Abstract Submitted
for the DPP96 Meeting of
The American Physical Society

Sorting Category: 5.1.1.2 (experiment)

High Fusion Performance NCS Plasmas in DIII–D,[1]
G.A. NAVRATIL, Columbia University, E.A. LAZARUS, Oak Ridge National Laboratory, C.M. GREENFIELD, General Atomics, B.W. RICE, Lawrence Livermore National Laboratory — A significant increase in the fusion reactivity (28 kW of DD fusion power) and $Q_{DD} \approx 1.5 \times 10^{-3}$ (equivalent $Q_{DT} \approx 0.36$) in DIII–D was achieved using target plasmas with negative central magnetic shear (NCS) in low q_{95} (≈ 4) plasmas. The higher fusion reactivity results from improved confinement (H≈4.5 times L–mode) obtained by extending the zone of near ion-neoclassical confinement observed previously only in the core region of NCS plasmas and an increased beta limit ($\beta_N = \beta aB/I > 4\%$ mT/MA) using pressure profile control provided by controlling the L to H transition time to broaden the pressure profile in the high performance phase. Fusion performance was observed to maximize when the negative magnetic shear level in the target plasma was relatively weak.

[1]Work supported by U.S. DOE Contract Nos. DE-AC03-89ER51114, W-7405-ENG-48, DE-AC05-96OR22464 and Grant No. DE-FG02-89ER53297.

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[X] Prefer Oral Session
[ ] Prefer Poster Session

Special instructions: O-1-1

Date submitted: August 1, 1996 Electronic form version 1.1