Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Current-driven discharges in the Compact Toroidal Hybrid[1]
STEPHEN KNOWLTON, GREGORY HARTWELL, JAMES HANSON, XINXING MA, ADAM STEVENSON, Auburn University — Control of disruptions remains a critical issue in toroidal confinement, particularly at the scale of ITER. Along with the other benefits of 3D shaping fields, the addition of moderate stellarator (vacuum) transform to the tokamak configuration may allow disruptions to be passively avoided[1]. The effects of the quench may also be reduced by the maintenance of a vacuum equilibrium throughout the disruption. Disruptions of current-driven stellarator plasmas are studied in the Compact Toridal Hybrid (CTH) device ($R_0 = 0.75$ m, a ~ 0.2 m, $B_0 \leq 0.7$ T, $\bar{n}_e = 0.2$ – 1.5 x 10^{19} m^{-3}), an ECR-heated heliotron with plasma currents $I_p \leq 45$ kA. In the range of vacuum transform $\iota_{VAC}(a) = 0.05$ – 0.1, disruptions leading to a complete loss of plasma can be induced by raising the density above $\bar{n}_e \geq 0.9$ x 10^{19} m^{-3}, comparable to the Greenwald limit for CTH. At higher vacuum transforms, disruptive signatures are not observed despite the radiative decline of the plasma as the density is increased.

[1]. A.H. Boozer, Phys. Plasmas, **16** (2009) 0058102

[1]Work supported by USDOE Grant DE-FG02-00ER54610.

Stephen Knowlton
Auburn University

Date submitted: 26 Jul 2010 Electronic form version 1.4