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Validation of Confocal Laser Induced Fluorescence Measurements in an Argon Plasma ROBERT VANDERVORT, JERRY CARR JR., MATTHEW GALANTE, RICHARD MAGEE, DUSTIN MCCARREN, JOHN MCKEE, EARL SCIME, STEPHANIE SEARS, MARK SODERHOLM, West Virginia University — To obtain a spatially localized measurement, conventional laser induced fluorescence (LIF) requires overlapping optical paths, i.e., injection and collection paths. Often the injection laser path is focused down to tens of microns at the measurement location. Alignment of the collection optics to the focal spot can be problematic. Two optical ports are often not available. Here we describe the application of confocal optics to LIF measurements in an argon plasma. In a confocal measurement, a single lens is used for both injected light focusing and fluorescence light collection, thereby eliminating the need for laborious optical alignment. The injected laser light and the fluorescent emission are separated by wavelength filtering optical elements and scanning of the measurement location is accomplished by scanning the focusing lens towards or away from the plasma. In this work, we compare ion metastable density and ion temperature profile measurements in argon plasmas obtained by high spatial resolution, conventional crossed-path LIF optics and a compact, optical fiber coupled, confocal LIF measurement system. The data indicate that the confocal system averages over no more than a few mm of the plasma, which is sufficient spatial resolution for nearly any measurement need.

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