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Category Number and Subject:

[ ] Theory [x] Experiment

Prospects for Edge Current Density Determination Using LIBEAM on DIII–D,* D.M. Thomas, K.H. Burrell, T.H. Osborne, L.L. Lao, General Atomics, D.G. Nilsen,† B.W. Rice,† *Lawrence Livermore National Laboratory* — The specific size and structure of the edge current profile has profound effects on the stability and ultimate performance of many advanced tokamak (AT) modes. This is true for both bootstrap and externally driven currents that may be used to tailor the edge shear. Absent a direct local measurement of j(r), the best alternative is a determination of the poloidal field, B_θ. Measurements of the precision (~0.1° in magnetic pitch angle and 1–10 ms) necessary to address issues of control and provide constraints for EFIT are difficult to do in the region of interest (ρ = 0.9–1.1). Using Zeeman polarization spectroscopy of the 2S-2P lithium resonance emission from the DIII–D LIBEAM,[1] measurements of the various field components may be made to the necessary precision in exactly the region of interest to these studies. Because of the negligible Stark mixing of the relevant atomic levels, this method of determining j(r) is insensitive to the large local electric fields typically found in enhanced confinement (H–mode) edges, and thus avoids an ambiguity common to Motional Stark Effect (MSE) measurements of B_θ. Key issues for utilizing this technique include good beam quality, an optimum viewing geometry, and suitable optical filters to isolate the polarized emission line. A prospective diagnostic system for the DIII–D AT program will be described.

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[1]D.M. Thomas, Rev.Sci.Instrum. 66, 1, 806 (1995).

[x] Prefer Poster Session

[ ] Prefer Oral Session

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[ ] This poster/oral should be placed in the following grouping: (specify order)

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