

Abstract Submitted  
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**Spectral MSE study on HSX and Non-Statistical Beam Level Populations** C. RUIZ, S.T.A. KUMAR, HSX Plasma Lab, Department of Electrical and Computer Engineering, UW-Madison, O. MARCHUCK, Forschungszentrum Juelich, GmbH, Germany, F.S.B. ANDERSON, D.T. ANDERSON, HSX Plasma Lab, Department of Electrical and Computer Engineering, UW-Madison — A spectral MSE diagnostic is investigated for measuring  $E_r$  and B field in the plasma. This method relies on the spectral fitting of the Stark multiplet components and knowledge of the excited beam level populations. In some cases a statistical approach to the populations has been shown to deviate from experimental results. Here, we present a method for measuring  $E_r$  and the B field components using two simultaneous views of the plasma without the knowledge of the beam level populations if the line emission from the Stark multiplet components is resolvable. However, this is not the case with a 30 keV diagnostic neutral beam and a 1 T magnetic field and knowledge of the beam level populations is required. In our experiment with line average densities ranging from  $[2-5] \times 10^{18} \text{ m}^{-3}$  the atomic levels are expected to be non-statistically populated. A systematic study is then performed and data is compared to collisional-radiative models which calculate the level populations for a specific set of experimental parameters of density and magnetic field. Spectra from H-alpha and H-beta line emissions are simultaneously measured and their ratio is taken and compared to the statistical and non-statistical case.

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