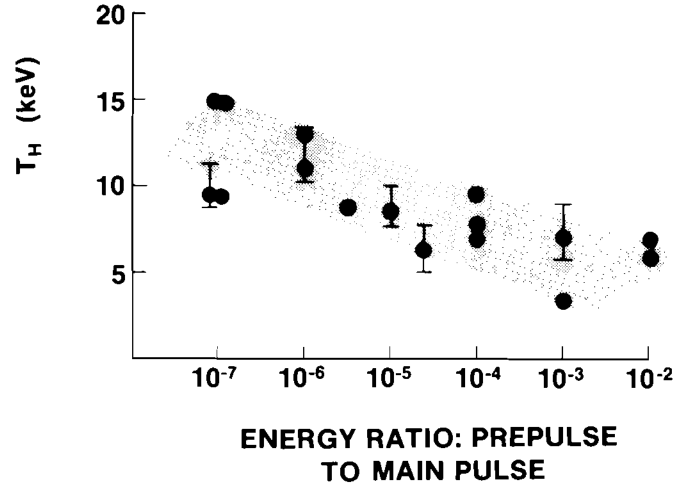


Figure 10 *T_H versus the energy ratio of prepulse to main pulse obtained from hard x-ray spectra. The main pulse peak intensity was 5 × 10^{15} W/cm^2. Typical error bars are shown.*

The ion data is consistent with an isothermal expansion model, which then yields a value for T_H. Values for T_H from fast ion spectra are typically 1.0-1.5 times the T_H obtained from hard x-ray data. Suprathermal temperatures from fast ion spectra also decline as the prepulse energy is increased; in addition, the total energy in fast ions decreases.

These results for the T_H dependence on prepulse energy conflict with crude estimates for the dependence. In previous experiments at LLE, the density profile from 0.1 $\times$ n_c to n_c (critical density) has been measured by double pulse holographic interferometry using a fourth harmonic probe pulse[4]. The density scale length in this region below n_c is found to increase with prepulse energy. The scale length L at n_c may also increase and certainly would not be expected to decrease with prepulse energy. Combining this observation with the scaling $T_H \sim \sqrt{L}$ for resonance absorption[5] would suggest that T_H should not decrease with increasing prepulse energy. Since T_H did decrease, the processes in the corona determining T_H are clearly more complex than assumed above. A number of effects related to the transport of suprathermal electrons in the low density prepulse plasma may be important here. It is also possible that the incident intensity reaching critical density is reduced by stimulated scattering on the longer density scale lengths produced by the prepulse. This area of the laser plasma interaction certainly requires more investigation.

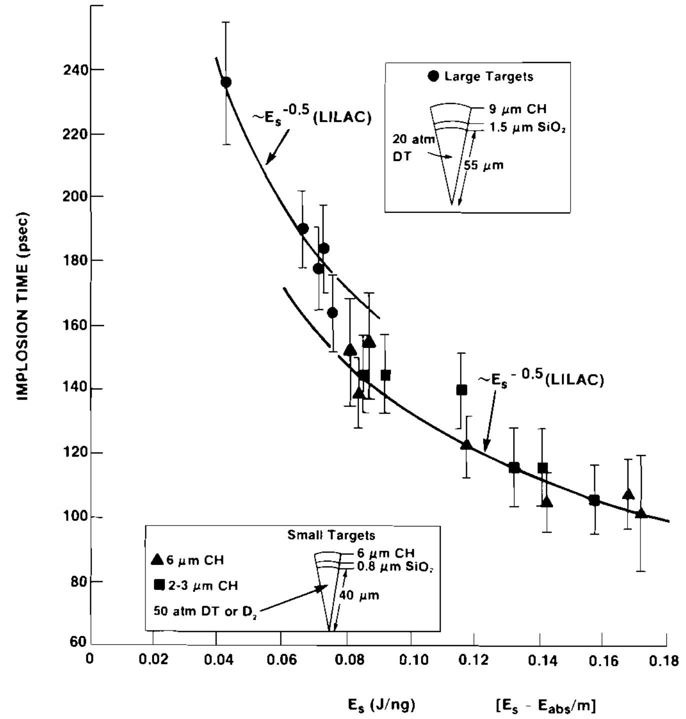
2.C Intermediate Density Experiments on ZETA

Analysis of previous implosion experiments with plastic coated targets has shown an increase in yield with wall thickness for constant implosion velocity. We therefore have indication of improved yield due to higher compression, an expected consequence of symmetric implosions with thicker wall targets. These results are also reproduced by LILAC simulations.

The experiments were carried out on the ZETA six beam laser with 100-150 J of energy in 50-80 psec pulses. The implosion times were measured with an x-ray streak camera equipped with a sequence of timing fiducials, which were at a known temporal relation to the laser pulse. Measurements were then made of the time from the peak of the laser pulse to the peak of the x-ray pulse produced at stagnation of the implosion, this time being defined as the implosion time. Figure 11 shows implosion times versus specific absorbed energy, $E_s = E_{abs}/m$, for a number of experiments on two sizes of plastic coated targets.

A crude estimate for the expected implosion time scaling with E_s can be made by taking the kinetic energy of the imploding shell to be proportional to E_s. Then the implosion time $\tau \sim v^{-1} \sim E_s^{-0.5}$. LILAC simulations give the same scaling result. The data in Figure 11 fall along such scaling curves quite well. The larger targets lie on a separate curve because of the longer implosion distance*. For the smaller 85-90 μm diameter targets the plastic coating thickness was either 2-3 μm or 6μm. We observe that for these targets the implosion time is independent of coating thickness for a particular E_s.

Figure 11 *Implosion time versus specified absorbed energy obtained on ZETA for two sizes of targets. The curves show LILAC scalings.*



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*The difference in implosion times is also related to the fill pressure difference.