**A27987 Holcomb Webbing Abstract PoP**

**Abstract**. Results from experiments on DIII-D [J.L. Luxon, *Fusion Sci. Technol*. **48**, 828 (2005)] aimed at developing high  steady-state operating scenarios with high- confirm that fast-ion transport is a critical issue for advanced tokamak development using neutral beam injection current drive. In DIII-D, greater than 11 megawatts of neutral beam heating power is applied with the intent of maximizing  and the noninductive current drive. However, in scenarios with  that target the typical range of
 5-7 used in next-step steady-state reactor models, Alfvén eigenmodes cause greater fast-ion transport than classical models predict. This enhanced transport reduces the absorbed neutral beam heating power and current drive and limits the achievable N. In contrast, similar plasmas except with  just above 1 have approximately classical fast-ion transport. Experiments that take  plasmas to higher  with  11-12 for testing long pulse operation exhibit regimes of better than expected thermal confinement. Compared to the standard high- scenario the high  cases have shorter slowing-down time and lower , and this reduces the drive for Alfvénic modes, yielding nearly classical fast-ion transport, high values of normalized confinement, , and noninductive current fraction. These results suggest DIII-D might obtain better performance in lower-, high- plasmas using broader neutral beam heating profiles and increased direct electron heating power to lower the drive for Alfvén eigenmodes.