Experiments to Assess Preheat in Blast-wave-driven Instability Experiments

C.M.Krauland[1], C.C.Kuranz[1], R.P.Drake[1], T.R.Boehly[2], J.P.Knauer[2], M.J.Grosskopf[1], D.C.Marion[1]

[1]*University of Michigan, 2455 Hayward St. Ann Arbor, MI, 48109*

[2]*Laboratory for Laser Energetics, University of Rochester, 250 East River Rd. Rochester, NY, 14623*

The use of multi-kilojoule, ns lasers to launch shock waves has become a standard method for initiating hydrodynamic experiments in Laboratory Astrophysics. However, the intense laser ablation that creates moving plasma also leads to the production of unwanted energetic x-rays and suprathermal electrons, both of which can be sources of material preheating. In principle, this preheat can alter the conditions of the experimental setup prior to the occurrence of the intended dynamics. At the University of Michigan, ongoing Rayleigh-Taylor instability experiments are defined by precise initial conditions, and potential deformation due to preheat could greatly affect their accuracy. An experiment devised and executed in an attempt to assess the preheat in this specific case will be presented, along with the quantitative analysis of the data obtained and comparison with 2D simulations.

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