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Simulations of laser-driven ion acceleration from a thin CH target[1] JAEHONG PARK, STEPAN BULANOV, QING JI, SVEN STEINKE, FRANZISKA TREFFERT, JEAN-LUC VAY, THOMAS SCHENKEL, ERIC ESAREY, WIM LEEMANS, Lawrence Berkeley National Laboratory, HENRI VINCENTI, LIDYL, CEA, CNRS, Universite Paris-Saclay — 2D and 3D computer simulations of laser driven ion acceleration from a thin CH foil using code WARP were performed. As the foil thickness varies from a few nm to μm, the simulations confirm that the acceleration mechanism transitions from the RPA (radiation pressure acceleration) to the TNSA (target normal sheath acceleration). In the TNSA regime, with the CH target thickness of 1μm and a pre-plasma ahead of the target, the simulations show the production of the collimated proton beam with the maximum energy of about 10 MeV. This agrees with the experimental results obtained at the BELLA laser facility ($I \sim 5 \times 18 W/cm^2$, $\lambda = 800nm$). Furthermore, the maximum proton energy dependence on different setups of the initialization, i.e., different angles of the laser incidence from the target normal axis, different gradient scales and distributions of the pre-plasma, was explored.

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