Study of fast electron generation and transport in interactions of intense laser pulse with pre-plasma produced by long laser pulse on foil targets

T. YABUUCHI, J.A. KING, M.S. WEI, B.S. PARADKAR, S.N. CHEN, T. MA, F.N. BEG, UCSD, R.B. STEPHENS, GA, M. HATAKEYAMA, N. NAKANII, H. HABARA, K. MIMA, K.A. TANAKA, ILE — The influence of pre-plasma on fast electron generation is a critical issue for fast ignition. Multi-layered targets containing a Cu fluorescence layer were irradiated by an intense laser pulse ($I \leq 2 \times 10^{18} \text{ W cm}^{-2}$) at the ILE, Japan. Various scale lengths of pre-plasma were generated using a long laser pulse. $K_{\alpha}$ x-rays spectroscopy and imaging were employed to characterize electron generation and transport. The Cu $K_{\alpha}$ x-rays were viewed from the front (laser irradiated) side through an Al ablator layer that prevented direct heating of the fluor. The presence of pre-plasma caused an x-ray yield reduction ($\leq 50\%$) and created a ring structure around an x-ray bright spot. Results compared against radiation hydrodynamics and hybrid/PIC modeling will be presented.

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