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Improved confinement at high density in MST M.D. WYMAN, B.E. CHAPMAN, S.P. OLIVA, A.F. ALMAGRI, D.J. CLAYTON, D. CRAIG, H.D. CUMMINGS, D.A. ENNIS, G. FIKSEL, S. GANGADHARA, J.A. GOETZ, D.J. DEN HARTOG, R. O'CONNELL, S.C. PRAGER, J.A. REUSCH, B.H. DENG, W.X. DING, T. YATES, D.L. BROWER, S.K. COMBS, C.R. FOUST, UW-Madison — MST plasmas with reduced fluctuations and improved confinement are routinely achieved using auxiliary inductive current drive, but only at relatively low density to avoid the onset of edge-resonant tearing instability. The confinement improvement in these plasmas is due almost entirely to an increase in the electron temperature (T_e), which can triple, while the ion temperature (T_i) changes very little. However, with D_2 pellet injection, the achievable density in these plasmas has been quadrupled without triggering edge instability. At high density, T_i increases with T_e, arriving at about the same peak value (600 – 700 eV) near the end of the current drive. The largest densities, approaching $4\text{x}10^{13}\text{cm}^{-3}$, are achieved at high toroidal plasma current (0.5 MA). This results in a total β up to 15%, compared to <4% in standard plasmas at this current Pellet injection at low current (0.2 MA) drives beta to 26%, the largest value yet attained in MST's improved confinement RFP plasmas. The central pressure gradient exceeds the Suydam interchange limit without any obvious adverse consequences. Work supported by USDOE.

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