

Abstract Submitted
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Development of a Coherence Imaging Diagnostic for the Compact Toroidal Hybrid¹ D.A. ENNIS, M.C. ARCHMILLER, M.R. CIANCIOSA, J.D. HANSON, G.J. HARTWELL, D.A. MAURER, Auburn University — A new optical coherence imaging diagnostic is planned for time-resolved measurements of ion emissivity, velocity, and temperature in the Compact Toroidal Hybrid (CTH). The coherence imaging technique² measures the spectral coherence of a visible emission line with an imaging interferometer of fixed delay. Coherence imaging has a number of potential advantages when compared to dispersive Doppler spectroscopy, including higher throughput and the capacity to provide 2D spectral images, making it advantageous for investigating the non-axisymmetric geometry of CTH plasmas. The coherence imaging technique can also be extended to yield the orientation and magnitude of the magnetic field by measuring the polarized spectral components due to Zeeman splitting. A spectral survey of the visible emission for a range of CTH discharges is being conducted to identify possible spectral lines that will motivate forward modeling of the plasma emissivity using the V3FIT equilibrium reconstruction code. Initial results from this diagnostic will aid in characterizing the equilibrium ion parameters in both the edge and the core of CTH plasmas for planned island divertor and MHD mode-locking experiments.

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²J. Howard *et al.*, Plasma Phys. Control. Fusion, **45**, 1143 (2003).

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