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Results of subscale MTF compression experiments STEPHEN HOWARD, A. MOSSMAN, M. DONALDSON, General Fusion Inc, GENERAL FUSION TEAM — In magnetized target fusion (MTF) a magnetized plasma torus is compressed in a time shorter than its own energy confinement time, thereby heating to fusion conditions. Understanding plasma behavior and scaling laws is needed to advance toward a reactor-scale demonstration. General Fusion is conducting a sequence of subscale experiments of compact toroid (CT) plasmas being compressed by chemically driven implosion of an aluminum liner, providing data on several key questions. CT plasmas are formed by a coaxial Marshall gun, with magnetic fields supported by internal plasma currents and eddy currents in the wall. Configurations that have been compressed so far include decaying and sustained spheromaks and an ST that is formed into a pre-existing toroidal field. Diagnostics measure B, n_e, visible and x-ray emission, T_i and T_e. Before compression the CT has an energy of ~10kJ magnetic, ~1 kJ thermal, with T_e of 100 - 200 eV, n_e ~$5x10^{20}$ m^{-3}. Plasma was stable during a compression factor $R_0/R > 3$ on best shots. A reactor scale demonstration would require ~10x higher initial B and n_e but similar T_e. Liner improvements have minimized ripple, tearing and ejection of micro-debris. Plasma facing surfaces have included plasma-sprayed tungsten, bare Cu and Al, and gettering with Ti and Li.

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