Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Recent Results from High Harmonic Fast Wave Experiments on NSTX[1] G. TAYLOR, R.E. BELL, J.C. HOSEA, B.P. LEBLANC, C.K. PHILLIPS, E.J. VALEO, J.R. WILSON, PPPL, L.A. BERRY, E.F. JAEGER, P.M. RYAN, J.B. WILGEN, ORNL, P.T. BONOLI, J.C. WRIGHT, MIT, R.W. HARVEY, CompX, H. YUH, Nova Photonics — 30 MHz high harmonic fast wave (HHFW) heating and current drive experiments in NSTX at an axial toroidal field of 0.55 T show significantly improved core power deposition and heating efficiency at lower launched toroidal wavenumbers ($k_{||}$) compared to operation at or below 0.45 T. In addition, lithium wall conditioning has been effectively used to reduce the edge density resulting in the first observation of HHFW core heating at $k_{||} = 3$ m^{-1} in a deuterium plasma. Record core electron temperatures of 5 keV were reached with 3.1 MW HHFW power, and for the first time core HHFW electron heating of NBI-driven deuterium H-mode plasmas was obtained. Motional Stark effect measurements of the current driven in 0.55 T L-mode helium plasmas are consistent with predictions from AORSA and TORIC full-wave simulations. These improved HHFW heating results are attributed to moving the onset density for perpendicular fast wave propagation in the plasma further from the wall [1]. [1] J.C. Hosea, *et al.*, Phys. Plasmas **15**, 056104 (2008)

[1]USDOE Contract DE-AC02-76CH03073 and DE-AC05-00OR22725.

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Date submitted: 14 Jul 2008 Electronic form version 1.4