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Temperature gradients in solid targets irradiated by high intensity short pulse laser[1] SOPHIA N. CHEN, University of California, San Diego, PRAVESH K. PATEL, HYUN-KUNG CHUNG, ANDREAS J. KEMP, SEBASTIEN LE PAPE, BRIAN R. MADDOX, SCOTT C. WILKS, Lawrence Livermore National Laboratory, FARHAT BEG, University of California, San Diego
— It has been observed that there exists a rapid decrease in thermal temperature in solid targets, as a function of depth, when irradiated by a high intensity short pulse laser. This phenomenon is further investigated using the Titan short pulse laser with intensities greater than 10^{20} W/cm^2 and buried layer targets. The longitudinal temperature profile is determined by measuring K-shell spectra from a 0.4 μm copper tracer layer placed at various depths (ie. 0-1.5 μm) within the 2.4 μm thick target. To study origins of K-shell x-rays in both space and time, a model involving hydrodynamics code HYADES and non-LTE atomic code FLYCHK has been developed. In addition, effect of the fast electron population on K-shell spectra is examined. Preliminary simulation results have produced good agreement with experimental measurements.

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