Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

Effect of spatial distribution on emission diagnostics of He-H2 plasmas SHABNAM MONFARED, LUTZ HUWEL, Wesleyan University — Electron densities have been measured in atmospheric pressure laser-induced helium and helium-hydrogen plasmas using optical emission techniques. Stark broadening (He at 5015, 4471, 4026 Å and H at 4861 Å) and peak splitting between allowed and forbidden components (He at 4471 Å) were employed. Analysis of spatially averaged, temporally resolved data yields good agreement between all He based methods.[1] However, large discrepancies were found between values extracted from the H_β line and those form helium based methods - especially at times after breakdown shorter than about 7 μs (up to a factor of 100 at 1 μs in mixtures of 1 torr of hydrogen). Differences diminish with increasing hydrogen content and delay times. For partial pressure of hydrogen above about 50 torr, good agreement is found between all methods. The observed pattern is believed to be due to differences in the spatial distribution of helium and hydrogen. An equilibrium model confirms the possibility of such discrepancies. In addition, a detailed analysis of Abel-inverted data will be presented.

[1]S. K. Monfared etal.Plasma Sources Sci. Technol. 20 (2011) 035001, and 20 (2011) 049503

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Date submitted: 13 Jul 2011 Electronic form version 1.4