

Abstract Submitted  
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**Improved-confinement plasmas with energetic electrons and increased ion temperature observed in the RFP.**<sup>1</sup> ROB O'CONNELL, University of Wisconsin - Madison, THE MST TEAM — Recent improved-confinement plasmas in the Madison Symmetric Torus (MST) exhibit anomalously large hard x-ray (HXR) production and a two-fold increase in the ion temperature. Current profile modification using edge current drive (PPCD) is a well-established method for the reduction of magnetic fluctuations in the reversed-field-pinch (RFP)<sup>2</sup>. In the MST, as the magnetic fluctuation level drops the electron temperature increases by up to a factor of three and hard x-rays, absent during standard RFP plasmas, are produced, indicating the presence of closed flux surfaces. Recent high current (> 500 kA) PPCD plasmas exhibit a higher than predicted further increase in HXR flux. Thomson scattering measurements of the electron temperature show a large increase, however non-Maxwellian distortion of the measurements is suspected. Measurements of impurity ions also show, for the first time, an increase in the core ion temperature to approximately 800 eV. CQL3D Fokker-Planck modeling suggests knock-on effects may explain the increase in x-rays. The large increase in the ion temperature is presently unexplained, but mechanisms such as wave-particle interaction with energetic electrons are being explored.

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<sup>2</sup>MST (PRL 78 1997 62-65), RFX (PRL 82 1999 1462-1465), TPE-RX (PPCF 44 2002 335-349)

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