Abstract Submitted for the DPP15 Meeting of The American Physical Society

Path to Efficient Lower Hybrid Current Drive at High Density¹ S.G. BAEK, P.T. BONOLI, D. BRUNNER, I. FAUST, B.L. LABOMBARD, R.R. PARKER, S. SHIRAIWA, G.M. WALLACE, S. WUKITCH, MIT PSFC — Recovery of lower hybrid current drive (LHCD) efficiency at high density was demonstrated on Alcator C-Mod by modifying the scrape-off layer (SOL) plasma. RF probe measurements around the C-Mod tokamak indicate that the LH wave amplitude at the high field side wall significantly attenuates with plasma density. This is interpreted as enhanced collisional loss due to the increase in the SOL density and width. By taking advantage of the narrower SOL width by doubling plasma current to 1.1 MA, it is found that the LH wave amplitude maintains its strength, and an effective current drive is extended to above 1x10e20 m-3. An order of magnitude increase in non-thermal Bremsstrahlung emission is consistent with ray-tracing results which take into account the change of SOL profiles with current. In the coming campaign, a further investigation on the role of the SOL plasma is planned by raising plasma current above 1.1 MA. This will be aided with newly developed RF magnetic loop antennas mounted on a radially movable probe head. This system is expected to intercept the LH resonance cone on the first pass, allowing us to measure radial profiles of both the wave amplitude and dominant parallel wavenumber in the SOL for the first time. These data will be compared with the GENRAY ray-tracing code.

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