Cross Comparison on DIII-D of Experimental Techniques for Measuring $n_e$ and $T_e$ in Detached Divertor Plasmas


Spectroscopy of high-$n$, Balmer line transitions provides a means of measuring $n_e$ and $T_e$ in recombining plasmas [1]. The relative intensities of Rydberg series lines near the ionization limit are a sensitive diagnostic of $T_e$ for $T_e < 1$ eV. Stark broadening of these same lines provides a measure of local $n_e$ and with less accuracy of $T_e$. Predictions from Balmer line spectroscopy are compared with those from divertor Thomson scattering to evaluate the accuracy of different theoretical models of line broadening [2,3]. In particular, the detailed dependence of line width on principal quantum number is used to distinguish which line-broadening model best accords with experiment.


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