Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

First Fast-Ion D-alpha (FIDA) Measurements and Simulations on C-2U NATHAN BOLTE, DEEPAK GUPTA, Tri Alpha Energy, Inc., LUKE STAGNER, University of California, Irvine, MARCO ONOFRI, SEAN DETTRICK, ERIK GRANSTEDT, Tri Alpha Energy, Inc., TAE TEAM[1] — In Tri Alpha Energy's C-2U experiment, advanced beam-driven field-reversed configuration (FRC) plasmas were sustained via tangential neutral beam injection[1]. The dominant fast ion population made a dramatic impact on the overall plasma performance. A fast-ion D-alpha (FIDA)[2] diagnostic, which is based on the Doppler-shifted Balmer-alpha light from neutralized fast ions, was recently added to the C-2U fast-ion diagnostics suite. The first ever FIDA measurements on an FRC topology have been carried out. Bandpass-filtered FIDA measurements (>6 keV ions) were made with a photomultiplier tube and are forward modeled by FIDASIM. Line-integrated signals were taken at eight radial locations and eight times during the FRC lifetime. While the measurements share some salient features with the simulation, they are 4.5x larger, suggesting a higher fast-ion content than the Monte Carlo distribution. Highly Doppler-shifted beam radiation is also measured with a high-speed camera and is spatially well-correlated with FIDASIM. Having shown the feasibility of FIDA on C-2U, we will further explore the use of FIDA on the upgraded C-2W machine to estimate fast-ion densities and to infer the local fast-ion distribution function. [1]M. Binderbauer *et al*, Phys. of Plasmas **22**, 056110 (2015) [2]W.W. Heidbrink., Rev. Sci. Instr. **81,** 10D727 (2010)

[1]Tri Alpha Energy, Inc.

Nathan Bolte
Tri Alpha Energy, Inc.

Date submitted: 08 Aug 2016 Electronic form version 1.4