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High q_{min} steady state scenario development using off-axis neutral beam injection on DIII-D,* C.T. Holcomb, M.J. Lanctot, *LLNL*; J.R. Ferron, T.C. Luce, P.A. Politzer, A.D. Turnbull, R.J. La Haye, *GA*; F. Turco, ORAU; J.M. Hanson, *Columbia U.*; J.M. Park, M. Murakami, *ORNL*; Y. In, *Far-Tech;* M. Okabayashi, *PPPL* — Initial high power DIII-D experiments using off-axis neutral beam injection have produced plasmas with broader pressure and current density profiles and higher core safety factor than in similar plasmas employing only on-axis NBI. Such changes are expected to increase the ideal β_N stability limits, avoid 3/2 and 2/1 tearing modes when $q_{min}>2$, thus enabling access to a high β_N, high bootstrap fraction steady state scenario. The maximum achieved β_N in $q_{min}>2$ plasmas using off-axis neutral beam injection and the calculated resistive and ideal stability limits will be shown, as well as the transport properties and non-inductive current drive fraction. Predictive modeling of the equilibrium profiles, stability and noninductive current will assess the need for additional auxiliary current drive power and flexibility.

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