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Creation of a high density, high flux target plasmoid for magneto-inertial fusion[1] THOMAS WEBER, THOMAS INTRATOR, JASON SEARS, Los Alamos National Laboratory — Magneto-inertial fusion utilizes embedded magnetic fields to reduce thermal transport and enhance alpha particle heating during an implosion reducing the required areal density, implosion speed, and convergence for fusion ignition. This enables the use of efficient inexpensive pulsed power, reducing the gain required for breakeven (e.g. $\eta G = 0.5 * 10$ (MIF), $= 0.05 * 100$ (ICF)). The FRX-L and FRCHX experiments at Los Alamos National Laboratory and the Air Force Research Laboratory at Kirtland AFB are investigating a subset of MIF called Magnetized Target Fusion (MTF) in which a Field Reversed Configuration (FRC) plasmoid is injected into a converging solid, conductive liner and compressed to fusion conditions. Traditional FRC formation techniques utilizing ringing-θ pre-ionization have proved to be incapable of forming target plasmoids with enough density and magnetic flux, limiting the particle inventory, confinement, and lifetime. An alternative formation technique utilizing magnetoplasmadynamic arc sources has been developed to increase the density and trapped flux of the target plasmoid. Plasma source technology and operation are presented, as well as changes to the target formation process, plasmoid characteristics, and implications to MTF.

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