Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Active Feedback Stabilization of Mirror Trap – Experimental Investigation ILAN BE'ERY, ASSAF LIFSHITZ, AMNON FISHER, AMIRAM RON, The Technion - Israel Institute of Technology — Plasma confinement in axi-symmetric mirror machine is unstable to large-scale 'flute' perturbations. Since the spatial scale of the perturbations is comparable to the plasma radius, and the time scale is 10-100 μs, it might be possible to suppress the instability using external active feedback. About 40 years ago several feedback experiments demonstrated some improvement in confinement, but the slow electronics of that time limited the feedback effectiveness. Since then there has been great improvement in feedback theory, plasma simulation, and digital real-time systems. As a result, active feedback is gradually becoming a major tool in toroidal confinement machines. We try to re-examine the physics of feedback stabilization of mirror machines using a table-top experiment. For this purpose we have built a small mirror trap and have studied the large scale dynamics of the plasma. The feedback system consists of optical sensors, magnetic or electric actuators, and fast and programmable digital processing system. We will present the instability evolution and open loop response, as measured by the sensors array and fast photography.

Ilan Be'ery

Date submitted: 14 Jul 2010 Electronic form version 1.4