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Laser-driven ion dynamics using multiple ultra-high intensity laser beams MARCO SWANTUSCH, RAJENDRA PRASAD, MIRELA CERCHEZ, SVEN SPICKERMANN, BASTIAN AURAND, THOMAS WOWRA, JUERGEN BOEKER, Institute for Laser and Plasma Physics, Heinrich Heine University Duesseldorf, 40225, Germany, TOMA TONCIAN, Center for High Energy Density Science The University of Texas at Austin 2515 Speedway Stop C1510 Austin, TX 78712-1204, OSWALD WILLI, Institute for Laser and Plasma Physics, Heinrich Heine University Duesseldorf, 40225, Germany — Ion acceleration from foils irradiated by a laser pulse at relativistic intensity is dominated by target rear-side electron dynamics of the foil. Simulations show that focusing a second, similar intense laser beam onto the foil, one can produce ion beams with interesting spectral features with respect to angular distribution and higher cut-off energies or can even initiate another acceleration phase depending on the temporal delay. In this contribution, we report on a series of recent experiments adressing the ion acceleration utilizing two ultrashort (30fs), high intensity (10^{20} W/cm^2) and high contrast (10^{-10}) laser beams. Both beams were focused and spatially overlapped onto 5 micron titanium targets. The main goal was to investigate the impact of temporal delaying of the two laser pulses on the maximum proton and/or ion energy. Extensive studies show an proton energy enhancement by factor 1.5 and clear impact on carbon ion spectra. In addition, we characterize the rearside plasma expansion with a temporal and spatial resolved interferometer (TASRI) and recflectometry using a chirped optical probe to obtain the evolution of electron temperatures and densities in a 20 ps time window for each shot.

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