



Contribution ID: 72

Type: **not specified**

Exploiting novel liquid sheet targets for the generation of bright MeV proton beams [BALLROOM]

Tuesday, 23 July 2024 11:00 (30 minutes)

Laser-plasma acceleration has enormous potential to provide compact sources of ultra-short ion beams. However, several factors hamper their wider adoption, such as the low shot-to-shot stability, large beam divergence and the difficulty of high-repetition rate operation. In this talk I will outline an approach for overcoming these challenges by a novel liquid sheet target, developed at the SLAC National Accelerator Laboratory. I will report on recent experiments at the GEMINI TA2 laser facility (10 TW, 5 Hz) which demonstrated stable acceleration of few MeV proton beams with high flux and low-divergence proton beams in comparison to typical laser-accelerated ion beams. Supporting PIC simulations have shown that the presence of background vapour around the target plays an important role in the observed collimation of 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 in radiobiology, materials science and fundamental physics.

Working group

invited speaker

Primary author: PALMER, Charlotte (Queen's University Belfast)

Co-authors: Dr STREETER, Matthew (Queen's University Belfast); Dr HAMAD, Ahmed (Central Laser Facility, STFC); Mr LOUGHRAN, Brendan (Queen's University Belfast); Mr ASTBURY, Sam (Central Laser Facility, STFC); Prof. BORGHESI, Marco (Queen's University Belfast); Dr BOURGEOIS, Nicolas (Central Laser Facility, STFC); Dr CURRY, Chandra (SLAC National Accelerator Laboratory); Dr DANN, Stephen (Central Laser Facility, STFC); Mr DIIORIO, Stephen (Gérard Mourou Centre for Ultrafast Optical Science, University of Michigan); Dr DOVER, Nicholas (The John Adams Institute for Accelerator Science, Imperial College London); Dr DZELZAINIS, Tom (Central Laser Facility, STFC); Dr ETTLINGER, Oliver (The John Adams Institute for Accelerator Science, Imperial College London); Dr GAUTHIER, Maxence (SLAC National Accelerator Laboratory); Dr GIUFFRIDA, Lorenzo (Extreme Light Infrastructure Beamlines Centre); Mr GLENN, Griffin (SLAC National Accelerator Laboratory); Prof. GLENZER, Siegfried (SLAC National Accelerator Laboratory); Dr GRAY, Ross (University of Strathclyde); Dr GREEN, James (Central Laser Facility, STFC); Dr HICKS, George (The John Adams Institute for Accelerator Science, Imperial College London); Dr HYLAND, Cormac (Queen's University Belfast); Dr ISTOKSKAIA, Valeriia (Extreme Light Infrastructure Beamlines Centre); Dr KING, Matthew (University of Strathclyde); Dr MARGARONE, Daniele (Extreme Light Infrastructure Beamlines Centre); Ms MCCUSKER, Orla (Queen's University Belfast); Prof. MCKENNA, Paul (University of Strathclyde); Prof. NAJMUDIN, Zulfikar (The John Adams Institute for Accelerator Science, Imperial College London); Ms PARISUANA, Claudia (SLAC National Accelerator Laboratory); Mr PARSONS, Peter (Queen's University Belfast); Mr SPINDLOE, Chris (Central Laser Facility, STFC); Dr SYMES, Dan (Central Laser Facility, STFC); Prof. THOMAS, Alec (Gérard Mourou Centre for Ultrafast Optical Science); Dr TREFFERT, Franziska (Lawrence Livermore National Laboratory); Dr XU, Nuo (The John Adams Institute for Accelerator Science, Imperial College London)

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

Session Classification: Plenary