High Power Heating of Magnetic Reconnection in UTokyo Spherical Tokamak Merging Experiment: TS-U

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It is noted that the ion heating energy is proportional to square of the reconnecting (poloidal) magnetic field $B_{rec}$ [1,2]. It is because the reconnection outflow accelerates ions up to the poloidal Alfven speed [1]. The accelerated ions are thermalized by shock-like density pileups in the downstreams. These results agree qualitatively with recent solar satellite observations and PIC simulation results [2]. Based on those results, our poster will show the design of upscaled high-field tokamak merging experiment: TS-U. The high-power heating of tokamak merging is useful not only for laboratory study of reconnection heating mechanisms but also for economical startup and heating of tokamak plasmas. The tokamak merging with $B_{rec}>0.3T$ will enables us to heat the tokamak plasma to the burning regime: $T_i>5keV$ without using any additional heating facility. [1] Y. Ono et al., Phy. Rev. Lett. 107, 185001 (2011), [2] Y. Ono et al., Plasma Phys. Cont. Fus. 54 124039, (2012); Y. Ono, Phys. Plasmas in press.

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Date submitted: 24 Jul 2015

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