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First Doppler backscattering measurements in MAST[1] J.C. HILLESHEIM, EURATOM/CCFE Fusion Association, W.A. PEEBLES, UCLA, H. MEYER, EURATOM/CCFE Fusion Association, N.A. CROCKER, UCLA —
We present the first Doppler backscattering (DBS) measurements in the core of a spherical tokamak. Doppler backscattering (DBS) has become a well-established and versatile diagnostic technique for the measurement of intermediate-k ($k_\theta \rho_s \sim 1$, and higher) density fluctuations and flows in magnetically confined fusion experiments. The 180° backscattering for DBS requires three dimensional wave-vector matching between the launched beam and the plasma fluctuations inducing the scattering, which are expected to be highly elongated along the magnetic field. The 3D alignment can be quantified in terms of a mismatch angle, $\hat{\mathbf{k}} \cdot \hat{\mathbf{B}} = \cos(\pi/2 - \theta_{mis})$, where $\theta_{mis} = 0$ for accurately aligned 180° backscattering. We report on ray tracing calculations to minimize θ_{mis} via a steerable mirror, description of the implementation, and present a survey of initial experimental data.

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