Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Origin of Non-Gaussian Spectra Observed via the Charge Exchange Recombination Spectroscopy Diagnostic in the DIII-D Tokamak[1]
ALEX SULYMAN, UC Davis, COLIN CHRYSTAL, General Atomics, SHAUN HASKEY, Princeton Plasma Physics Laboratory, KEITH BURRELL, General Atomics, BRIAN GRIERSON, Princeton Plasma Physics Laboratory — The possible observation of non-Maxwellian ion distribution functions in the pedestal of DIII-D will be investigated with a synthetic diagnostic that accounts for the effect of finite neutral beam size. Ion distribution functions in tokamak plasmas are typically assumed to be Maxwellian, however non-Gaussian features observed in impurity charge exchange spectra have challenged this concept.[2] Two possible explanations for these observations are spatial averaging over a finite beam size and a local ion distribution that is non-Maxwellian. Non-Maxwellian ion distribution functions could be driven by orbit loss effects in the edge of the plasma,[3] and this has implications for momentum transport and intrinsic rotation. To investigate the potential effect of finite beam size on the observed spectra, a synthetic diagnostic has been created that uses FIDAsim to model beam and halo neutral density. Finite beam size effects are investigated for vertical and tangential views in the core and pedestal region with varying gradient scale lengths. [2] C. Chrystal et al., Rev. Sci. Instrum. **87**, 11E512 (2016) [3] D.J. Battaglia et al., Phys. Plasmas **21**, 072508 (2014)

[1]Work supported in part by US DoE under the Science Undergraduate Laboratory Internship (SULI) program, DE-FC02-04ER54698, and DE-AC02-09CH11466.

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Date submitted: 13 Jul 2017 Electronic form version 1.4