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Particle Generation by Interaction between 1 TW, 50 fs Laser and Thin Foils

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Abstract: Thin ($< 10 \mu\text{m}$) plastic and metal foils were irradiated by 1 TW, 50 fs laser pulses at an incident angle of $\pi/4$. Particle beams were obtained on both sides of the foil with respect to the laser injection. A laser intensity of up to $10^{17} \text{ W cm}^{-2}$ produced only neutral particle beams on the forward side of the laser propagation with small ($\sim 15^\circ$) divergence. When the laser intensity was higher than $10^{17} \text{ W cm}^{-2}$, a particle beam with larger ($> 70^\circ$) divergence was observed in addition to that with smaller divergence. The components of the neutrals and ions were contaminants of the foil surface. On the other hand, mainly ions were produced on the backward side, which were components of the target foils. The most energetic particles were protons on both sides, whose energy was about 550 keV.

Key Words: [Ion source](#), [Neutral beam](#), [Table-top terawatt laser](#), [CR39](#), [Thomson parabola](#)

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