

ALCATOR C-MOD STATUS, RECENT ACCOMPLISHMENTS AND FUTURE PLANS

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A number of major upgrades have been recently completed this year on the Alcator C-Mod high-field, compact, RF-heated tokamak. A 4.6 Ghz lower hybrid (LH) system has just been installed and will be used to control the plasma current profile and to extend the discharge duration as part of the C-Mod advanced tokamak program. The system currently consists of 12 klystrons with a total source power of 3 MW, which feed a 96-waveguide launcher. The LH control system provides flexible toroidal phasing of the grill waveguides, resulting in good adjustability of the launched n-parallel spectrum, which is important for achieving the desired current drive performance.

Prior to the 2005 campaign, all the boron nitride (BN) protection tiles on the ICRF antennas were replaced with molybdenum, leaving the machine entirely with all-metal plasma-facing surfaces (as it was prior to 2000). Extensive experimental investigations detailing the difference this has made to plasma energy confinement and impurity content will be presented. Multi-megawatt ICRF auxiliary heating has recently resulted in new tokamak records for plasma thermal energy density and volume-averaged pressure.

A long-pulse diagnostic neutral beam was installed during the campaign to provide spectral signals for a number of diagnostics to measure internal plasma parameters including current profile, ion temperature, and plasma rotation. The beam, built at the Budker Institute in Novosibirsk, has an arc source that yields 7 amps of hydrogen or deuterium at 50 kV, for pulse lengths of 1.5-3.0s. An extensive interlock system is designed to prevent overheating of the inboard wall by the beam under all fault conditions.

Engineering design work is currently being carried out to develop an in-vessel helium cryopump system which will be used to maintain the plasma density at low values, which is desirable for the advanced tokamak program.