Wavenumber spectra of turbulent density fluctuations in a *Bouncing Ball* DIII-D plasma

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We used the Doppler backscattering (DBS) diagnostic to measure wavenumber spectra of turbulent density fluctuations, $\delta n_e^2(k_\perp)$, in DIII-D. To measure different turbulent wavevectors, $k_\perp$, the plasma was moved up and down while the DBS system remained fixed. This is in contrast with the typical approach of using DBS to measure wavenumber spectra, which relies on steering the DBS poloidal launch angle from shot to shot. Since the DBS system used in this study has eight channels, our *Bouncing Ball* approach enabled the k-spectrum to be measured at multiple radial locations in the core (normalised radial coordinate ρ between 0.3 and 0.7) with just a single shot. The measured density fluctuations spanned a large wavenumber range: 2.0 $cm^{-1} < k_\perp <$ 12.0 cm^{-1}, or $0.9 < k_\perp \rho_s < 5.5$. Having determined the backscattered power as a function of wavenumber, we leveraged the Scotty synthetic diagnostic to calculate the turbulent density fluctuation spectrum, finding both the dominant transport scale and the exponent of the turbulence cascade.

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