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NSTX High-k Scattering System on NSTX: Status and Plan[1]
H.K. PARK, E. MAZZUCATO, D. SMITH, S. KAYE, Princeton University, C.W. DOMIER, N.C. LUHMANN, JR., UC at Davis, W. LEE, POSTECH — A multi-channel collective scattering system was commissioned on NSTX to investigate anomalous electron transport physics related to the electron density turbulence. NSTX plasma parameters with a large gyro-radius (ρ_i $\sim$1 cm) facilitate the investigation of the turbulence related physics in the high-k regime ($k_r\rho_s$ >3) which is not readily accessible in other toroidal devices. The system employs a moderate power ($\sim$100 mW) source at $\sim$ 1 mm wavelength as the probe beam and has an excellent spatial and wavenumber resolution. The system consists of 5 discrete channels which primarily measure five radial wavenumbers up to k_r $\sim$ 20 cm^{-1} which corresponds to $k_r\rho_e$ $\sim$0.2 and $\sim$0.7 for the NSTX edge and core parameters, respectively. Initial results from various operating regimes [edge and core of the quiescent OH, L/H modes of the RF and NBI heated plasmas] will be addressed in this paper. The observed high signal to noise ratio at the highest wave-number provides confidence in the future upgrade plan for even higher wavenumbers up to $\sim$50 cm^{-1} ($k_r\rho_e$ $\sim$2) employing a shorter probe beam wavelength in which the net S/N is comparable (optimum beam power and available detector sensitivity) to the present $\sim$1mm system. Upgrade plans for the tangential and poloidal high-k configuration that can share the same probe beam will be discussed.

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