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Status of Linear Transformer Driver Facilities for High Energy Density Physics Experiments at the University of Michigan

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The Michigan Accelerator for Inductive Z-pinch Experiments (MAIZE) is a 3-m-diameter, single-cavity Linear Transformer Driver (LTD). MAIZE supplies a fast electrical pulse (0–1 MA in 100 ns) to various experimental configurations, including wire-array z-pinches and cylindrical foil loads. MAIZE is the first LTD of its kind in the United States, and it has been operational at the University of Michigan (UM) since 2008. The MAIZE cavity was originally developed at the Institute for High Current Electronics in Tomsk, Russia, and later transported to UM through a collaboration with Sandia National Laboratories.

This talk will report on the progress of several projects aimed at upgrading the MAIZE facility. Within the next 12 months, MAIZE will be equipped with a new ultraviolet laser shadowgraphy system; a 2-frame, 1–20 keV x-ray radiography system based on x-pinch backlighting; and one or more time-gated 4-frame extreme ultraviolet imaging systems. These diagnostics will complement the existing 12-frame laser shadowgraphy system recently developed for MAIZE. In addition to new diagnostics, MAIZE will be equipped with a gas-puff z-pinch nozzle and/or a dense plasma focus (DPF) head. This will enable neutron source development as well as projects to better diagnose these neutron sources (e.g., advanced neutron imaging).

In addition to MAIZE, UM will be constructing a second, smaller LTD facility consisting of four 1.25-m-diameter cavities. These cavities were previously part of Sandia's 21-cavity Ursa Minor facility, which is being reconfigured to serve new missions. These 4 cavities will be assembled at UM such that experiments can be driven with 1, 2, 3, or 4 cavities stacked together. Stacking multiple cavities together increases the voltage and impedance of the driver while leaving the current nominally unchanged. This will enable the investigation of driver impedance (or machine "stiffness") effects on pinch performance.

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Author: MCBRIDE, R. D. (University of Michigan)

Co-authors: BEQI, D. (University of Michigan, Ann Arbor, MI 48109, USA); BONDIN, M. (University of Michigan, Ann Arbor, MI 48109, USA); CAMPBELL, P. C. (University of Michigan, Ann Arbor, MI 48109, USA); Dr CUNEO, M. E. (Sandia National Laboratories, Albuquerque, New Mexico 87185, USA); DARBY, F. B. (University of Michigan, Ann Arbor, MI 48109, USA); DENNISTON, A. (University of Michigan, Ann Arbor, MI 48109, USA); Prof. GILGENBACH, R. M. (University of Michigan, Ann Arbor, MI 48109, USA); HUA, M. (University of Michigan, Ann Arbor, MI 48109, USA); Dr JORDAN, N. M. (University of Michigan, Ann Arbor, MI 48109, USA); Dr KIEFER, M. L. (Sandia National Laboratories, Albuquerque, New Mexico 87185, USA); Prof. LAU, Y. Y. (University of Michigan, Ann Arbor, MI 48109, USA); Dr LECKBEE, J. J. (Sandia National Laboratories, Albuquerque, New Mexico 87185, USA); LEPPINK, E. (University of Michigan, Ann Arbor, MI 48109, USA); MILLER, S. M. (University of Michigan, Ann Arbor, MI 48109, USA); RAO, A. (University of Michigan, Ann Arbor, MI 48109, USA); Dr STEINER, A. M. (University of Michigan, Ann Arbor, MI 48109, USA); Dr STYGAR, W. A. (Sandia National Laboratories, Albuquerque, New Mexico 87185, USA); WAGNER, C. (University of Michigan, Ann Arbor, MI 48109, USA); WISHER, M. L. (Sandia National Laboratories, Albuquerque, New Mexico 87185, USA); WOOLSTRUM, J. (University of Michigan, Ann Arbor, MI 48109, USA); YAGER-ELORRIAGA, D. A. (University of Michigan, Ann Arbor, MI 48109, USA)

Presenter: MCBRIDE, R. D. (University of Michigan)

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