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Off-axis Current Drive via High Field Side Lower Hybrid Current Drive in DIII-D[1] S.J. WUKITCH, A. SELTZMAN, Y. LIN, Massachusetts Institute of Technology MIT, C. HOLCOMB, LLNL, R.I. PINSKER, GA — A high field side launch lower hybrid current drive (HFS LHCD) system is nearing completion. The guiding physics criteria is to drive off axis current drive, $\rho \sim$0.6-0.8, with peak current density approaching 0.4 MA/m^2 in DIII-D AT discharges. HFS launch position was selected to improve wave penetration, allow for single pass absorption and off-axis deposition. In AT discharges, good wave penetration is achieved because the poloidal upshift balances the toroidal down shift as the wave penetrates into the plasma. Near the damping location, the wavenumber upshifts quickly resulting in localized, $\sim$0.2a, absorption and current drive. The technical challenges to implement HFS LHCD coupler in DIII-D were substantial. The coupler and waveguides enter on the low field side and follow the vacuum vessel contour up to the center post near the mid-plane. The expected disruption loads, 400C bake, and detailed RF structures compelled the use of an additive manufactured, high temperature copper alloy, GRCop-84. Further, the waveguide routing utilizes two compact vacuum-RF flanges tested to withstand >2 years accumulated bake time and 5 years worth of thermal cycling. The latest simulations, design and system status will be presented.

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