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6.31 Millimeter-Wave Far-Forward Scattering for Density Fluctuation Measurements on LTX-

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The λ≈1 mm (f=288 GHz) interferometer for the Lithium Tokamak Experiment β (LTX-β) device will use a centerstack-mounted retro-reflector mirror to provide line density measurements along a single radial chord at the midplane. Previously this diagnostic has been used for routine line density measurements in LTX. The current work investigates the capabilities of the system as a simultaneous far-forward scattering diagnostic, which can provide line-integrated measurement of density fluctuations within the divergence of the probe beam for perpendicular wavenumbers k⊥⊠2 cm^-1. The far-forward scattering diagnostic is expected to provide enhanced sensitivity for high frequency coherent density oscillations (e.g. Alfvénic modes due to NBI on LTX-β) as well as for broadband turbulence. Comprehensive simulations of the scattered beam using beam tracing and full-wave codes will be used to develop quantitative estimates for the scattered signal using target fluctuations. These calculations will also consider the 3-D scattering geometry due to the magnetic configuration of the spherical tokamak and the radial view of the diagnostic. Analysis of data from previous measurements on LTX will also be presented. Supported by U.S. DoE Contracts DE-FG02-99ER54527 and DE-AC02-09CH11466.

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