Abstract Submitted
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Combining impurity X-ray and impurity density measurements to determine Z_{eff}[1] M.D. NORNBERG, University of Wisconsin-Madison, M.E. GALANTE, Nova Photonics, Inc., L.M. REUSCH, D.J. DEN HARTOG, University of Wisconsin-Madison, P. FRANZ, Consorzio RFX, Padova, Italy, H.D. STEPHENS, Pierce College Fort Steilacoom, Lakewood, WA — Determining the resistive dissipation of hot plasmas requires knowledge of the effective charge Z_{eff}. Typically Z_{eff} is determined from visible bremsstrahlung emission. In limiter plasmas with relatively high core and edge neutral density, the neutrals likely contribute as much emission to the visible spectrum as do the impurities. By using sufficiently thick Be filters, detected soft x-ray emission can be limited to a region of the spectrum dominated by bremsstrahlung and impurity recombination. Modeling this emission requires good constraints on the impurity density profiles and charge state balance. This information can be supplied by charge exchange recombination measurements (CHERS). Combining these two different diagnostic measurements within a Bayesian framework enables the self-consistent determination of $Z_{\text{eff}} = 1.9 \pm 0.1$ in the core of MST RFP plasmas with tearing mode suppression. This integrated data analysis (IDA) has the additional benefit of helping identify systematic uncertainties in the individual measurements and facilitates constraining the densities of other impurities for which there are no CHERS measurements.

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