Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Numerical simulations for evaluation of EBW Heating development in LTX-β[1] BHAVYA KENIA, University of Wisconsin - Madison, A. MAAN, R. MAJESKI COLLABORATION[2], A. KOHN-SEEMANN COLLABORATION[3], S. DIEM, J. K. ANDERSON COLLABORATION[4] — The electrostatic Electron Bernstein wave (EBW) can propagate at frequencies near the electron cyclotron frequency throughout the over dense plasma of a Spherical Tokamak but not in vacuum or low-density extreme edges. A scheme to couple to the wave exploits physics that allows X-mode or O-mode wave to mode convert to an EBW at the plasma edge. The mode conversion efficiency is expected to sensitively depend on the electron density scale length (L_n) at the Upper Hybrid Resonance (UHR) layer with a theoretical maximum of 100%. Full wave modelling of the O-X coupling in LTX-β shows that at a moderate edge density, an O mode launched with finite $k_{||}$ gives optimized coupling efficiency greater than 65%. At very steep edge density profiles, a normal X mode launch gives highest coupling. With a recently upgraded toroidal field capability to $B_0 \leq 3.4$ kG in LTX-β, a 9.3 GHz launch frequency allows a range of narrow heat deposition across the entire minor radius. Genray ray tracing of EBW propagation launched at the UHR layer just inboard of the LCFS yields a span of the radial positions at which localised deposition occurs core deposition at the fundamental cyclotron resonance for B = 3.0 kG and an edge deposition at radius $r/a > 0.7$ for B = 2.05 kG.

[1]USDOE
[2]PPPL
[3]Inst. of Interfacial Process Engineering Plasma Tech., Univ. of Stuttgart
[4]UW Madison

Bhavya Kenia
University of Wisconsin - Madison

Date submitted: 01 Jul 2020 Electronic form version 1.4