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**Investigation of fast helium beam emission spectroscopy on MST.** JOON-WOOK AHN, DARREN CRAIG, GENNADY FIKSEL, DANIEL DEN HARTOG, JAY ANDERSON, University of Wisconsin - Madison, MARTIN O'MULLANE, University of Strathclyde — A fast helium beam emission spectroscopy (BES) diagnostic is being investigated as a way to measure local plasma parameters on MST. A full collisional-radiative model was developed and compared with experimental measurements. The ratio of intensities of the lines at 667.8nm and 492.2nm ( $I_{667}/I_{492}$ ) appears useful for local density measurements in that it has a strong density dependence while only weakly dependent on other parameters. The effect of  $Z_{eff}$  profiles and ion impact affects triplet line intensities more strongly than singlet lines and modeling better reproduces experimental results with these effects properly considered. The comparison of theoretical and experimental line ratios shows good qualitative agreement. The quantitative agreement is within a factor of 2 for  $I_{667}/I_{492}$ . There is so far no good singlet line ratio identified for local  $T_e$  measurement in the range of interest. An independent measurement of local metastable fraction would allow for the use of triplet lines for the line ratio technique.

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