Abstract Submitted
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Upgrade of radial interferometer-polarimeter for internal magnetic fluctuation measurements on DIII-D[1] RYOTA YONEDA, JIE CHEN, DAVID BROWER, WEIXING DING, University of California, Los Angeles, DANIEL FINKENTHAL, Palomar Scientific Instruments — The Faraday-effect radial interferometer-polarimeter diagnostic on DIII-D tokamak, using two probe waves at 650 GHz with right- and left-handed circular polarizations, has been upgraded for high resolution internal magnetic and density fluctuation measurements. A novel correlation polarimetry technique, which measures Faraday rotation using two sets of independent mixers viewing an identical line-of-sight, has been developed for detection of small amplitude internal magnetic fluctuations. Using this approach, the polarimeter phase noise floor has been reduced from $\sim$1 to below 0.1 Gauss*m/sqrt(kHz) under medium plasma density condition ($5\times10^{19}\mathrm{m}^{-3}$). A third 650 GHz solid-state microwave source has also been added, enabling simultaneous measurement of internal line-integrated Faraday and density fluctuation along three horizontal chords at Z=0 and $\pm$13.5 cm. New optical design, with small incident angle on mesh beam splitters is adopted, allowing smaller distortion of probe beam polarization. Digital phase demodulator has been upgraded to process the data from three-waves and correlation measurement in real-time. Results from bench test and plasma experiments will be presented.

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