

Abstract Submitted
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Prototype testing of the ITER Toroidal Interferometer and Polarimeter (TIP) on DIII-D¹ T.N. CARLSTROM, M.A. VAN ZEELAND, A. GATTUSO, R. O'NEILL, J. VASQUEZ, GA, D.K. FINKENTHAL, R.A. COLIO, PSI, D. JOHNSON, PPPL, D. BROWER, J. CHEN, W_lX_l DING, UCLA — A 10.6 micron CO₂ laser based ITER TIP system has been designed and tested for density measurements on DIII-D. Features include vibration compensation using a 5.22 micron Quantum Cascade Laser, real-time measurements at 1 kHz with <1% error at expected ITER operating densities, 500 kHz bandwidth density fluctuation measurements, active feedback alignment with auto signal recovery capabilities, fringe skip correction using polarimetry measurements, and a novel three-frequency heterodyne technique with real-time digital phase demodulation. A 120 m path length laboratory prototype was used to test components, demonstrate active feedback alignment capabilities, and determine noise floor capabilities. Phase errors of 1.5 degrees for the interferometer and 0.06 degrees for the polarimeter have been demonstrated for 1000 seconds. The system is now installed on the DIII-D tokamak, using a geometry and path length similar to that planned for ITER and has successfully demonstrated the ITER requirements for accuracy and time resolution.

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