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Optical Tagging of Ion Beams Accelerated by Double Layers in Laboratory Plasma TIMOTHY GOOD¹, Gettysburg College, Department of Physics, EVAN AGUIRRE, DEREK THOMPSON, EARL SCIME, West Virginia University, Department of Astronomy and Physics — Experiments in helicon sources that investigate plasma expansion into weakly magnetized, low density regions reveal the production of supersonic ion beams attributed to acceleration by spatially localized double layer structures. Current efforts are aimed at mapping the ion velocity flow field utilizing 2D spatially scanning laser induced fluorescence (LIF) probes that yield metastable ion velocity distribution functions (IVDF) for velocities along and perpendicular to the flow.* Observation of metastable ion beams by LIF renders plausible a Lagrangian approach to studying the field-ion interaction via optical tagging. We propose a tagging scheme in which metastable state ion populations are modulated by optical pumping upstream of the double layer and the synchronous detection of LIF at the ion beam velocity is recorded downstream. Besides the unambiguous identification of the source of beam ions, this method can provide detailed dynamical information through time of flight analysis. Preliminary results will be presented.

Reference to Evan Aguirre's poster

¹Please include this poster in session that includes poster authored by Evan Aguirre et al.

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