Abstract Submitted
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Developing DIII-D to Address Critical Plasma Science for Fusion Energy[1] R.J. BUTTERY, T.S. TAYLOR, M.R. WADE, GA, D.N. HILL, LLNL — DIII-D is being equipped with new tools and upgrades to confront the scientific challenges required to prepare the next generation of fusion devices. An increase to dominant electron heating with high power ECH and balanced neutral beam will heat like fusion alphas to develop the scientific basis for burning plasma regime optimization. Improved 3-D field capabilities will resolve control of transients while maintaining plasma stability. Upgraded disruption mitigators will explore the science of safely quenching tokamak plasmas. These developments will provide the basis to develop robust high performance in ITER. To develop quasi-continuous operation for a future reactor, off axis current drive and total heating power is being raised, to study the optimization of self-consistent self-sustaining plasma regimes. And the physics basis for an improved divertor configuration is being developed, to be tested and optimized in an upgrade to DIII-D prior to implementation in an FNSF. These solutions will then be tested with a reactor relevant wall, emergent from a parallel US materials program. This will enable DIII-D to address the crucial challenges for ITER, FNSF and fusion energy.

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