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Measurement of high-frequency density fluctuations using far-forward collective scattering and interferometric techniques in improved-confinement RFP plasmas JAMES DUFF, BRETT CHAPMAN, JOHN SARFF, UW-Madison, WEIXING DING, DAVID BROWER, LIANG LIN, UCLA — In standard RFP plasmas, transport is governed by magnetic fluctuations associated with global tearing modes. For improved-confinement plasmas using inductive current profile control (PPCD), smaller-scale fluctuations at higher frequencies might become important for transport, especially drift-wave-like instabilities which may be theoretically unstable for the larger temperature gradients achieved. On the MST-RFP, an 11-chord laser-based diagnostic with ∼8 cm chord spacing is and frequency 694 GHz used to measure electron density fluctuations both interferometrically and by far-forward collective scattering. The existing diagnostic configuration measures the line-integrated fluctuations within the divergence of the probe beam covering a wavenumber range $k_\perp$ <1.3 cm^{-1}, corresponding to $k_\perp \rho_s$ <1.3 (ρ_s is the ion-sound Larmor radius). Of particular interest is comparing fluctuations in standard and PPCD plasmas. Relative to standard plasmas, tearing mode and higher frequency broadband fluctuations (up to 600 kHz) are suppressed with PPCD. This suppression in PPCD plasmas corresponds to the improved confinement. A diagnostic upgrade, in progress, will improve sensitivity and cover shorter wavelengths. Work supported by U.S.D.O.E.

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