Abstract Submitted
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The effect of feedback-controlled divertor nitrogen seeding on the boundary plasma and power exhaust channel width in Alcator C-Mod[1] B. LABOMBARD, D. BRUNNER, A.Q. KUANG, W. MCCARTHY, J.L. TERRY, MIT Plasma Science and Fusion Center — The scrape-off layer (SOL) power channel width, λ_q , is projected to be ˜0.5 mm in power reactors, based on multi-machine measurements of divertor target heat fluxes in H-mode at low levels of divertor dissipation. An important question is: does λ_q change with the level of divertor dissipation? We report results in which feedback controlled nitrogen seeding in the divertor was used to systematically vary divertor dissipation in a series of otherwise identical L-mode plasmas at three plasma currents: 0.55, 0.8 and 1.1 MA. Outer midplane profiles were recorded with a scanning Mirror Langmuir Probe; divertor plasma conditions were monitored with 'rail' Langmuir probe and surface thermocouple arrays. Despite an order of magnitude reduction in divertor target heat fluxes (q// ˜400 MW m^{-2} to ˜40 MW m^{-2}) and corresponding change in divertor regime from sheath-limited through high-recycling to near-detached, the upstream electron temperature profile is found to remain unchanged or to become slightly steeper in the near SOL and to drop significantly in the far SOL. Thus heat in the SOL appears to take advantage of this impurity radiation 'heat sink' in the divertor by preferentially draining via the narrow (and perhaps an increasingly narrow) λ_q of the near SOL.

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