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SXR Double-Foil Measurements of Electron Temperature and Impurity Structures on MST[1] M.B. MCGARRY, University of Wisconsin, Madison, P. FRANZ, Consorzio RFX, D.J. DEN HARTOG, J.A. GOETZ, J. JOHNSON, University of Wisconsin, Madison — A new diagnostic has been developed that uses time-resolved soft x-ray (SXR) emission to measure tomographically reconstructed x-ray emissivity and double-foil electron temperature (T_e) either directly from brightness or from emissivity mapped to flux surfaces on the MST reversed field pinch. Full radial profiles of double-foil electron temperature have been compared with Thomson scattering T_e measurements, confirming that electron temperatures typically reach $\sim$ 1.2-1.8keV during high-current improved-confinement discharges. The diagnostic has also identified enhanced SXR emission from island structures whose poloidal locations are consistent with external magnetic measurements in both rotating and locked discharges. Studies of locked SXR emissivity structures sometimes indicate corresponding T_e structures that are correlated to the magnetic island structure and have amplitudes of less than 20% of the core T_e. Additionally, other discharges exhibit a ring of SXR emission resulting from an enhancement in local effective ionic charge, indicating a hollow impurity density profile. This profile results from classical transport of impurity ions out of the core via the ion temperature screening mechanism.

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