

Abstract Submitted  
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**Multichannel Density Measurements with a Millimeter Wave Interferometer on CTH**<sup>1</sup> M.C. ARCHMILLER, G.J. HARTWELL, S.F. KNOWLTON, D.A. MAURER, Auburn University — A three-channel 1 mm wave interferometer has been installed on the Compact Toroidal Hybrid torsatron (CTH). The interferometer design makes novel use of a subharmonic mixer for detection, which simplifies alignment. It employs a single electronically tunable source that is repetitively chirped using a sawtooth waveform of frequency up to 1 MHz. The 15.25 GHz drive oscillator is multiplied in two stages to 122 GHz before a final doubler stage brings it to 244 GHz. Local oscillator (LO) power at 122 GHz is directed through waveguide to the LO input of the subharmonic mixer of each viewing chord, simplifying alignment. Phase detection is performed by directly digitizing the amplified mixer outputs at 50 MHz and processing them with a software algorithm. Measurements made with the central chord of the new interferometer agree with those from the existing 4 mm system at low densities. The 1 mm system performs well in current-driven discharges reaching densities over  $10^{19} \text{ m}^{-3}$ , whereas the lower frequency interferometer is found to be less reliable due to loss of fringes. This is a critical improvement for experiments studying disruptions in the CTH device. Results from the fully implemented three-channel interferometer will be presented and discussed.

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