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A thin solid hydrogen target for ion acceleration at a high repetition rate

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Laser-plasma acceleration is used to accelerate charged particles and can minimize the size of the next-generation accelerators. However, compared to radiofrequency accelerators, the energies of particles are still low. The ion beam produced by the interaction of the target medium and the high-power laser depends mainly on the laser parameters and the target characteristics. To enhance the ion energy, the target needs to be thinner to foster a radiative pressure acceleration scheme rather than other ions acceleration schemes. The low-temperature system department, DSBT, has developed the cryostat Elise, to produce a solid hydrogen target at 10 K with a thickness of a hundred micrometer. This target is extruded continuously through the nozzle using the hydrogen changes state. The low rise of the vacuum level during the experiment is compatible with the petawatt high repetition rate laser facility as Apollon or Eli-Beamlines. The current development to reduce the thickness is to use a 2200 nm laser to sublimate the target surface. The new target thickness will be measured by a Nomarski interferometer with two different wavelengths.

This talk will present two ions acceleration schemes, TNSA and RPA, the current development to reduce and measure the target thickness.

Language

Field

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