

P2.1032 Effect of high neutral density on radiation measurements in Alcator C-Mod

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See full abstract here

<http://ocs.ciemat.es/EPS2019ABS/pdf/P2.1032.pdf>

Alcator C-Mod measurements of the radiated power density profiles using resistive bolometry in high density (up to $3.2 \times 10^{20} \text{ m}^{-3}$) Ohmic L-mode plasmas show elevated signal levels, up to 0.9 MW/m^2 , outside the separatrix. Such near scrape-off-layer observations are not present at lower densities of up to $1 \times 10^{20} \text{ m}^{-3}$, and it is thought that these measurements are due to an additional power flux onto the bolometer foils from neutral particles.

This work uses the kinetic neutral code KN1D, benchmarked against experimental measurements of Ly α emissivity profiles, to validate a method for distinguishing photon flux and neutral flux contributions to edge bolometry measurements. We are able to estimate and remove the spurious neutral contribution to the measured brightness profiles, and therefore reconstruct emissivity profiles for high density shots which no longer show significant radiation outside the separatrix. This is in agreement with similar plasmas at lower densities. Understanding and correcting for this effect is important for an extensive range of physics studies focussing on power exhaust from plasmas in high neutral density environments. Examples include the successful interpretation of experimental data from detachment experiments on MAST-Upgrade, and more generally the ability to distinguish radiation and radial flux contributions which are important for understanding baffled, long-legged divertors at high power density.

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