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10.36 A Window-less Target for Magnetized Liner Inertial Fusion Characterized using High-Speed Solid-State Framing Cameras

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Magnetized Liner Inertial Fusion (MagLIF) compresses a preheated, magnetized, deuterium-filled Be cylinder, using magnetic direct drive from high-current pulsed power devices such as Sandia's Z-machine. A major complication of existing MagLIF targets is the presence of a solid-density window that a preheat laser must pass through before being absorbed in the low-density gas that comprises the fusion fuel. This complication can potentially be eliminated by applying techniques used in shock tubes in which the diaphragm containing the high-pressure gas is punctured and allowed to mechanically be pushed away from the target axis by expanding gas from the main target volume. We will report on experiments testing the feasibility of this new type of MagLIF target in which we use a low-energy pulsed laser to puncture the target window. We make use of a new generation of compact and high-speed hybrid-CMOS digital framing cameras to visualize the dynamics of the target window puncture and subsequent expansion and to measure the uniformity of laser-heating of the target gas using the multi-kJ Z-Beamlet laser facility. Sandia is a multimission laboratory managed and operated by NTESS LLC, a wholly owned subsidiary of Honeywell Int, Inc, for the U.S. DOE's NNSA under contract DE-NA0003525.

Primary author(s) : COLOMBO, Anthony (Sandia National Laboratories)

Co-author(s) : SCHWARZ, Jens (Sandia National Laboratories); SLUTZ, Stephen (Sandia National Laboratories); KIMMEL, Mark (Sandia National Laboratories); CLAUS, Liam (Sandia National Laboratories); ENGLAND, Troy (Sandia National Laboratories); FANG, Lu (Sandia National Laboratories); LOOKER, Quinn (Sandia National Laboratories); MITCHELL, Brandon (Sandia National Laboratories); MONTOYA, Andrew (Sandia National Laboratories); RAMBO, Patrick (Sandia National Laboratories); ROBERTSON, Gideon (Sandia National Laboratories); ROCHAU, Gregory (Sandia National Laboratories); SANCHEZ, Marcos (Sandia National Laboratories); STAHOVIAK, John (Sandia National Laboratories); PORTER, John (Sandia National Laboratories); HUND, Jared (Belcan); SIN, Justin (Belcan)

Presenter(s) : COLOMBO, Anthony (Sandia National Laboratories); SCHWARZ, Jens (Sandia National Laboratories); SLUTZ, Stephen (Sandia National Laboratories); KIMMEL, Mark (Sandia National Laboratories); CLAUS, Liam (Sandia National Laboratories); ENGLAND, Troy (Sandia National Laboratories); FANG, Lu (Sandia National Laboratories); LOOKER, Quinn (Sandia National Laboratories); MITCHELL, Brandon (Sandia National Laboratories); MONTOYA, Andrew (Sandia National Laboratories); RAMBO, Patrick (Sandia National Laboratories); ROBERTSON, Gideon (Sandia National Laboratories); ROCHAU, Gregory (Sandia National Laboratories); SANCHEZ, Marcos (Sandia National Laboratories); STAHOVIAK, John (Sandia National Laboratories); PORTER, John (Sandia National Laboratories); HUND, Jared (Belcan); SIN, Justin (Belcan)

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