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Overview of Recent Alcator C-Mod Results[1] EARL MARMAR, MIT, ALCATOR C-MOD TEAM — Alcator C-Mod research currently emphasizes RF heating, current and flow drive, divertor/PMI issues, non-ELMing pedestal regimes with enhanced confinement, and disruption mitigation/runaway dynamics. Stability analysis of I-mode pedestals shows pressures well below the peeling-ballooning limit, as well as expected kinetic ballooning mode thresholds, consistent with the lack of ELMs. Results with the magnetic field aligned ICRF antenna show reductions in high-Z metallic impurities. Implementation of novel "mirror-probe" electronics has enabled simultaneous measurements of T_e, n_e and φ with 1 μs time response using a single probe tip, revealing important properties of the Quasi-Coherent-Mode (QCM) which regulates edge particle transport in EDA H-mode. An Accelerator-based In-situ Material Surveillance diagnostic has been deployed, providing the first between-shot measurements of surface evolution of the all-metal wall. We have observed suppression of boundary turbulence and τ_E improvement using LHRF into high-density H-modes, with H-factor increases up to 30%. Upgrades which are ready for construction and near term installation on C-Mod include: an off-midplane LH launcher to test theories of improved current drive at high density and an actively heated (900 K) tungsten DEMO-like outer divertor. We are proposing a new facility, ADX, based on Alcator technology, to access advanced magnetic topologies to solve the divertor PMI problem, combined with high-field launch LHCD and ICRF to extend the tokamak to steady-state with reactor relevant tools.

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