

Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

High-k Scattering Receiver Mixer Performance for NSTX-U¹ ROBERT BARCHFELD, PAUL RIEMENSCHNEIDER, CALVIN DOMIER, NEVILLE LUHMANN, UC Davis, YANG REN, ROBERT KAITA, Princeton Plasma Physics Laboratory — The High-k Scattering system detects primarily electron-scale turbulence $k\theta$ spectra for studying electron thermal transport in NSTX-U. A 100 mW, 693 GHz probe beam passes through plasma, and scattered power is detected by a 4-pixel quasi optical, mixer array. Remotely controlled receiving optics allows the scattering volume to be located from core to edge with a $k\theta$ span of 7 to 40 cm⁻¹. The receiver array features 4 RF diagonal input horns, where the electric field polarization is aligned along the diagonal of a square cross section horn, at 30 mm channel spacing. The local oscillator is provided by a 14.4 GHz source followed by a x48 multiplier chain, giving an intermediate frequency of ~1 GHz. The receiver optics receive 4 discrete scattering angles simultaneously, and then focus the signals as 4 parallel signals to their respective horns. A combination of a steerable probe beam, and translating receiver, allows for upward or downward scattering which together can provide information about 2D turbulence wavenumber spectrum. IF signals are digitized and stored for later computer analysis. The performance of the receiver mixers is discussed, along with optical design features to enhance the tuning and performance of the mixers.

¹Work supported in part by U.S. DOE Grant DE-FG02-99ER54518 and DE-AC02-09CH1146

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Date submitted: 14 Jul 2016

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