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High temperature deuterium plasmas produced by laser irradiation of clusters in a confining magnetic field M. WISHER, H.J. QUEVEDO, M. MCCORMICK, ROGER D. BENGTSON, T. DITMIRE, University of Texas at Austin, K.W. STRUVE, D.C. ROVANG, M. SAVAGE, J.L. PORTER, Sandia National Laboratories — Experiments have shown that interactions of intense ultrafast lasers with targets of small atomic clusters with thousands of atoms can create plasmas with high density and high average ion energies ($>>$ 1keV). DD fusion neutrons can be produced with laser pulses of a few joules to kilojoules. The fusion yield is limited by the fast expansion time ($<$100 ps)of the plasma. The expansion could be affected by a large magnetic field ($>$ 100 T) to limit transport in the radial direction that would lead to an increase of fusion neutron yield. We present preliminary design of the magnetic field generator for fields as large as 200 T. This includes a 100 kV capacitor bank that can deliver 2.2 MA through coaxial cables that feed into a conical transmission line. This line is connected to two destructible concentric millimeter coils in a mirror configuration to generate the high magnetic field for a microsecond. We will use a cryogenically cooled gas jet to produce 10 nm deuterium clusters as the laser target. The jet will be irradiated by a femtosecond laser beam propagating on the axis of a 100 T magnetic field.

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