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Overview of the Tri Alpha Energy Plasma Diagnostics Program

MATTHEW THOMPSON, HIROSHI GOTA, SERGEI PUTVINSKI, MICHEL TUSZEWSKI, MICHL BINDERBAUER, Tri Alpha Energy, Inc., THE TAE TEAM — Tri Alpha Energy (TAE) seeks to study the evolution of advanced beam-driven field-reversed configuration (FRC) plasmas sustained and heated by neutral beam (NB) injection [1,2]. Heating of FRCs is the focus of the upcoming C-2W program. Data on the FRC plasma performance is provided by a comprehensive suite of diagnostics including magnetic sensors, interferometry, Thomson scattering, spectroscopy, bolometry, reflectometry, and NB-related fast-ion/neutral diagnostics. While many of these diagnostic systems were first implemented for the earlier C-2 [3] and C-2U experiments, virtually all of them benefit from continuous improvement and upgrades. TAE maintains a large plasma diagnostics development program working on a variety of new systems for future devices including: far-infrared polarimetry, visible and infrared fast imaging cameras, proton detector arrays, end loss analyzers, impurity and majority ion CHERS, and 100-channel bolometer units with proprietary compact local data acquisition. In addition, extensive ongoing work focuses on developing advanced methods of measuring the internal magnetic fields of the FRC plasma. [1] M. W. Binderbauer et al., AIP Conference Proceedings **1721**, 030003 (2016). [2] M. W. Binderbauer et al., Phys. Plasmas **22**, 056110 (2015). [3] H. Gota et al., Rev. Sci. Instrum. **85**, 11D836 (2014).

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