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Overview of High-k Scattering Diagnostics on NSTX and NSTX-U[1] Y. REN, PPPL, E. MAZZUCATO, Retired, D.R. SMITH, UW-Madison, R. BARCHFELD, C.W. DOMIER, E.R. SCOTT, N.C. LUHMANN JR., UC-Davis, R. KAITA, R. ELLIS, PPPL, K.C. LEE, NFRI (Korea) — Electron-gyro scale turbulence, e.g. driven by the Electron Temperature Gradient (ETG), has been proposed as a potential candidate for driving anomalous electron thermal transport, a major problem for magnetic confinement fusion. NSTX and NSTX-U provide a unique laboratory for studying electron-scale turbulence and its relation to electron thermal transport due to their low toroidal field, high plasma beta, low aspect ratio and large ExB flow shear. Electron-gyro scale turbulence has been successfully measured in NSTX using a unique high-k_r microwave scattering system, providing the first direct evidence of ETG turbulence in STs and detailed studies of parametric dependence of electron-scale turbulence. However, the high-k_r microwave scattering system could not capture the predicted ETG spectral peak. Thus a new high-k_θ FIR scattering system is being implemented for NSTX-U. We will present an overview of the scattering systems on NSTX and NSTX-U, including physics designs, capabilities and recent physics results. We will also discuss methods to achieve radially localized scattering measurements.

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