

Reduced divergence of TNSA proton beams using a foil target and a gas jet

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Typically, target normal sheath accelerated protons have a high divergence, often greater than 10s of degrees. However, a lower divergence beam is beneficial for many applications and for beam capture by a transport system. An experiment in at the Gemini TA2 laser facility (Central Laser Facility), using a water sheet target, observed proton beams with a divergence in the order of 1 degree; the reduction in beam divergence has been attributed to the effect of a low-density plasma in the water vapour surrounding the target on proton beam propagation. This motivated an experiment to explore the effect of a low-density plasma behind the target on beam divergence at the Vulcan Petawatt laser (Central Laser Facility), using a gas jet behind a thin foil target. Initial results suggest that the presence of a gas reduced the divergence of the proton beam and that the gas only had a small effect on maximum proton energies and proton numbers. The preliminary results of this experiment will be presented in this poster.

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