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Laser-driven Ion Acceleration from pre-expanded thin foils.

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Over the past decade, ion acceleration from near-critical density (NCD) targets has been a hot research topic [1]. The near-critical term arises from the fact that the laser frequency wL is resonant with the plasma frequency wP where the transparency threshold of the propagation in the plasma is marked [2]. Studies have shown that this regime can actually be beneficial for ion acceleration. Compared to solid targets, more laser light is absorbed by the near-critical density targets leading to the conversion of the laser energy to electrons kinetic energy; producing hot electrons that enhances the acceleration process in return [3]. In this poster we present an exploding foil experiment, were we pre-expand a thin foil via a dedicated pre-pulse

$$(10^{15} W/cm^2)$$

prior to the interaction with the main pulse

$$(10^{20} W/cm^2)$$

. A Nano-second probing beam in combination with a streak camera is used to diagnose the state of the Plasma during expansion. This experiment is still ongoing and our aim is to diagnose the optimum plasma density for ion acceleration for preliminary results to be presented.

References

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