

Magnetized Liner Inertial Fusion, MagLIF

Stephen. A. Slutz

Sandia National Laboratories, Albuquerque, NM, USA 87185 saslut@sandia.gov

Lasers are being used to drive spherical implosions with the goal of obtaining fusion in the laboratory. Pulsed power can drive implosions with much higher efficiency, but with lower implosion velocities and with cylindrical rather than spherical convergence. MagLIF [S.A. Slutz et al., Phys. Plasmas 17, 056303, 2010] is a concept that uses fuel magnetization and preheat to allow these relatively slow cylindrical implosions to achieve fusion conditions. MagLIF experiments on the Z Accelerator at Sandia National Laboratories [M.R. Gomez et al. Phys. Rev. Lett. 113, 155003 (2014)] have produced significant fusion yields with only 18 MA drive. It has been shown numerically [S.A. Slutz and R.A. Vesey, Phys. Rev. Lett., 108, 025003 (2012)] that MagLIF could provide large yields (> 1 GJ) and large gains (~ 1000) when driven by currents exceeding 60 MA. New pulsed-power machines based on Linear Transformer Driver (LTD) technology [W.A. Stygar et al., submitted to Phys. Rev. ST Accel. Beams] could provide such currents. The basic physical principles of MagLIF and the experimental results obtained so far will be reviewed. Simulations of MagLIF on future LTD machines will be presented.

This work in collaboration with M. R. Gomez, A. B Sefkow, R. A. Vesey, D. B. Sinars, D. C. Rovang, E. M. Campbell, M. C. Herrmann, K. J. Peterson and M. E. Cuneo.

* Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.