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Probing RFP Density Limits and the Interaction of Pellet Fueling and NBI Heating on MST K.J. CASPARY, B.E. CHAPMAN, J.K. ANDERSON, S.T. LIMBACH, S.P. OLIVA, J.S. SARFF, J. WAKSMAN, UW-Madison, S.K. COMBS, C.R. FOUST, ORNL — Pellet fueling on MST has previously achieved Greenwald fractions of up to 1.5 in 200kA improved confinement discharges. Additionally, pellet fueling to densities above the Greenwald limit in 200 kA standard discharges resulted in early termination of the plasma, but pellet size was insufficient to exceed the limit for higher current discharges. To this end, the pellet injector on MST has been upgraded to increase the maximum fueling capability by increasing the size of the pellet guide tubes, which constrain the lateral motion of the pellet in flight, to accommodate pellets of up to 4.0 mm in diameter. These 4.0 mm pellets are capable of triggering density limit terminations for MST's peak current of 600 kA. An unexpected improvement in the pellet speed and mass control was also observed compared to the smaller diameter pellets. Exploring the effect of increased density on NBI particle and heat deposition shows that for MST's 1 MW tangential NBI, core deposition of 25 keV neutrals is optimized for densities of 2 - 3 x 10^{19} m^{-3}. This is key for beta limit studies in pellet fueled discharges with improved confinement where maximum NBI heating is desired. An observed toroidal deflection of pellets injected into NBI heated discharges is consistent with asymmetric ablation due to the fast ion population. In 200 kA improved confinement plasmas with NBI heating, pellet fueling has achieved a Greenwald fraction of 2.0. Work supported by US DoE.

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