Abstract Submitted for the DPP09 Meeting of The American Physical Society

Improvements to CHI Plasma Start-up and Ramp-up in NSTX T.R. JARBOE, R. RAMAN, B.A. NELSON, Univ. of Washington, D. MUELLER, M.G. BELL, L. ROQUEMORE, H.W. KUGEL, PPPL, V. SOUKHANOVSKII, LLLNL — Experiments in NSTX have now demonstrated the savings of central solenoid inductive flux after coupling of toroidal plasmas produced by the technique of Coaxial Helicity Injection (CHI) to inductive sustainment and ramp-up of the toroidal plasma current. In these discharges, the central solenoid with zero precharge was used to apply an inductive loop voltage to the decaying CHI started discharges. The coupled discharges ramped up to 800kA without the benefit of auxiliary heating. Inductive flux savings was realized as a result of an effort to reduce the influx of low-Z impurities during the plasma start-up phase. This was achieved through the use of 400ms long CHI discharges produced using a DC rectifier power supply to ablate low-Z surface impurities from the lower divertor electrodes, followed by the use of Lithium evaporative coatings and an effort to reduce spurious arcs in the upper divertor region by controlling the extent of CHI plasma growth in the vessel. Previous work on NSTX has shown that CHI started discharges after coupling to neutral beam heated discharges can transition to an H-mode. These important new results from NSTX demonstrate that CHI is a viable solenoid-free plasma startup method for future STs and Tokamaks. This work supported by U.S. DOE Contracts # DE-AC02-09CH11466 and DE-FG02-99ER54519 AM08.

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Date submitted: 15 Jul 2009

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