Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Full wave simulations of lower hybrid waves in toroidal geometry with non-Maxwellian electrons JOHN WRIGHT, MIT, ERNEST VALEO, CYNTHIA PHILLIPS, PPPL, PAUL BONOLI, MIT, MARCO BRAMBILLA, IPP-Garching, RF-SCIDAC TEAM — Analysis of LH wave propagation in the past has been done using ray tracing and the WKB approximation. Advances in algorithms and the availability of massively parallel computer architectures has permitted the solving of the Maxwell-Vlasov system for wave propagation directly. These simulations have shown that the bridging of the spectral gap (the difference between injected phase velocities and the velocity at which damping on electrons occurs) can be explained by the diffraction effects captured by the full wave algorithm - an effect missing in WKB based approaches. However, these full wave calculations were done with a Maxwellian electron distribution and it is well know that a quasilinear plateau between the point of most efficient damping on electrons at about 2-3 v_{te} and where collisional and quasilinear diffusion balance. Ray tracing codes have long iterated to a self-consistent steady state with Fokker-Planck codes. To address this discrepancy and better model experiment, we have implemented a non-Maxwellian dielectric in our full wave solver. We will show how these effects improve coupling and penetration into the plasma of the waves and show comparisons with ray tracing and experiment.

John Wright
MIT

Date submitted: 20 Jul 2007 Electronic form version 1.4