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Faster, 80ns, Current Scaling Experiments Yield Higher Radiated X-Ray Power and Approach Quadratic Dependence[1] MICHAEL MAZARAKIS, MICHAEL CUNEO, WILLIAM STYGAR, HENRY HARJES, DANIEL SINARS, BRENT JONES, CHRISTOPHER DEENEY, EDUARDO WAISMAN, THOMAS NASH, KENNETH STRUVE, DILLON MCDANIEL, Sandia National Laboratories — We report the results of a new series of current scaling experiments with the Z accelerator. The novelty of this work is the shorter implosion times of 80 ns as compared with the 95 ns of the previously reported work. In the present study we utilized lighter weight tungsten wire arrays, which had 300 wires, 20-mm diameter and 10-mm height. We measured the z-pinch radiated x-ray power and energy as a function of the peak current. Two different currents were driven through the loads with the maximum attainable difference in peak values. The x-ray power measured at full 90-kV charge was the highest ever observed with a single 20-mm diameter, 10-mm high tungsten wire array and was of the order of 185 TW. The superior performance of the faster implosions can be attributed to shorter ablation times and to less mass left behind at the initial array radius. The present results are compared with the predictions of heuristic models and enhanced resistivity models.

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Michael Mazarakis
Sandia National Laboratories

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