

Abstract Submitted  
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**Merging Formation of Large-Size Field-Reversed Configurations with the Assistance of Neutral Beam Injection**<sup>1</sup> TORU I<sup>1</sup>, KEIJI GI, TOSHIYUKI UMEZAWA, MICHIAKI INOMOTO, YASUSHI ONO, University of Tokyo, ATSUSHI OSAKI, HIROYUKI MATSUNAGA, TOMOHIKO ASAI, Nihon University — The effect of energetic beam ions on oblate Field-Reversed Configurations (FRCs) was studied experimentally in the TS-4 plasma merging device. An important question is whether plasma flows and large ion gyroradii generated by beam ions can stabilize the global modes essential to high- $s$  (plasma size normalized by ion gyroradius) FRCs. We developed a new high-power pulsed Neutral Beam Injection (NBI) with a washer gun plasma source, achieving beam power up to 0.6 MW (15 kV, 40 A). The Monte Carlo simulation of tangential co-current NB injection indicates that the beam ions are trapped between the magnetic axis and the separatrix. A new finding is that two merging high- $s$  spheromaks with opposite helicities relax into the largest scale FRC with its poloidal flux as high as 10 mWb. On the other hand, they did not relax to an FRC without the assistance of NBI. These facts suggest ion kinetic effects essential to FRC equilibrium and stability. Effect of high energy beam on parameters  $s$  or  $S^*$  of FRCs will be a key to solve the unknown FRC stability.

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