7th European Advanced Accelerator Conference

EAAC2025

Contribution ID: **691** Type: **Invited Talk**

Stable laser-acceleration of high-flux proton beams from liquid sheets

Monday 22 September 2025 11:00 (30 minutes)

Laser-plasma acceleration has enormous potential to provide compact sources of ultra-short ion beams. Several factors, such as the low shot-to-shot stability, large beam divergence and the difficulty of high-repetition rate operation, hamper their wider adoption. Recent work demonstrates an approach for overcoming these challenges using a novel liquid sheet target, developed at the SLAC National Accelerator Laboratory. These experiments, at the GEMINI TA2 laser facility (10 TW, 5 Hz), demonstrated stable acceleration of few MeV proton beams via target normal sheath acceleration with beam exhibiting high flux and low-divergence in comparison to proton beams from typical thin foil targets [1]. Supporting PIC simulations indicate that the presence of the low-density background vapour which surrounded the target plays an important role in the observed collimation of the proton beam through the generation of azimuthal magnetic fields which act to focus the proton beam. The measured proton beams are already suitable for applications requiring high proton flux and the platform can be extended to kHz repetition rates or higher laser energies extending the utility of the source to a wide range of applications.
[1] Streeter et al., Nat. Comms 16, 1004 (2025)

Author: PALMER, Charlotte (Queen's University Belfast)

Presenter: PALMER, Charlotte (Queen's University Belfast)

Session Classification: Plenary Session

Track Classification: Invited Talk