Temperature structures in MST helical core plasmas\textsuperscript{1} STEFANO MUNARETTO, MARK D. NORNBERG, BRETT E. CHAPMAN, ELI PARKE, DANIEL J. DEN HARTOG, Department of Physics and Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas, University of Wisconsin-Madison, Madison, WI — The RFP configuration is dominated by several MHD tearing modes with poloidal periodicity $m=1$. These modes are resonant at different radii within the plasma core, giving rise to stochastization of the magnetic field. Increasing the plasma current (and consequently the Lundquist number $S$) tends to channel the perturbation energy to the innermost resonant tearing mode, leaving the other modes with negligible amplitude (QSH state). A further topological transition takes place when the main magnetic axis and island X point vanish leaving the O-point as the new helical magnetic axis (SHAx state). Previous work on RFXmod has shown the formation of a thermal structure that becomes wider during the transition between QSH to SHAx states. In MST we have performed experiments at similar $S$ to RFXmod plasmas. Ion Doppler spectroscopy and Thomson scattering measurements reveal the presence of in-outboard asymmetries in the impurity ion temperature radial profiles and the formation of a hot electron region. The changes in both the temperature radial profiles are associated with the transitions to non-axisymmetric equilibria. Further analysis will be performed to characterize the thermal structures also through charge-exchange spectroscopy measurements of ion temperature.

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