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4.7 Electron temperature turbulence measurements on the high magnetic field side of the DIII-D tokamak

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Turbulence measurements in tokamaks have for the most part concentrated on the low field side (LFS) of the magnetic axis due to accessibility of measurements and conventional belief that high field side (HFS) turbulence is negligible compared to the LFS. This has led to HFS turbulence not been considered for turbulence model validation studies although it can be a stringent constraint. To address this issue, we have modified the UCLA eight-channel Correlation Electron Cyclotron Emission (CECE) system at DIII-D to locally probe both the LFS and HFS. CECE uses a cross-correlation technique to remove intrinsic thermal noise and reveal electron temperature turbulence. Typically, 2nd harmonic X-mode electron cyclotron resonance has been utilized on DIII-D when probing the LFS. In order to study turbulence on the HFS, fundamental O-mode emission is employed. The optical system was modified to minimize differences in spot sizes on LFS and HFS (e.g., wavenumber range). Laboratory tests have shown that the optical systems for HFS and LFS are comparable. Details on hardware modifications together with investigation of potential measurement issues will be described. Preliminary plasma data will also be presented. Supported by the U.S. DOE under DE-FG02-08ER54984 and DE-FC02-04ER54698.

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