

Progress towards measurement of ETG turbulence on NSTX

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Installation of the high-k scattering system on NSTX is nearly complete. The system will measure density fluctuations on scales relevant to electron temperature gradient (ETG) turbulence. System components include a backward wave oscillator source providing ~150 mW at 280 GHz and a superheterodyne receiver with five simultaneous detection channels and noise temperatures of ~5000 K. The system is configured for tangential scattering with the probe beam and five scattered beams lying nearly on the toroidal midplane. The scattered beams will sample radial density fluctuations with wavenumbers $k_r \leq 20 \text{ cm}^{-1}$. The 6 cm diameter probe beam provides good k-space resolution at $\Delta k_r \approx 0.7 \text{ cm}^{-1}$. A novel spatial localization technique befitting the spherical torus geometry improves the localization at small scattering angles. Steerable launch and detection optics can position the scattering volume either near the magnetic axis at $\rho \approx 0.1$ or near the edge at $\rho \approx 0.8$. The system will measure fluctuations with $k_r \rho_e \leq 0.6$ and $\delta n/n \geq 10^{-5}$ to investigate the existence of ETG turbulence. ETG turbulence may drive significant electron thermal transport in NSTX.