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Comparative Study of Radiation Dosage Distribution and Medical Implication of Quasi-monoenergetic Proton Generated from Laser Acceleration of Ultra-thin Foil TEMUGE BATPUREV, University of Maryland, College Park, JENNIFER CAO, Richard Montgomery High School, WANG XIE, Sidwell Friends Upper School in Washington DC, TUNG-CHANG LIU, XI SHAO, CHUAN-SHENG LIU, University of Maryland, College Park — Recently the search for mono-energetic protons has gained great interest, particularly in applications such as proton therapy for cancer treatment. The advantage of proton therapy is that unlike photon radiation, proton beams deposit most of the energy at the tumor, sparing surrounding tissue and vital organs. A compact laser-driven proton accelerator is attractive for proton cancer therapy since the electric fields for particle acceleration can reach the order of tens of GV per cm which allows large reduction of the system size. Recent work by Liu et al. [2012] shows that laser acceleration of an ultra-thin multi-ion foil can generate high quality quasi-monoenergetic proton beams. The proton acceleration is due to the combination of radiation pressure and heavy-ion Coulomb repulsion. To assess the feasibility of laser-proton cancer therapy with such a proton accelerator, we simulated the interaction of protons with water and determine the radiation dosage deposition for particle beams produced from the PIC simulation of laser acceleration of multi-ion targets. We used the SRIM code to calculate the depth and lateral dose distribution of protons. We also compared the dosage map produced from protons generated from laser acceleration of single ion and multi-ion targets.

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