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Quasi-Monoenergetic Dense and Uniform Electron Bunch Generation from Laser Driven Double-Layer Thin Films C. WANG, R. ROYCROFT, E. MCCARY, A. MEADOWS, J. BLAKENEY, K. SERRATTO, D. KUK, C. CHESTER, L. GAO, Center for High Energy Density Science, University of Texas, Austin, H. FU, X.Q. YAN, State Key Laboratory of Nuclear Physics and Technology, Peking University, J. SCHREIBER, Fakultat fur Physik, Ludwig-Maximilians-University, I. POMERANTZ, A. BERNSTEIN, H. QUEVEDO, G. DYER, E. GAUL, T. DITMIRE, Center for High Energy Density Science, University of Texas, Austin, D.C. GAUTIER, J. FERNANDEZ, Los Alamos National Laboratory, B.M. HEGELICH, Center for High Energy Density Science, University of Texas, Austin — We demonstrate that dense, uniform quasi-monoenergetic relativistic electron bunches can be generated from the interaction of a high-intensity laser pulse with a double-layer thin film target. The first layer of the target is a freestanding, nanometer-scale, diamond-like carbon production layer. The second layer is a thin plastic reflection layer which reflects the drive-laser pulse, but allows electrons to pass through. Although no electron bunch is generated from the second layer alone, by adding it behind the first layer we obtained a quasi-monoenergetic bunch along the laser axis, 35 times denser than a bunch from the single layer target. Comparing the angular distribution of the electron spectra from a double-layer target with that of a single-layer target, we observed an increase of the electron cutoff energy at larger angles, which improves the uniformity of created electron bunches.

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