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Absolute brightness modeling for improved measurement of electron temperature from soft x-rays on MST[1] L. M. REUSCH, University of Wisconsin - Madison, P. FRANZ, Consorzio RFX, J. A. GOETZ, D. J. DEN HARTOG, M. D. NORNBERG, P. VAN METER, University of Wisconsin - Madison
— The two-color soft x-ray tomography (SXT) diagnostic on MST is now capable of Te measurement down to 500 eV. The previous lower limit was 1 keV, due to the presence of SXR emission lines from Al sputtered from the MST wall. The two-color technique uses two filters of different thickness to form a coarse spectrometer to estimate the slope of the continuum x-ray spectrum, which depends on Te. The 1.6 - 2.0 keV Al emission lines were previously filtered out by using thick Be filters (400m and 800m), thus restricting the range of the SXT diagnostic to Te 1 keV. Absolute brightness modeling explicitly includes several sources of radiation in the analysis model, enabling the use of thinner filters and measurement of much lower Te. Models based on the atomic database and analysis structure (ADAS) agree very well with our experimental SXR measurements. We used ADAS to assess the effect of bremsstrahlung, recombination, dielectronic recombination, and line emission on the inferred Te. This assessment informed the choice of the optimum filter pair to extend the Te range of the SXT diagnostic.

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