Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Turbulence Measurements by Interferometry and Far-forward Scattering on the HSX Stellarator[1] C.B. DENG, D.L. BROWER, University of California, Los Angeles, D.T. ANDERSON, F.S.B. ANDERSON, K.M. LIKIN, J.N. TALMADGE, University of Wisconsin-Madison — After neo-classical transport was reduced by restoring symmetry along the helical axis, a primary physics goal for HSX is to study how 3-D shaping can reduce turbulence thereby requiring measurement of turbulence with $k_y\rho_s$up to 1. For characteristic HSX parameters (Te ˜200 eV at r/a ˜0.5 where the density gradient peaks), this condition corresponds to $k_y$up to 7 cm^{-1}. To accommodate this goal, a new 9-chord HSX interferometer/far-forward scattering system has been designed to measure density turbulence at higher k. The new system employing two high-power (30 mW each, 320 GHz), solid-state sources with frequency offset up to 6 MHz. This will permit true heterodyne detection, thereby realizing faster measurement time response, increased bandwidth and reduced noise. High power sources and high sensitivity planar-diode mixers will allow us to reduce the aperture of the receiver optics to a few mm thereby increasing the maximum wavenumber to k˜15 cm^{-1}. Reconfiguring the interferometer system into a finite-angle collective scattering arrangement is also planned as it will increase the measured k-spectrum up to 18 cm^{-1} with some spatial resolution (core or edge).

[1]Supported by USDOE grants DE-FG03-01ER54615 and DE-FG02-93ER54222

Chuanbao Deng
Univ of California - Los Angeles

Date submitted: 14 Jul 2017 Electronic form version 1.4