

Abstract Submitted  
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**Spectroscopic Measurements of Ion Temperature and Plasma Rotation in C-2 FRC plasmas** DMITRY OSIN, DEEPAK GUPTA, SERGEY KOREPANOV, MARCO ONOFRI, SANGEETA GUPTA, SEAN DETTRICK, Tri Alpha Energy Inc., TAE TEAM — A time history of the ion temperature and rotational velocity of the main plasma component of C-2 FRCs [1] was determined from spectral line shapes, produced by charge-exchange between the plasma and heating neutral beams. An independent spectroscopic measurement of the O V ion spectral line allowed us to follow the time evolution of the O V impurity ion temperature and rotational velocity throughout the FRC lifetime. We found that the main plasma component and O V ions thermalize during a time period considerably shorter than the FRC plasma lifetime. The main plasma ions are found to rotate in the ion diamagnetic direction, while O V impurity ions are observed to rotate in the opposite direction. The time decay of the ion temperature and analysis of the radial pressure balance of the plasma suggest that the fast ion pressure contributes significantly to the total radial pressure after the fast ion build-up. Numerical simulations of the C-2 FRC plasma explain fairly well the experimentally observed ion dynamics.

[1] M. Tuszewski et al, *Field Reversed Configuration Confinement Enhancement through Edge Biasing and Neutral Beam Injection*, *Phys. Rev. Lett.*, 108, p.255008. 2012.

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