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A Performance Upgrade to DIII-D to Close Physics Gaps on Future Fusion Reactors[1] RICHARD BUTTERY, General Atomics, DIII-D TEAM — Future burning plasma facilities will operate in different physics regimes from present devices. A performance upgrade to DIII-D can close gaps on these conditions. By significantly increasing current drive capabilities, a substantial rise (up to x3) in stored energy and density can be achieved in steady state regimes. This increases thermal and bootstrap fractions, with balanced electron and ion heating, significant electron-ion coupling, low rotation and fast ion fraction to explore reactor-relevant fusion cores. The tripling of heat flux and increased density will enable divertor physics exploration with increased opacity, shorter mean free paths, and increased dissipation in regimes where neutrals become more fluid like and Lyman alpha trapped. Pedestal neutral penetration depths will fall and height triple, with low collisionality access expanded to high density to explore optimization of transport-defined pedestals with radiative mantle. Combined with a reactor relevant wall and new 3D and disruption mitigation tools, this will take DIII-D to its full potential to explore and project stable integrated fusion reactor scenarios.

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