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High confinement high temperature plasmas in MST B.E. CHAPMAN, A.F. ALMAGRI, J.K. ANDERSON, K.J. CASPARY, D.J. CLAYTON, D.J. DEN HARTOG, D.A. ENNIS, G. FIKSEL, S. GANGADHARA, J.A. GOETZ, R. O'CONNELL, R.M. MAGEE, S.C. PRAGER, J.A. REUSCH, J.S. SARFF, H.D. STEPHENS, University of Wisconsin-Madison, F. BONOMO, P. FRANZ, RFX, D.L. BROWER, B. DENG, W.X. DING, T. YATES, University of California, Los Angeles, D. CRAIG, Wheaton College — With inductive modification of the current profile and reduction of magnetic fluctuations, the energy confinement time in MST had previously been increased ten-fold, to about 10 ms. However, this result was achieved at relatively low plasma current, 0.2 MA, and relatively low temperature, Te = 0.6 keV and Ti = 0.2 keV. We have now extended improved confinement to the upper range of MST's plasma-current capability, around 0.5 MA. Here, the ohmically heated electrons reach 2 keV, and ions are heated to well above 1 keV by magnetic reconnection occurring prior to improved confinement. The global energy confinement time in these plasmas is about 12 ms, a modest improvement over the confinement at low current. This corresponds to a global thermal diffusivity of about 5 m^2/s. Total beta (volume-averaged pressure/total field pressure at the plasma boundary) is about 10 percent. Supported by USDOE and NSF.

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