Off-axis Neutral Beam Injection as a Tool for Expanding the Operating Space of DIII-D High $f_{NI}$ Discharges,* J.R. Ferron, T.C. Luce, P.A. Politzer, J.C. DeBoo, R.J. La Haye, GA; C.T. Holcomb, M.J. Lanctot, LLNL; F. Turco, ORAU; J.M. Park, ORNL; Y. In Far-Tech; M. Okabayashi, PPPL – The newly installed capability for 5 MW off-axis neutral beam injection is being utilized to broaden the pressure and current density profiles and raise the minimum q value in DIII-D discharges with noninductive current fraction $f_{NI}$ near 1. Broader pressure is expected to allow stable access to increased $\beta_N$ and increase the bootstrap current density $J_{BS}$ off-axis. Reducing the on-axis current drive allows access to higher $q_{min}$, increasing the on-axis $J_{BS}$ and improving tearing mode stability. This is a path toward DIII-D (and a steady-state powerplant) $f_{NI}$=1 discharges at $q_{95}$ = 5, which require $\beta_N \geq 4$. Initial experiments have demonstrated $q_{min}$ maintained above 2 with broader pressure profiles than previously observed. Analysis of the noninductive current profiles and high $\beta_N$ stability of discharges with off-axis beam injection will be presented.

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