Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

First results of Faraday-effect polarimeter measurements of internal magnetic fluctuation in DIII-D[1] J. CHEN, W.X. DING, D.L. BROWER, UCLA-Dept of Physics and Astronomy — Motivated by the need to measure fast equilibrium temporal dynamics, non-axisymmetric structures and core magnetic fluctuations (coherent and broadband), a 694 GHz Faraday-effect polarimeter has recently been installed on the DIII-D tokamak. A novel detection scheme is utilized, which results in simultaneous integral density measurement, to isolate the magnetic component, along with fast time response (up to 3MHz) and high phase resolution (1×10^{-4} degree^2/kHz, equivalent to <1 Gauss at medium to high electron density conditions). Spatial resolution is provided by three radial chords located at $z = 0$ cm and $z = \pm 13.5$ cm ($z = 0$ cm is machine center). Simultaneous Faraday rotation and integral density measurements have been demonstrated in the experimental campaign of 2016, with good agreement with MSE-constrained EFIT. The change of Faraday rotation during sawteeth indicates periodic evolution of current density in the core plasma. Coherent and broadband fluctuations associated with plasma instabilities and turbulence, up to 500 kHz, have been observed on both Faraday rotation and integral density data.

[1]Supported by USDOE grant DE-FC02-04ER54698 and DE-FG03-01ER54615.

J. Chen
UCLA-Dept of Physics and Astronomy

Date submitted: 13 Jul 2016 Electronic form version 1.4