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Energy scaling of laser accelerated protons, and performance of reduced mass targets JOSEFINE METZKES, K. ZEIL, S.D. KRAFT, S. BOCK, M. BUSSMANN, U. HELBIG, T. KLUGE, T.E. COWAN, R. SAUERBREY, U. SCHRAMM, Forschungszentrum Dresden-Rossendorf — Proton acceleration from thin foils and reduced mass targets is studied with the 150 TW Ti:Sa DRACO Laser at FZD. DRACO has ∼30 fs pulses, with up to 5 J at 10 Hz, and a contrast of 1e-10 in the ps regime, and 1e-9 to 1e-10 in the ns regime. Proton spectra are measured in radiochromic film stacks and magnetic spectrometers. Flat metallic foils exhibit a near-linear scaling of the maximum proton energy with laser power, consistent with [1] in the limiting case of ultrashort laser pulses [2]. Despite the high laser contrast, a slight deformation of the target rear surface results in a reproducible deflection of the emission of energetic protons away from the target normal direction [2]. The mass limited targets of 2 μm thick Si, were fabricated by MEMS techniques and ranged from 20x20 μm^2 to 100x100 μm^2 lateral size. Significant influence of the target edge and supporting stalks is observed, which depending on size can both both increase or decrease the maximum proton energy in comparison to a flat foil.

[1] J. Schreiber *et al.*, **PRL 97**, 045005 (2006).
[2] K. Zeil *et al.*, **NJP 12**, 045015 (2010).

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