Contribution ID: **322** Type: **Oral contribution**

Highly efficient proton acceleration from solid and pre-expanded thin foils

Tuesday, 19 September 2023 17:45 (20 minutes)

We present the preliminary results of proton acceleration from tens of nanometer thick plastic foils that are irradiated by a 10^{21} W/cm^2 laser pulse with 25 fs pulse duration and 1.8 μm focal spot size (FWHM). We consider the effect of circular (CP) and linear (LP) polarization on the proton energy spectra. For CP we observe an optimum in the proton energy in dependence of the target thickness; such an optimum is absent from the LP data. Thinner targets in the range of (10-50) nm exhibit monoenergetic proton spectra. This feature is lost for foils thicker than 90 nm and the cut-off energy is significantly lowered.
Further, we study the impact of pre-expanding the target by introducing a pre-pulse on the order of 10^{15} W/cm^2 that arrives at the target a few picoseconds before the main pulse. Record peak proton energies per Joule of laser energy are observed.

Primary authors: SHI, Mingyuan (Helmholtz Institute Jena); SALAHELDIN, Israa (Helmholtz Institute Jena); HILZ, Peter (Helmholtz Institute Jena); SÄVERT, Alexander (Helmholtz Institute Jena); SCHÄFER, Georg (Helmholtz Institute Jena); ZEPF, Matt (Helmholtz Institute Jena)

Presenter: SALAHELDIN, Israa (Helmholtz Institute Jena)

Session Classification: WG6: Ion acceleration and developments towards fusion

Track Classification: WG6: Ion acceleration and developments towards fusion