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Improving Resolution of Confocal Laser Induced Fluorescence in Argon Helicon Plasma MARK SODERHOLM, ROBERT VANDERVORT, EARL SCIME, JOHN MCKEE, DUSTIN MCCARREN, West Virginia Univ — Laser Induced Fluorescence (LIF) provides measurements of flow speed, temperature and when absolutely calibrated, density of ions or neutrals in a plasma. Traditionally, laser induced fluorescence requires two ports on a plasma device. One port is used for laser injection and the other is used for fluorescence emission collection. Traditional LIF is tedious and time consuming to align. These difficulties motivate the development of an optical configuration that requires a single port and remains fully aligned at all times; confocal LIF. Our confocal optical design employs a single two inch diameter lens to both inject the laser light and collect the stimulated emission from an argon plasma. A dichroic mirror is used to separate the injected laser light from the collected emission. The measurement location is scanned radially by manually adjusting the final focusing lens position. In the initial version of the confocal optical system, measurements were poorly resolved radially because they were integrated over a fairly large path length ($\sim$ 4 cm) centered at the focal point. Here we present collected data from a modified configuration that significantly improves the special resolution of confocal measurements. The confocal measurements are compared to traditional, two-port, LIF measurements over the same radial range.

Mark Soderholm
West Virginia Univ

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