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High Bootstrap Fraction, High Performance Plasmas on DIII-D¹ M.R. WADE, Oak Ridge National Laboratory, T.C. LUCE, J.R. FERRON, P.A. POLITZER, W.P. WEST, DIII-D RESEARCH STAFF, GA, A.M. GAROFALO, Columbia U., J.A. JAYAKUMAR, LLNL, M. OKABAYASHI, PPPL, J.G. WATKINS, SNL — The major elements in achieving integrated advanced tokamak performance (namely, high β , density control, efficient ECCD) have been demonstrated on DIII-D. High performance plasmas that combine $\beta_N \sim 4$, $H_{89} \sim 3$, and $f_{bs} \sim 60\%$, with $q_{min} > 1.5$ have been sustained for several confinement times on DIII-D. The β limit in these plasmas is significantly above the no-wall, n=1 ideal stability limit with $\beta_N \sim 6 l_i$ as a result of active feedback stabilization of RWMs. Furthermore, both density control and electron cyclotron current drive (ECCD) efficiency required for sustaining these plasmas noninductively have been demonstrated. The integration of these elements still remains a challenge as the duration of the high performance phase at reduced density is limited by the onset of neoclassical tearing modes. Future experiments will focus on improved current profile control to avoid these instabilities.

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