Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Beam-Driven Ion-Cyclotron Modes in FRC BRADLEY NICKS, ALES NECAS, TOSHIKI TAJIMA, RICHARD MAGEE, THOMAS ROCHE, AND THE TAE TEAM, TAE Technologies, Inc., 19631 Pauling, Foothill Ranch, CA 92610
— The population of high-energy ions created by neutral beam injection in a high-beta field-reversed configuration (FRC) plasma drives a class of ion-cyclotron modes that gives rise to coherent, large-amplitude ion waves at ion-cyclotron harmonics. These waves exhibit the physics of wakefields saturated at the Tajima-Dawson field while generating energetic tails of fast ions observed in C-2U experiments [1] and sufficient to yield fusion enhancement in future devices. The underlying mechanism behind this effect is the fast phase velocity of the wave relative to the ion thermal velocity, which prevents bulk disruptions of the plasma such as turbulence or anomalous transport despite a robust field amplitude. Using particle-in-cell (PIC) simulations, the nonlinear physics of this mode is explored, particularly with regard to the generation of fast ions, and a scheme of targeted excitation of this mode is considered. [1] R. M. Magee, A. Necas, R. Clary, S. Korepanov, S. Nicks, T. Roche, M. C. Thompson, M. W. Binderbauer, T. Tajima, Nature Physics **15**, 281-286 (2019)

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Date submitted: 01 Jul 2019 Electronic form version 1.4