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Laser Acceleration of Proton with Multi-Ion Plasma Gaseous Targets[1] CHUAN-SHENG LIU, TUNG-CHANG LIU, XI SHAO, University of Maryland, College Park — We present simulation results of quasi-monoenergetic proton acceleration with a circularly polarized laser irradiating on a carbon-hydrogen target with thickness 2.5 wavelength. We show that caviton, shock and radiation pressure accelerations are initially the dominant mechanisms. After 50 laser periods, when the electrons become transparent to laser, Coulomb repulsion then becomes the leading acceleration mechanism, stably accelerating the proton layer for 150 more periods. Quasi-monoenergetic protons of 80 MeV can be obtained by a laser with normalized amplitude a = 10 and pulse duration 150 wave periods. In comparison, using similar input parameters on single-species gas target, we can only obtain proton energy less than 40 MeV.

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