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Investigation of Spheromak Plasma Cooling through Metallic Liner Spallation during Compression KEETON ROSS, Univ of California - Berkeley, ALEX MOSSMAN, WILLIAM YOUNG, RUSS IVANOV, PETER O'SHEA, STEPHEN HOWARD, General Fusion, Inc. — Various magnetic-target fusion (MTF) reactor concepts involve a preliminary magnetic confinement stage, followed by a metallic liner implosion that compresses the plasma to fusion conditions. The process is repeated to produce a pulsed, net-gain energy system. General Fusion, Inc. is pursuing one scheme that involves the compression of spheromak plasmas inside a liner formed by a collapsing vortex of liquid Pb-Li. The compression is driven by focused acoustic waves launched by gas-driven piston impacts. Here we describe a project to exploring the effects of possible liner spallation during compression on the spheromaks temperature, lifetime, and stability. We employ a 1 J, 10 ns pulsed YAG laser at 532nm focused onto a thin film of Li or Al to inject a known quantity of metallic impurities into a spheromak plasma and then measure the response. Diagnostics including visible and ultraviolet spectrometers, ion Doppler, B-probes, and Thomson scattering are used for plasma characterization. We then plan to apply the trends measured under these controlled conditions to evaluate the role of wall impurities during 'field shots', where spheromaks are compressed through a chemically driven implosion of an aluminum flux conserver. The hope is that with further study we could more accurately include the effect of wall impurities on the fusion yield of a reactor-scale MTF system. Experimental procedures and results are presented, along with their relation to other liner-driven, MTF schemes. -/a

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