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Study of the plasma expansion produced on ultra-thin foil targets with a high intensity and ultrashort laser pulse SEMEN GNEDYUK, SYLVAIN FOURMAUX, INRS-EMT, SEBASTIEN BUFFECHOUX, BRUNO ALBERTAZZI, LULI, FRANCOIS MARTIN, JEAN CLAUDE KIEFFER, INRS-EMT — INRS-EMT, Université du Québec, 1650 Lionel Boulet, Varennes J3X 1S2, Québec, Canada LULI, UMR 7605, CNRS - CEA - Université Paris 6 - Ecole Polytechnique, Palaiseau, France Abstract: A high intensity ultrashort laser pulse, with an intensity of the order of 10^{19} W/cm^2, focused onto a thin foil target generates a plasma and highly energetic ion (including proton) beams from its front and rear sides which propagate along the target normal. Another interest of laser plasma interaction with ultra-thin foil is the possibility to deposit energy in the entire laser absorption depth before any expansion thus enabling target isochoric heating. With a target thickness of 30 or 15 nm the laser pulse should interact in volume and enable to reach very high temperature while the target is still at solid density. The resulting cooling of the target will then be ultra-fast and potential X-ray emission should be ultrashort. The 100 TW class laser system at the Advanced Laser Light Source facility enables laser plasma interaction study with femtosecond laser pulses, ultra thin foil targets and high contrast laser pulse intensity ratio. We used a shadowgraph diagnostic with a femtosecond laser probe to characterize the plasma expansion.

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