**Lower Hybrid Current Drive on Alcator C-MOD*** - J. R. Wilson, J. Hosea, C. K. Phillips, *Princeton Plasma Physics Laboratory,* R. Parker, P. T. Bonoli, A. E. Hubbard, M. Porkolab, A. E. Schmidt, G. Wallace, *MIT*

A Lower Hybrid Current Drive (LHCD) system has been installed on the Alcator C-MOD tokamak at MIT. Twelve klystrons at 4.6 GHz feed a 4×22 waveguide array. This system was designed for maximum flexibility in the launched parallel wave-number spectrum. This flexibility allows tailoring of the lower hybrid deposition under a variety of plasma conditions. Power levels up to 900 kW have been injected into the tokomak. The parallel wave number has been varied over a wide range, $n_{\|} \sim 1.6\text{-}4$. Driven currents have been inferred from magnetic measurements by extrapolating to zero loop voltage [1] and by direct comparison to Fisch-Karney theory[2], yielding an efficiency of $n_{20}IR/P \sim 0.3$. Modeling using the CQL3D code supports these efficiencies. Sawtooth oscillations vanish, accompanied with peaking of the electron temperature ($T_{e0}$ rises from 2.8 to 3.8 keV). Central q is inferred to rise above unity from the collapse of the sawtooth inversion radius, indicating off-axis cd as expected. Measurements of non-thermal x-ray and electron cyclotron emission confirm the presence of a significant fast electron population that varies with phase and plasma density. The x-ray emission is observed to be radially broader than that predicted by simple ray tracing codes. Possible explanations for this broader emission include fast electron diffusion or broader deposition than simple ray tracing predictions (perhaps due to diffractive effects). This variation will be compared to that predicted by detailed propagation and absorption codes.

[1] Giruzzi, G. et al., Nuclear Fusion **37** (1997) 673
[2] Karney, C.F.F. and Fisch, N.J., Phys. Fluids **29** (1986) 180
*Work supported by USDOE DE-FC02-99ER54512 and DE-AC02-76CH03073.