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Category Number and Subject: 5.6.2. DIII-D Tokamak

[ ] Theory [X] Experiment

Cross Comparison on DIII-D of Experimental Techniques for Measuring n_e and T_e in Detached Divertor Plasmas,* N.H. Brooks, A.W. Leonard, *GA*, S. Lisgo, E. Oks, D. Volodko, *Auburn U.*– 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-broadenign model best accords with experiment.

[1] J. Terry, Phys. Plasmas **5**, 3373 (1998).
[2] H. Griem *Spectral Line Broadening by Plasmas*, Academic Press, New York (1974).
[3] E. Oks *Stark Broadening of Hydrogen and Hydrogenlike Spectral Lines in Plasmas: The Physical Insight*, Alpha Science International, Oxford, UK (2006).

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