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Experimental results from the 1.2 MA, 2.2 m diameter linear transformer driver cavity at Sandia National Labs

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In this presentation we describe the design, simulation and performance of a 118-GW linear transformer driver (LTD) cavity at Sandia National Laboratories. The cavity consists of 20 to 24 “bricks”. Each brick is comprised of two 80 nF, 100 kV capacitors connected electrically in series with a custom, 200 kV, three-electrode, field-distortion gas switch. The brick capacitors are bi-polar charged to a total of 200 kV. Typical brick circuit parameters are 40 nF capacitance (two 80 nF capacitors in series) and 160 nH inductance. The switch electrodes are fabricated from a WCu alloy and are operated with breathable air. Over the course of over 10,000 shots the cavity generated a peak electrical current and power of 1.19 MA and 118 GW. Experimental results are consistent (to within uncertainties) with circuit simulations for normal operation, and expected failure modes including pre-fire and late-fire events. New features of this development that will be presented include: high-impedance solid charging resistors that are optimized for this application and evaluation of maintenance-free trigger circuits using capacitive coupling and inductive isolation.

Authors: DOUGLASS, Jon (Sandia National Laboratories); HUTSEL, Brian (Sandia National Laboratories); LECK-BEE, Josh (Sandia National Laboratories); STOLTZFUS, Brian (Sandia National Laboratories); WISHER, Matthew (Sandia National Laboratories); Mr SAVAGE, Mark (Sandia National Laboratories); STYGAR, William (Sandia National Laboratories); Mr BREDEN, Eric (Sandia National Laboratories); Mr CALHOUN, Jacob (Sandia National Laboratories); CUNEO, Michael (Sandia National Laboratories); Mr JOHNS, Owen (Sandia National Laboratories); JONES, Michael (Sandia National Laboratories); LUCERO, Diego (Sandia National Laboratories); MOORE, James (Sandia National Laboratories); SCEIFORD, Matthew (Sandia National Laboratories); Dr KIEFER, Mark (Sandia National Laboratories); MULVILLE, Thomas (Sandia National Laboratories); HOHLFELDER, Robert (Sandia National Laboratories)

Presenter: DOUGLASS, Jon (Sandia National Laboratories)

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