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Laser Beat-Wave Magnetization of a Dense Plasma[1] KEVIN YATES, University of New Mexico, SCOTT HSU, DAVID MONTGOMERY, JOHN DUNN, SAMUEL LANGENDORF, Los Alamos National Lab, BRADLEY POLLOCK, TIMOTHY JOHNSON, Lawrence Livermore National Lab, DALE WELCH, CARSTEN THOMA, Voss Scientific — We present results from the first of a series of experiments to demonstrate and characterize laser beat-wave magnetization of a dense plasma, motivated by the desire to create high-beta targets with standoff for magneto-inertial fusion. The experiments are being conducted at the Jupiter Laser Facility (JLF) at LLNL. The experiment uses the JLF Janus 1ω (1053 nm) beam and a standalone Nd:YAG (1064 nm) to drive the beat wave, and the Janus 2ω (526.5 nm) beam to ionize/heat a gas-jet target as well as to provide Thomson-scattering (TS) measurements of the target density/temperature and scattered light from the beat wave. Streaked TS data captured electron-plasma-wave and ion-acoustic-wave features utilizing either nitrogen or helium gas jets. Effects of initial gas density as well as laser intensity on target have been measured, with electron densities ranging from 1E18 to 1E19 cm-3 with temperatures of tens to hundreds of eV, near the desired range for optimal field generation. LSP simulations were run to aid experimental design and data interpretation.

[1]LANL LDRD Program

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