

**30Abstract Submitted for the 53rd Annual Meeting  
Division of Plasma Physics  
November 14–18, 2011, Salt Lake City, Utah**

Category Number and Subject:

☐ Theory      ☒ Experiment

**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.

\*Work supported in part by US DOE under DE-FC02-04ER54698, DE-AC52-07NA27344, DE-AC05-06OR23100, DE-AC05-00OR22725, DE-FG02-08ER85195, DE-AC02-09CH11466.