Abstract Submitted
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Confinement Physics on Plasma Injector 3 KELLY EPP, R. RABLAH, S. HOWARD, M. LABERGE, M. REYNOLDS, R. IVANOV, P. CARLE, W. YOUNG, A. FROESE, C. GUTJAHR, K. BELL, S. BOLANOS, A. ROHOLLAHI, R. CORFU, A. WONG, C. EYRICH, General Fusion — Achieving energy gain with Magnetized Target Fusion (MTF) requires the plasma to satisfy a set of goals: particle inventory (10^{21} ions), magnetic flux (0.3 Wb) to confine the plasma without MHD instability, and energy confinement time significantly longer than the compression time. To study the physics of reactor-scale plasmas, General Fusion (GF) has constructed Plasma Injector 3 (PI3). The toroidal magnetic field in PI3 is produced by a pulsed power supply that also provides a low-voltage pulse to compensate resistive losses on a timescale of 10-50 ms. Once the toroidal field is established, PI3 uses a 50 microsecond pulse of coaxial helicity injection to produce a spherical tokamak plasma with total lifetime of 20 ms, within an aluminum flux conserver of radius 1 m, evap. coated with Li. Diagnostics include Mirnov probes, visible imaging, interferometers, spectroscopy, Doppler thermometry, Thomson scattering, AXUV, and FIR polarimetry. The goal is to determine the magnetic profile, stability, and the energy confinement time of the ST plasma during the first 7 ms to evaluate its suitability for compression to fusion conditions by an imploding liquid metal flux conserver. Comparing PI3 data to our SPECTOR devices (vessel radius = 0.2 m) will inform the requirements of the next generation injector for GF's Fusion Demonstration Plant. PI3 is upgrading power supply from 3.5 MJ to 7 MJ by Fall of 2020.

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