Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Robust analysis of space-, time-, and energy-resolved soft x-ray measurements on MST PATRICK VANMETER, University of Wisconsin - Madison, LUIS FELIPE DELGADO-APARICIO, Princeton Plasma Physics Lab, LISA REUSCH, University of Wisconsin - Madison, Edgewood College, DANIEL DEN HARTOG, University of Wisconsin - Madison — A multi-energy soft x-ray diagnostic has recently been installed on the MST reversed-field pinch. Based on a novel calibration of the commercially available 100,000-pixel PILATUS3 100K detector, this diagnostic can simultaneously sample the SXR spectrum with a unique combination of spatial and spectral resolution. This allows for simultaneous 2D imaging of impurity and T_e structures using SXR emission. Such a capability is valuable in MST due to the presence of bright H- and He-like Al ions with excitation lines 2 keV, making straightforward measurements of the bremsstrahlung continuum difficult. Data is presented for two distinct MST plasma scenarios: (1) improved confinement, where T_e can reach up to 2 keV, and (2) quasi-single helicity, a 3D state which occurs when the $n = 5$ tearing mode grows to dominate the magnetic spectrum. Interpretation of the data is aided by a forward model which considers the underlying atomic physics, geometry, and detector response. Using this model, along with complementary data from the existing diode-based tomography diagnostic, a framework is developed for interpreting ME-SXR data in terms of the underlying temperature and density profiles. The time evolution of these profiles is explored in both plasma scenarios. Supported by US DOE.

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Date submitted: 02 Jul 2019 Electronic form version 1.4