Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Mitigation of Confinement Degradation near Te Ti with Neon Injection on DIII-D[1] GEORGE MCKEE, DINH TRUONG, ZHENG YAN, University of Wisconsin - Madison, COLIN CHRYSTAL, KATHREEN THOME, General Atomics — Injection of Neon gas into NBI and ECH heated plasmas with nearly equilibrated ion and electron temperatures increases global energy confinement by nearly 25% while simultaneously doubling the radiated power and reducing turbulence. The energy confinement time in plasmas heated with 3 MW of NBI ($T_i > T_e$) is reduced by up to 40% when 3 MW of ECH are injected ($T_i \sim T_e$), which is thought to result from reduced critical gradients to ITG and TEM turbulence near equilibrated temperatures. Interestingly, density fluctuations undergo very little change with ECH, while thermal transport increases significantly; new measurements with UF-CHERS demonstrated that ion temperature fluctuations increase at higher T_e/T_i, explaining the increased transport. Injecting Neon gas into these NBI+ECH heated discharges results in a significant increase in core ion temperature, confinement time, and radiated power, while reducing intrinsic carbon density; consistently, low-wavenumber density turbulence is found to decrease by approximately 20%, as measured with BES near $\rho = 0.75$. These results show that the physics behind the Radiative-Enhanced (RI)-Mode is effective near $T_e/T_i \sim 1$ but that T_e/T_i and Ne injection alter turbulence through different mechanisms.

[1]Work supported by US DOE under DE-FC02-04ER54698, DE-FG02-08ER54999.

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Date submitted: 29 Jun 2020 Electronic form version 1.4