Abstract Submitted
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High Performance Regimes in Alcator C-Mod at High Magnetic Field[1] E.S. MARMAR, Massachusetts Institute of Technology, ALCATOR C-MOD TEAM — Alcator is the only divertor tokamak in the world capable of operating at magnetic fields up to 8 T, equaling and exceeding that planned for ITER. Using RF and microwave tools for auxiliary heating and current drive, C-Mod accesses high pressure, high density, reactor-relevant regimes with no external torque and equilibrated electrons and ions, with exclusive use of high-Z metal plasma-facing components. The 2016 experimental campaign focused on naturally ELM-suppressed, enhanced energy confinement regimes (including I-mode and EDA H-mode, and approaches to super-H-mode), with emphasis on operation at the highest fields ($5<B_T<8T$). Results include extension of pedestal stability studies to 8T, including characterization of edge relaxation mechanisms and comparisons with theory, evaluation of the window for steady-state I-mode access, as well as confirmation of the Eich scaling for SOL power widths ($L_q \propto 1/B_p$) for B_p up to 1.3T. On the final operation day of the campaign, a new world record for average confined-plasma pressure (>2 atm.) was achieved. Taken together, combined with previous results from C-Mod and the world tokamak database, these results form a strong foundation for the high field, compact approach to achieving fusion energy production. New advances in high temperature, high field superconductors open the possibilities for practical development of this path for commercial fusion.

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