

Abstract Submitted
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Second Harmonic Electron Cyclotron Pre-Ionization in the DIII-D Tokamak¹ G.L. JACKSON, J.S. DEGRASSIE, J. LOHR, C.P. MOELLER, R. PRATER, General Atomics — Second harmonic pre-ionization, i.e. the production of plasma before the application of a toroidal electric field, E_ϕ , has been successfully demonstrated in the DIII-D tokamak using both the previously installed 60 GHz gyrotrons ($B_\phi \leq 1.05$ T) and the present 110 GHz system ($B_\phi \approx 1.9$ T). Pre-ionization and electron cyclotron (EC) assisted startup may be important in future devices such as ITER (at reduced toroidal magnetic field) and K-STAR where thicker vacuum liners and superconducting coils limit the maximum E_ϕ to values which are marginal for plasma initiation and burnthrough. In the DIII-D experiments the X-mode 2nd harmonic pre-ionization was reproducible, initially occurred at the 2nd harmonic EC resonance, and then filled the vessel volume. We will present the characteristics of these pre-ionized plasmas and parameter scans of EC power, neutral pressure, and toroidal field. The pre-ionization scenario will be discussed including modeling of single electron collisionless heating.

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