

Advances in heavy ion beam probe measurements of fluctuations in improved confinement Madison Symmetric Torus reversed-field pinch plasmas

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A heavy ion beam probe (HIBP) is measuring fluctuations in the Madison Symmetric Torus (MST) reversed-field pinch. The unique strength of the diagnostic is its ability to simultaneously acquire spatially localized measurements of electric potential, and fluctuations in density (\tilde{n}/n) and potential ($\tilde{\phi}$) within the plasma interior. These measurements may shed light on the characteristics and evolution of electrostatic fluctuations and their role in transport. This is of particular interest in MST improved confinement plasmas when magnetic turbulence and transport are suppressed and electrostatic fluctuations may be the dominant transport mechanism. The fluctuation spectra measured out to 500 kHz with the HIBP are broadband with most power below 100 kHz. Features evident in the data are examined along with plasma parameters to help unfold the relationship between fluctuations and improved confinement characteristics. These results, and the HIBP diagnostic advancements making them possible, will be presented. (Work supported by US DoE.)