

Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Development of a Millimeter Wave Polarimeter-Interferometer Diagnostic for the Compact Toroidal Hybrid¹ D.A. ENNIS, M.C. ARCHMILLER, M.R. CIANCIOSA, J.D. HANSON, G.J. HARTWELL, S.F. KNOWLTON, D.A. MAURER, Auburn University — A new millimeter wave polarimeter-interferometer system is being designed to provide direct measurements of the internal magnetic field structure and electron density in the Compact Toroidal Hybrid (CTH). Results from this diagnostic will aid in characterizing the stability of CTH plasmas confined by both externally generated magnetic fields and internal plasma currents. The polarimeter-interferometer measurements will be incorporated directly into a 3D equilibrium reconstruction model (V3FIT) to more accurately map the non-axisymmetric CTH geometry. The diagnostic will be comprised of three microwave beams—two circularly polarized probing beams and one local oscillator beam—to avoid the use of mechanical components or dependence on amplitude modulations of the sources [1]. Microwave sources in the range of 250 to 300 GHz have been identified to minimize refractive losses while maintaining an acceptable signal to noise ratio in CTH plasmas. A total of five double-pass chords will allow for inversions using V3FIT to provide core rotational transform, and density profiles. Further details of the diagnostic design will be presented.

[1] D. L. Brower et al., *Rev. Sci. Instrum.*, **74**, 1534 (2003).

¹This work is supported by the USDoE under grant DE-FG02-00ER54610.

D.A. Ennis
Auburn University

Date submitted: 11 Jul 2013

Electronic form version 1.4