Abstract Submitted for the DPP16 Meeting of The American Physical Society

Behavior of Compact Toroid Injected into C-2U Confinement Vessel TADAFUMI MATSUMOTO, Nihon Univ., T. ROCHE, I. ALLREY, Tri Alpha Energy, J. SEKIGUCHI, Nihon Univ., T. ASAI, Nihon Univ - Tokyo, M. CONROY, H. GOTA, E. GRANSTEDT, C. HOOPER, J. KINLEY, T. VALEN-TINE, W. WAGGONER, M. BINDERBAUER, Tri Alpha Energy, T. TAJIMA, University of California, Irvine, THE TAE TEAM — The compact toroid (CT) injector system [1] has been developed for particle refueling on the C-2U device [2]. A CT is formed by a magnetized coaxial plasma gun (MCPG) and the typical ejected CT/plasmoid parameters are as follows: average velocity ~100 km/s, average electron density ~ 1.9×10^{15} cm⁻³, electron temperature 30-40 eV, mass ~ $12\mu q$. To refuel particles into FC plasma the CT must penetrate the transverse magnetic field that surrounds the FRC. The kinetic energy density of the CT should be higher than magnetic energy density of the axial magnetic field, i.e., $\rho v^2/2 \ge B^2/2\mu_0$, where ρ , v, and B are mass density, velocity, and surrounded magnetic field, respectively. Also, the penetrated CT's trajectory is deflected by the transverse magnetic field (B_z ~ 1 kG). Thus, we have to estimate CT's energy and track the CT trajectory inside the magnetic field, for which we adopted a fast-framing camera on C-2U: framing rate is up to 1.25 MHz for 120 frames. By employing the camera we clearly captured the CT/plasmoid trajectory. Comparisons between the fast-framing camera and some other diagnostics as well as CT injection results on C-2U will be presented. [1] T. Matsumoto et.al., Rev. Sci. Instrum. 87, 053512 (2016). [2] M. Binderbauer et. al., Phys. Plasmas **22**, 056110 (2015).

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Date submitted: 13 Jul 2016

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