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Shock compression experiment for gold at an extreme pressure of 0.36Gbar driven by radiation on the Shenguang-III prototype laser facility Z. HU, D. YANG, S. LI, X. JIANG, Y. LIU, R. YI, T. SONG, L. GUO, C. ZHANG, H. ZHANG, Z. LI, S. JIANG, S. LIU, J. YANG, Y. DING, Research Center of Laser Fusion, P. O. Box 919-986, CAEP, Mianyang 621900, China, X. LI, Y. LI, K. LAN, W. ZHENG, Institute of Applied Physics and Computational Mathematics, Beijing 100088, China — In this paper, we report a radiation-driven shock compression experiment for gold at an extreme pressure around 0.36Gbar. In order to obtain such high pressure with relatively low laser energy, two main proposals were used in the target design: a smaller-size cavity to obtain higher temperature radiation resource, and impedance-match technique for pressure enhancement. The present experiment was carried out on the Shenguang-III prototype laser facility which is located at the research center of laser fusion, Mianyang, China. Eight laser beams (a total energy of 6.4kJ of 0.35μm light in 1nsec) were injected into a cavity and heat its inner wall, and then the generated x-ray radiation was used to ablate an aluminum substrate and generate shock waves. For using the impedance-match, the gold stepped sample was placed on the aluminum substrate. The shock wave velocity of 49.6 km/s was measured by a streaked optical pyrometer, and then the shock-induced pressure of 0.36Gbar was deduced using Hugoniot data of gold.

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