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Scaling of laser interactions with plasmas from high-Z gasbags RICHARD BERGER, C. CONSTANTIN, L. DIVOL, N. MEEZAN, C. NIEMANN, L. SUTER, Lawrence Livermore National Laboratory — Gasbags filled with high-Z gases (Krypton and Xenon) illuminated with 38 heater beams of 351nm wavelength and two probe beams at the Omega Laser Facility showed remarkably little stimulated Brillouin backscatter and even less stimulated Raman backscatter of the 351nm and 527nm probe beams. The probe beams were focused with an f/6.7 lens to a 250 micron diameter spot near the center of the gasbag to produce a vacuum intensity of 8 x 10^{14} W/cm^2. Both the heater and probe beams were 1ns in duration but the probe beams were delayed 500ps with respect to the heater beams. For the duration of the probe beam interaction with the plasma, the electron temperature at the center reaches 4 keV for the lowest fill pressures (N_e = 4 x 10^{20} cm^{-3} where N_e is the electron density) and 3 keV for the higher fill pressures (N_e = 1 x 10^{21} cm^{-3}). Because Z Te/Ti >> 1, ion acoustic waves driven by the SBS interaction are weakly damped, and expectations, based on experiments with CO_2 fills where Z Te/Ti is also large, are that SBS should exceed 25% rather than the measured 2-5%. With a combination of linear gain calculations and pF3d simulations, we show that the reflectivity can be explained by a combination of the effects of inverse bremsstrahlung absorption of the probe beam and the backscattered light, velocity and density gradients, and the large Debye length of the hot plasma.

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