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New Targets for Laser Proton Production

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We present a new method for the hydrogen enrichment of targets for high-power laser-matter interaction. Transition metals (Ta, Ti, Nb, Pd) are known as good H₂ adsorbers. After a laser cleaning process (by KrF excimer laser) of thin samples (thickness ~ 10 μm) a constant flow of H₂ (6.0 pure) was maintained inside the vessel. Next, we exposed the metal foils to excimer laser irradiation (1500 pulses) in order to promote adhesion of the hydrogen. We tested the targets at Lecce and Frascati laboratories. Measurements performed on Ti targets showed an increase (a factor ~ 4, up to 5×10⁹ protons/shot) of proton yield with respect to reference targets not enriched in Hydrogen.

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