

AbstractID: 1150 Title: Optimized target design and generation of quasi-monoenergetic proton beams for laser-proton accelerator.

Double target design consisting of a layer of heavy atoms and a thin layer of hydrogen is amenable to generation of quasi-monoenergetic proton beams accelerated by high power lasers. We present analytical as well as PIC simulation results of laser interaction with complex target system. Using over-the-barrier ionization model we calculate the charge state of the heavy ion target, which is subsequently used in the PIC simulations. The results of parametric studies show that the proton energy distribution is a function of many parameters (for a given laser pulse intensity) including the thickness and density of both the heavy ion and hydrogen targets, the charge state of the heavy ion layer, and ion to proton mass ratio. Proton depth dose distributions calculated using the energy spectra of accelerated protons exhibit somewhat wider Bragg peaks, but otherwise preserving the overall advantages of proton dosimetry. The possibility of tailoring the target design can lead to proton acceleration with specific energy spectrum that can potentially provide a spread out Bragg peak without resorting to particle selection device.