Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Development of High-Field ST Merging Experiment: TS-U for High Power Reconnection Heating Y. ONO, H. KOIKE, H. TANABE, S. HIMENO, S. ISHIDA, K. KIMURA, M. KAWANAMI, M. NARITA, Y. TAKAHATA, T. YOKOYAMA, M. INOMOTO, C. Z. CHENG, University of Tokyo — We are developing high-magnetic field ST merging/ reconnection experiment TS-U with B_{rec} = 0.3-0.5T, based on our scaling law of reconnection heating energy proportional to square of the reconnecting (poloidal) magnetic field B_{rec} [1-3]. This scaling law indicates that the high-B_{rec} ST merging will heat ions to the burning plasma regime without using any additional heating facility. Its mechanism is that the reconnection outflow accelerates mainly ions up to the poloidal Alfven speed like the Sweet-Parker model [1]. The shock-like density pileups thermalize the accelerated ions in the down-streams in agreement with recent solar satellite observations and PIC simulation results [2,3]. We already documented significant ion heating of spheromak and ST mergings up to 0.25keV in TS-3 [1-3] and 1.2keV in MAST [2,3], leading us to the high-B_{rec} merging experiment TS-U. It is noted that high-resolution (>500 channel) 2D measurements of ion and electron temperatures is being developed for the purpose of solving all acceleration and heating effects of magnetic reconnection, such as the huge outflow heating of ions in the downstream and electron heating localized at the X-point [1-3]. [1] Y. Ono et al., Phys. Rev. Lett. 107, 185001 (2011), [2] Y. Ono et al., Plasma Phys. Cont. Fus. 54 124039, (2012), [3] Y. Ono et al., Phys. Plasmas 22, 055708 (2015).

Yasushi Ono
University of Tokyo

Date submitted: 15 Jul 2016 Electronic form version 1.4