Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Initial tests of a high magnetic field generator to increase the neutron yield of fusion plasmas produced by laser irradiation of clusters M. WISHER, H.J. QUEVEDO, M. MCCORMICK, R.D. BENGTSON, T. DITMIRE, University of Texas at Austin, K.W. STRUVE, B.S. STOLTZFUS, D.C. ROVANG, M. SAVAGE, J.L. PORTER, Sandia National Laboratories — The interaction of ultrafast intense terawatt laser pulses with clusters can create high density plasmas with temperatures much greater than 1 keV. The neutron yield from cigar-shape deuterium fusion plasmas is believed to be limited by the fast expansion time ($<$ 100 ps) mainly in the radial direction. A large magnetic field ($>$ 100 T) could limit the radial transport, increasing the fusion time and neutron yield considerably. We present initial tests of the prototype magnetic field generator intended to produce 50 T (upgradeable to 200 T). The device consists of two 100 kV capacitors that can deliver 500 kA through 12 coaxial cables into a conical transmission line. A destructible double coil of 1 cm diameter is connected at the center of the line to create a high magnetic field in a mirror configuration for 1 μs. We will use a cryogenically cooled gas jet to produce 10 nm deuterium clusters as the laser target. The jet will be irradiated initially by a 20 TW laser beam propagating on the axis of the 200 T magnetic field. The experiment will be conducted later using petawatt-class lasers.

Hernan Quevedo
University of Texas at Austin

Date submitted: 16 Jul 2010 Electronic form version 1.4