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Experimental Study for the Laser Driven Protons Acceleration with a Circularly Polarized Ultra-short and High-intense Laser Pulse Interaction with Ultra-thin Target DONGHOON KUK, JOEL BLAKENEY, SAMUEL FELDMAN, GILLISS DYER, BJORN HEGELICH, TODD DITMIRE, University of Texas at Austin, CENTER FOR HIGH ENERGY DENSITY SCIENCE TEAM — When a linearly polarized TW laser pulse interacts with a solid target, the hot electrons generated by the J x B heating lead to charge separation and accelerate ions to multi-MeV. However, this non –adiabatically heated hot electrons result thermal distribution of the accelerated ions. To suppress the thermal effects of the hot electrons, circularly polarized beam incident on an ultra-thin target has been suggested in which the oscillating component of the J x B force is removed. In this paper, we present the experimental study of the circularly polarized 10^{19} W/cm^2 irradiance beam interaction with few tens of nanometer thickness of PMMA targets. We observe that the circularly polarized beam generates obviously decreased number of hot electrons compared with the linearly polarized beam and that results the different energy spectrum of the accelerated protons.

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