Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Electron-Beam Heating Experiments on the C-2 Field-Reversed Configuration Device MATTHEW THOMPSON, EUSEBIO GARATE, IAN ALLFREY, DANIEL BOYLE, RYAN CLARY, JON DOUGLASS, ANDREW LONGMAN, VIJAY PATEL, ERIK TRASK, TRAVIS VALENTINE, Tri Alpha Energy, Inc., THE TAE TEAM — The C-2 experiment [1] seeks to study the evolution, heating and sustainment effects of neutral beam injection on field-reversed configuration (FRC) plasmas. Electron-beam heating can potentially provide both general auxiliary heating and strong, short heat pulses for studying thermal transport. Electron-beam heating has a long history on mirror machines [2] where the mechanism of plasma electron heating by beam-driven plasma waves is well understood. The open-field-line plasma surrounding the FRC can be heated the same way. Electron-beam injection into FRC plasmas also raises the novel possibility of trapping the high energy beam particles in the cusp-like fields at the ends of the FRC and, at sufficiently high beam energy, penetrating into the closed-field-line region of the plasma. We have conducted the first experiments with electron-beam heating in an FRC configuration using a short pulse (~ 6 μs), high power (≤ 500 MW), 30 kV peak energy electron beam injected along field lines from the divertor. Early results show evidence of beam particle trapping as well as the generation of strong heat pulses in the open-field-line plasma surrounding the FRC.

[1] M. Tuszewski et al., Phys. Rev. Lett. 108, 255008 (2012)
[2] M. Seidl, LLNL Report, UCRL-52759 (1979)

Matthew Thompson
Tri Alpha Energy, Inc.

Date submitted: 11 Jul 2013 Electronic form version 1.4