Measurements and Modeling of X-Ray and ECE Spectra During C-Mod Lower Hybrid Current Drive Experiments*

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Lower Hybrid Current Drive (LHCD) has been demonstrated on Alcator C-Mod. The LH-driven fast electrons can be detected through hard x-ray Bremsstrahlung emission as well as relativistically downshifted electron cyclotron emission (ECE). C-Mod has a hard x-ray camera with 32 chords [1], as well as several outboard midplane ECE diagnostics. CQL3D/GENRAY [2] is a modeling package that employs a 3-D Fokker-Planck solver to compute steady-state distribution functions for a given LH $N_{\|}$ spectrum and plasma. It also can perform self-consistent synthetic diagnostic calculations. LH phase and power scans have been carried out. Fast electron diffusion time can be inferred from x-ray data. Experimental measurements will be compared with synthetic diagnostic modeling to see how changes in phasing and power affect current profile control and to benchmark CQL3D in ITER-relevant regimes.

[1] J. E. Liptac, to be published in RSI
[2] R. W. Harvey and M. G. McCoy, General Atomics Report GA-A20978, www.compxco.com

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