseille University, MICHEL VITTOT, Centre de Physique Theorique, CNRS, REMI DUMONT, XAVIER GARBET, IRFM, CEA — We study the motion of a charged particle in a toroidal magnetic field and discuss its chaotic nature. First considering an idealized magnetic configuration, we add a non generic perturbation corresponding to a magnetic ripple, breaking one of the invariant of the motion. Chaotic motion is then observed and opens questions about the link between chaos of magnetic field lines and chaos of particle trajectories. Second, we return to an axi-symmetric configuration and tune the safety factor (magnetic configuration) in order to recover chaotic motion. In this last setting with two constants of the motion, the presence of chaos implies that no third global constant exists. We are facing a mixed phase space with both regular and chaotic regions and point out the difficulties in performing a global reduction such as gyrokinetics.

Xavier Leoncini
Aix-Marseille University

Date submitted: 07 Jul 2014 Electronic form version 1.4