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Proton probing of ultra-thin foil dynamics in high intensity regime RAJENDRA PRASAD, ESIN AKTAN, BASTIAN AURAND, MIRELA CERCHEZ, OSWALD WILLI, Institute for laser and plasma physics, Heinrich Heine University Duesseldorf, Germany — The field of laser driven ion acceleration has been enriched significantly over the past decade, thanks to the advanced laser technologies. Already, from 100s TW class systems, laser driven sources of particles and radiations are being considered in number of potential applications in science and medicine due to their unique properties. New physical effects unearthed at these systems may help understand and conduct successful experiments at several PW class multi-beam facilities with high rep rate systems, e.g. ELI. Here we present the first experimental results on ultra-thin foil dynamics irradiated by an ultra-high intensity (10^{20} W/cm^2), ultra-high contrast (10^{-12}) laser pulse at ARCTURUS laser facility at HHU Duesseldorf. By employing the elegant proton probing technique it is observed that for the circular polarization of laser light, a 100nm thin target is pushed forward as a compressed layer due to the radiation pressure of light. Whereas, the linear polarization seems to decompress the target drastically. 2D particle-in-cell simulations corroborate the experimental findings. Our results confirm the previous simulation studies investigating the fundamental role played by light polarization, finite focus spot size effect and eventually electron heating including the oblique incidence at the target edges.

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