

## HTPD 2018



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### 10.40 Development of a three-wave far-infrared laser interferometry and polarimetry diagnostics for the C-2W FRC experiment

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C-2W field-reversed configuration (FRC) experiments [1] are focused to resolve major physics issues facing the future of FRC devices. To achieve these goals, it is essential to measure the plasma equilibrium dynamics and monitor plasma fluctuations. One of the critical diagnostics under development is a 14-chord three-wave far infrared (FIR) laser interferometry and polarimetry system, which can provide simultaneous high temporal resolution measurements of density and Faraday rotation profiles with high accuracy. The unique challenges facing FIR diagnostics in high beta FRC plasmas are the extremely small (< 0.5 degrees) Faraday rotation angles, severe laser beam refraction effects due to high density gradients and choice of long wavelength [2], and extremely high electromagnetic noise produced by the plasma forming pulsed power circuits. The electro-opto-mechanical design and development of the system will be described with methods to overcome the challenges. Initial experimental data will be presented. [1] M.W. Binderbauer et al., AIP Conf. Proc. 1721, 030003 (2016). [2] B.H. Deng et al., Rev. Sci. Instrum. 87, 11E125 (2016).

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