Abstract Submitted for the DPP11 Meeting of The American Physical Society

Improvements in CTIX Plasma Formation and Acceleration ROBERT D. HORTON, DAVID Q. HWANG, University of California, Davis, DEAN A. BUCHENAUER, Sandia National Laboratory — The advantage of fast-moving compact toroids for fueling and disruption mitigation is the ability to deposit fuel or high-Z material into the central region of a magnetized plasma at higher speed than neutral gas. An important objective for CT application is to maximize plasma density while minimizing the neutral gas fraction. The combination of active switching in a formation region, together with snowplow plasma buildup in an acceleration region, is a promising approach to achieving these goals. The Compact Toroid Injection Experiment (CTIX) has recently been modified to permit formation-region active switching, using multiple spark-gap switches operated in parallel. Parallel spark-gap operation is straightforwardly scaled to high power, but requires timing accuracy of tens of nanoseconds to achieve equal current division between switches. The techniques used to achieve this timing on CTIX will be discussed. Operating comparison between passive and active formation-region switching will be made, including gas utilization efficiency, achievable density, and total compact-toroid kinetic energy. Accelerator-region density buildup will be demonstrated with multiple gas species, suitable for either hydrogen fueling or non-hydrogenic disruption control.

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Date submitted: 19 Jul 2011

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