

Abstract Submitted
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Studies in DIII-D of High Beta Discharge Scenarios Appropriate for Steady-state Tokamak Operation With Burning Plasmas¹ J.R. FERRON, J.C. DEBOO, T.C. LUCE, T.W. PETRIE, C.C. PETTY, P.A. POLITZER, General Atomics, H. REIMERDES, Columbia U., M. SCHNEIDER, CEA, T.A. CASPER, C.T. HOLCOMB, LLNL, J.M. PARK, M. MURAKAMI, ORNL, Y. OU, E. SCHUSTER, Lehigh U., E.J. DOYLE, UCLA — In the DIII-D steady-state scenario with $q_{min} = 1.5-2.0$, the duration with the noninductive current fraction (f_{NI}) near 1 has been extended to 70% of the resistive time. To extend duration, ECCD is deposited with a broad profile in order to avoid the 2/1 tearing mode, enabling reliable operation at $\beta_N = 3.6-3.7$. These discharges have double-null shape biased in the direction opposite the ∇B drift, in order to simultaneously optimize confinement and divertor pumping, and ECCD power up to 3 MW. An alternate scenario with internal inductance increased to 1.1-1.4 is under study, motivated by the possibility of steady-state operation at $\beta_N = 4-5$ without wall stabilization. Thus far, $\beta_N = 4.6$, just below the calculated $n = 1$ and $n = \infty$ stability limits, has been achieved transiently with $f_{NI} = 0.85$.

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