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The effect of a supersonic plasma jet expansion on a magnetized, ambient plasma measured using laser-induced fluorescence[1] JEFFREY BONDE, STEPHEN VINCENA, WALTER GEKELMAN, University of California, Los Angeles — The supersonic expansion of a laser-produced carbon plasma through an ambient argon plasma ($n \sim 2 \cdot 10^{12} cm^{-3}, c_s = 4 \cdot 10^5 cm/s$) is studied in the Large Plasma Device at UCLA. A laser-induced fluorescence diagnostic characterized the interface of the plasma species' populations as the carbon plasma expands ($\tau_{exp} \sim .5 \mu s$) along the background magnetic field. A planar beam of a YAG-pumped, tunable dye laser sampled the distribution function of the Ar-II ions using the Doppler broadened transition at 611.5 nm. A CCD camera with a fast ($\geq$3 ns) shutter provided a spatially and temporally resolved image of the fluorescence. Time lapsed imaging revealed a front of argon ion excitation moving at a speed comparable to the carbon parallel expansion velocity ($v_{exp} \sim 1 \cdot 10^7 cm/s$) while the distribution function from the transition spectra showed a significant fraction of argon ions accelerated to an ion sound speed mach number of 2-3. The laser-induced fluorescence measurements are supplemented by magnetic and Langmuir probe measurements.

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