Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Exploring EBW conversion physics with applications to NSTX-U N. A. LOPEZ, Princeton University, A. K. RAM, MIT, F. M. POLI, PPPL, E. J. DU TOIT, University of York — Radiofrequency waves are commonly used on traditional tokamaks to assist plasma formation and to provide non-inductive heating and current drive (NI H&CD). Their applicability to spherical tokamaks (STs), however, is complicated by the latter's comparatively high densities and low field strengths. Electron Bernstein waves (EBW) are attractive for NI H&CD on STs because they do not experience a density cutoff and they damp strongly in the vicinity of cyclotron harmonics, even at low temperatures typical of startup. The excitation of EBWs using vacuum-launched electromagnetic waves requires a mode conversion that is highly sensitive to the choice of launch polarization and to local plasma parameters. Common theoretical models employ a 1D slab geometry to study such conversion processes; however, these models may be insufficient to describe the EBW conversion physics in STs, in which equilibria are typically strongly-shaped with large magnetic shear. We report our progress on a theoretical study of EBW conversion physics that emphasizes the inherent idiosyncrasies of the ST equilibrium. Additionally, using a recently developed OD2V kinetic model along with GENRAY simulations, we assess the EBW NI H&CD on NSTX-U using the OXB startup technique that has been developed on MAST. We then make recommendations regarding its implementation in future experimental campaigns.

Nicolas Lopez
Princeton University

Date submitted: 12 Jul 2017 Electronic form version 1.4