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[ ] Theory [X] Experiment

Understanding the High Confinement Properties of Hybrid Plasmas in DIII-D,* C.C. Petty, *GA*, and Hybrid Scenarios Thrust Team – Hybrid discharges on DIII-D have remarkably good transport properties, with an energy confinement time that is up to 1.65 times higher than the IPB98(y,2) scaling relation in stationary, high-β_N discharges. In hybrid plasmas with a dominant 4/3 NTM, the experimental ion thermal conductivity is equal to the neoclassical value across the plasma cross-section. The electron heat conduction dominates the energy loss process, which is consistent with GYRO simulations that show the ETG mode and TEM cause the majority of transport. Hybrid discharges have been created with the controlling X-point either towards or away from the grad-B drift direction, with similar values of H_{89P} achieved. Using the new ability to inject either co or counter neutral beams into DIII-D, the effect of toroidal rotation on the transport properties of hybrid plasmas is being investigated. Preliminary experiments show that the energy confinement time decreases as counter-NBI is added to an established co-NBI hybrid discharge while keeping β_N fixed, which is likely due to the reduced ExB velocity shear as the toroidal rotation decreases.

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