Abstract Submitted
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Uncertainty analysis of the HIBP equilibrium potential measurements in the MST-RFP[1] X. ZHANG, K.A. CONNOR, D.R. DEMERS, P.M. SCHOCH, Rensselaer Polytechnic Institute, Troy, NY 12180, MST COLLABORATION — Measurements within the Madison Symmetric Torus at r/a ~ 0.35 indicate that the average potential in standard discharges is on the order of 1.55 kV, but there are significant shot to shot variations up to $\pm$ 0.37 kV. To determine the sources of the variation, we consider characteristics of the Heavy Ion Beam Probe, and the interaction of the beam with the plasma and confining magnetic field. The plausible instrumental and plasma affects are investigated in a controlled fashion using simulations; these include beam scrape-off during a sawtooth cycle, non-ideal fields within the energy analyzer, noise on the detectors and loading of power supplies due to plasma and UV radiation, plasma density gradients, and beam attenuation. We present the relative uncertainty of each affect and conclude that the maximum uncertainty due to all examined sources (in the interior of standard discharges) is on the order of $\pm$ 0.14 kV. This is significantly smaller than the scatter of the data, implying other factors such as variations of plasma parameters including mode speed, electron density, and plasma current play a role.

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