

Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Combining Soft X-Ray, Magnetic, and Interferometric Diagnostics for Equilibrium Reconstruction on the Compact Toroidal Hybrid Experiment¹ G.J. HARTWELL, J.D. HANSON, M. CIANCIOSA, J.L. HERFINDAL, S.F. KNOWLTON, M.C. MILLER, D.A. MAURER, P. TRAVERSO, M. PANDYA, X. MA, Auburn University — Reconstruction of the 3-dimensional equilibrium is important for both improving the operation and understanding the physics of non-axisymmetric stellarator type devices. Equilibrium reconstructions using the V3FIT[1] code will be presented for current carrying plasmas on the Compact Toroidal Hybrid (CTH) torsatron experiment ($R_o = 0.75$ m, $a_p \sim 0.2$ m, $B \leq 0.7$ T, $n_e \leq 5 \times 10^{19}$ m⁻³, $T_e \leq 300$ eV, $I_p \leq 75$ kA). The reconstruction input data set includes Soft X-Ray (SXR) chord signals, magnetic diagnostics, data from a 1mm microwave interferometer, and shunt signals. The SXR data set includes signals from four cameras, each consisting of a 20-channel AXUV-20EL photo-diode array viewing the CTH plasma through 2 μ m Be foil. Two full rogowski coils measure the plasma and vacuum vessel current, while additional eight-segment rogowski coils measure moments of the plasma position. Interferometer measurements along three chords help to constrain the density profile, while the shunt signals provide external coil current inputs. Reconstructions are explored using different SXR emissivity, density and current profile models, with different combinations of input data.

[1] J.D. Hanson, S.P. Hirshman, S.F. Knowlton, L.L. Lao, E.A. Lazarus, J.M. Shields, Nucl. Fusion, **49** (2009) 075031

¹Work supported by US. Department of Energy Grant No. DE-FG02-00ER54610.

Greg Hartwell
Auburn University

Date submitted: 13 Jul 2012

Electronic form version 1.4