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Impact of diagnostic neutral beam optimization on active spectroscopy in MST[1] XIANDE FENG, MARK. D. NORNBERG, DANIEL. J. DEN HARTOG, STEVEN. P. OLIVA, Univ of Wisconsin, Madison, DARREN CRAIG, Wheaton College, IL, UNIV OF WISCONSIN, MADISON TEAM, WHEATON COLLEGE, IL COLLABORATION — The hydrogen diagnostic neutral beam on MST provides local measurements of impurity ion emission through charge exchange recombination spectroscopy (CHERS) and of core-localized magnetic field through the motional Stark effect (MSE). The beam has been optimized to operate at 50kV, 4A steady beam current with 20ms beam pulse and 75% primary energy ion fraction. It's achieved by tuning the beam voltage, arc current, fuel line pressure, arc and high voltage module timing, and the magnetic isolation field. Electron density measurements in the ion source revealed that ion extraction is maximized under low density conditions which are thought to affect the shape of the ion sheath at the extraction grid. The sheath may be transitioning from a planar or convex shape at high density to one which is concave which helps focus the ion trajectories and produce higher beam current. With the improvements in beam operation, the CHERS signal is expected to increase by 20%-30%, and the Stark broadening is expected to increase by 10%. These signal increases will help resolve convolved fine-structure components in both analyses. Beam voltage ripple is also measured to better quantify the accuracy of spectral MSE and CHERS measurement. This work is supported by the U.S. DOE.

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