

Spectroscopic Investigations of Heating and Fuelling Systems on C-2W - Advanced Beam-Driven FRC

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Abstract

Abstract: The C-2W experiment is the world's premier beam-driven Field-Reversed Configuration (FRC) device that produces high temperature, stable, long-lived plasmas by means of neutral beam injection (NBI) and edge biasing/control [1]. In addition to about 10 MW of NBI heating, several fuelling methods are implemented to satisfy the refuelling requirements, including Compact Toroid (CT) injection, Pellet injection, Plasma Gun (PG) and Gas puff. Each of these complex systems were studied and characterized prior to usage on C-2W. Various spectroscopic techniques were employed to investigate parameters of each individual system. Stark broadening of deuterium Balmer series and Doppler broadening of carbon ion impurity spectral line were used to measure CT electron density and temperature, respectively. Intensity ratio of deuterium Balmer series were exploited for determination of PG electron density. To study NB energy components and divergence a Doppler shift spectroscopy were utilized. Spectroscopic methods that were used to examine NB's, CT injectors and PG's together with obtained experimental results are presented.

Bibliography

- [1] M. W. Binderbauer et al., AIP Conf. Proc. 1721, 030003 (2016).