Abstract Submitted for the DPP15 Meeting of The American Physical Society

Electron Beam-Blip Spectroscopic Diagnostics of the Scrape-off-Layer Parallel Transport in C-2 DMITRY OSIN, MATTHEW THOMPSON, EUSEBIO GARATE, Tri Alpha Energy Inc., TAE TEAM — C-2 is a microscopically stable, high-performance field-reversed configuration (FRC), where high plasma temperatures with significant fast ion population and record lifetimes were achieved by a combination of tangential neutral beam injection, electrically biased plasma guns at the ends and wall conditioning [1]. FRC confinement depends on the properties of both the open and closed field lines, therefore, understanding the electron transport in the scrape-of-layer (SOL) is critical. To study parallel heat conduction in SOL, a high-energy pulsed electron beam (e-beam) was injected on-axis into C-2 to produce a heat pulse, which causes a fast rise and slower decay of the electron temperature, T_{e} , in the SOL. The heat-blip was observed by means of He-jet spectroscopy. A small fraction of the total deposited e-beam energy is necessary to explain the measured T_e increase. The electron thermal conductivity along the magnetic field lines can be inferred from the T_e decay. Experiments suggest that a high energy e-beam pulse can serve as a direct diagnostic of heat transport in the SOL.

[1] M.W. Binderbauer et al., Phys. Plasmas 22, 056110 (2015).

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Date submitted: 24 Jul 2015

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