

Abstract Submitted
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Experimental Results from Initial Operation of Plasma Injector

1 STEPHEN HOWARD, General Fusion Inc — General Fusion has begun operation of its first full-scale plasma injector, designed to accelerate high density spheromak plasmas into the compression chamber of a proposed MTF reactor. The geometry of Plasma Injector 1 (PI-1) is that of a two stage coaxial Marshal gun with a conical converging accelerator electrodes, similar in shape to the MARAUDER device, while pulsed power is applied in the same configuration as the RACE device. PI-1 is 5 meters in length and 1.9 m in diameter at the expansion region where a high aspect ratio (4.4) spheromak is formed with a minimum lambda of $9 m^{-1}$. The acceleration/compression stage is 4 m long and tapers to a final outer diameter of 40 cm. PI-1 is now operating at 1 MJ of total capacitor power, which will be doubled again before it reaches its design parameters. Diagnostics include 3 interferometer chords, 21 magnetic probes (2 axis poloidal/toroidal), 13 fast photodiode chords, as well as one Thomson scattering chord, a visible light survey spectrometer, and a Langmuir triple probe. Electrode voltage and current are also monitored. So far spheromaks of poloidal flux exceeding 100 mWb have been formed in the expansion region, and spheromaks of 40-50 mWb have been formed and accelerated out the end of the accelerator into a flux conserving target chamber. Expansion region densities are typically $\sim 5 \times 10^{14} cm^{-3}$, while conditions in the target chamber have reached $n_e \sim 10^{16} cm^{-3}$, and lifetimes of 300 μs .

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