

**Abstract Submitted for the 53rd Annual Meeting  
Division of Plasma Physics**

Category Number and Subject:

Theory       Experiment

**Advanced Inductive Plasmas with Low Torque Startup,\***

W.M. Solomon, M. Okabayashi, *PPPL*; R.J. Buttery, J. Ferron, A.M. Garofalo, G.L. Jackson, R.J. La Haye, T.C. Luce, C.C. Petty, P.A. Politzer, A.S. Welander, *GA*; J.M. Hanson, *U. Columbia*; Y. In, *Far-Tech, Inc.*, M.J. Lanctot, *LLNL*; F. Turco, *ORISE* — Experiments on DIII-D have been performed to investigate the access and performance of advanced inductive discharges produced with zero net torque for the full duration of the plasma. With low torque, the plasma is particularly susceptible to  $2/1$  neoclassical tearing modes, which typically slow and lock, spoiling confinement and ending the high beta phase. Attempts to reduce the residual error field did not appear to significantly modify the stability at low torque. The addition of a modest amount of electron cyclotron heating (1 MW), configured for current drive aimed at the  $q=2$  surface, appeared adequate to reduce the mode amplitude sufficiently to allow stable operation at  $\beta_N \sim 2.5$  with  $q_{95} \sim 4.3$ . Details of the stability, confinement and current profile, and comparison with typical high torque advanced inductive discharges will be presented.

\*Supported by the US DOE under DE-AC02-09CH11466, DE-FC02-04ER54698, DE-FG02-04ER54761, DE-FG02-08ER5195, DE-AC52-07NA27344, and DE-AC05-00OR21300.