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Mirror Langmuir Probe measurements of fluctuation-induced heat and particle transport in the Alcator C-Mod boundary plasma[1] B. LABOMBARD, D. BRUNNER, MIT PSFC, O.E. GARCIA, U. Tromso, Norway, M. GREENWALD, J.W. HUGHES, MIT PSFC, R. KUBE, U. Tromso, Norway, J.L. TERRY, MIT PSFC, S. ZWEBEN, PPPL — A "Mirror Langmuir Probe" technique [1] has recently been implemented on a four-electrode scanning Langmuir/Mach probe, allowing simultaneous measurements of electron temperature, density and plasma potential fluctuations at high bandwidth (1 MHz) at four separate spatial locations. This unique capability allows cross-field profiles of fluctuation-induced heat and particle transport fluxes to be recorded in the C-Mod boundary plasma for the first time. Wavenumber and frequency spectra of $\tilde{T}_e$, $\tilde{n}$ and $\tilde{\Phi}$ and their relative phase shifts can also be computed, providing key information on transport dynamics (drift-wave vs. interchange). Higher-order correlations, such as Reynolds stress components, may also be evaluated. By varying current, toroidal field, and line-averaged density, we have begun to explore the scaling of fluctuation-induced transport and its relationship to the empirical scalings of the heat flux widths seen in C-Mod L and H-mode plasmas. Of particular interest are the flux-gradient relationships near the last-closed flux surface and their connections to the "critical gradient transport" behavior that has been reported previously from observations of time-averaged T_e, n profiles.

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