Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Measuring 3D plasma flow in compact toroids SETTHIVOINE YOU, ALEXANDER BALANDIN, YASUCHI ONO, Univ. of Tokyo — The TS-3 and TS-4 experiments at the University of Tokyo shoot two compact toroids at each other to form a single compact toroid with strong plasma flows. Up to now, conventional ion Doppler spectroscopy has been used to measure toroidal plasma flows only. The observations identified the "slingshot effect" [1], which converts magnetic energy into ion thermal and kinetic energy from the 3D contraction of reconnected magnetic field lines. The ions are however accelerated in both the toroidal and the poloidal direction. This paper presents the implementation of a novel Doppler spectroscopy diagnostic, designed to obtain the full 3D plasma fluid velocity profile by tomographic reconstruction. A simulation of the experimental setup determines the minimum number of line-of-sights (projections) and their optimum locations. The synthetic noisy measurements are then fed into the reconstruction program, which uses a spherical harmonics series expansion to obtain the solenoidal component of the velocity vector [2]. Progress towards experimental measurements will be presented. The diagnostic will help determine the ion self-helicity of a compact toroid in the context of two-fluid MHD relaxation theory [3]. [1] Y. Ono et al, Phys. Rev. Lett., 76, 18 (1996) [2] A.L. Balandin, Y. Ono, J. Comp. Phys., 202 (2005) 52-64 [3] L. Steinhauer, A. Ishida, Phys. Rev. Lett., 79, 18 (1997)

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Date submitted: 25 Jul 2007 Electronic form version 1.4