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Development and Calibration of Electron Density Measurements in Argon Plasma Using Laser Collision-Induced Fluorescence[1] ED BARNAT, Sandia National Laboratories, BRANDON WEATHERFORD, L-3 Communications, Electron Devices Division — Laser collision-induced fluorescence (LCIF) is a powerful diagnostic which can be used for making temporally and spatially resolved measurements of electron densities in a plasma discharge. The technique, which involves the measurement of optical emission emanating from higher energy excited states due to the redistribution of the lower energy laser-excited state by collisions with energetic electrons, has been readily employed to study argon discharges. In this work, we report on recent efforts to extend the LCIF technique to argon based plasma systems. Discussion will be offered on the spectroscopic pathway used for the interrogation of argon and discussion will be given on the procedures used to calibration the LCIF diagnostic. Particular emphasis will be placed on the double-pulse excitation of a plasma column that enables near independent control of electron density and electron energy. Anticipated bounds on the range of application of the calibrated transitions will likewise be discussed. Finally, the utility of the LCIF diagnostic will be demonstrated by applying the technique to spatially and temporally varying plasma systems.

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