

C-2U Field Reversed Configuration Experiment at Tri Alpha Energy, Inc.

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Tri Alpha Energy, Inc. is a privately funded company pursuing research of Field Reversed Configuration (FRC) plasmas for fusion reactor applications. Over the past decade, TAE has brought together world-class technical specialists in such fields as FRC plasma science, magnets, neutral beams, pulsed power, diagnostics, controls, electronics and fabrication. This group of over 150 full-time scientists, engineers and technologists is working at TAE's state-of-the-art plasma research facility in Orange County, California.

The core of the facility is the world's largest FRC device named C-2U. In the C-2U experiment [1], tangential neutral beam injection (15 keV hydrogen, 10+ MW total neutral power), coupled with electrically-biased plasma guns at the plasma ends, magnetic end plugs, and advanced surface conditioning, led to dramatic reductions in turbulence-driven losses and greatly improved plasma stability [2, 3]. Under such conditions, high-performance, advanced beam-driven FRCs were produced and sustained for times significantly longer (5+ ms) than all characteristic plasma decay times without the beams. The FRC sustainment is correlated with neutral beam injection, and confinement of fast ions is close to the classical limit. Collectively, these accomplishments represent a dramatic advance towards the scientific validation of the FRC-based approach to fusion. This presentation will provide an overview of the C-2U device and recent experimental advances.

- [1] M. W. Binderbauer *et al.*, Phys. Plasmas 22, 056110 (2015).
- [2] M. Tuszewski *et al.*, Phys. Rev. Lett. 108, 255008 (2012).
- [3] H. Y. Guo *et al.*, Nature Comm. 6, 6897 (2015).