ECCD in DIII-D: Experiment and Theory* R. Prater, C.C. Petty, *General Atomics*, R.W. Harvey, *CompX*, Y.A. Gorelov, J. Lohr, T.C. Luce, *General Atomics*, K.-L. Wong, *Princeton Plasma Physics Laboratory*, R.J. Jayakumar, and M.A. Makowski, *Lawrence Livermore National Laboratory*

Measurements of electron cyclotron current drive (ECCD) have been carried out on DIII-D for a wide range of discharge conditions and wave parameters. Accurate measurements of the profile and magnitude of driven current are made using the motional Stark effect diagnostic, yielding detailed comparisons between measurements and theory which show excellent agreement. The theory is evaluated through calculations using the TORAY-GA ray tracing code coupled to the CQL3D Fokker-Planck code. Single parameter scans, like $n_{||}$ between –0.5 and 0.5 at fixed minor radius or normalized minor radius between 0.1 and 0.4 at fixed $n_{||}$, also show excellent agreement with theory. In experiments on stabilization of neoclassical tearing modes, MHD activity including sawteeth, edge localized modes, and tearing modes does not significantly broaden the profile or diminish the magnitude of the driven current. The use of ECCD for Advanced Tokamak applications in DIII-D is well supported by this predictive capability.

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