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Energy and angular distribution of photoneutron for 16.6 MeV polarized photon on medium-heavy targets

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Photoneutrons produced from (γ,xn) reactions in high energy accelerators are essential in radiation shielding. In this report, we study the double differential cross sections (DDXs) of (γ,xn) on medium-heavy-mass targets (Pb, Au, Sn, Cu, Fe, and Ti) using a 16.6 MeV monoenergetic linearly polarized photon beam. The photon beam was produced using laser Compton scattering (LCS) technology with high intensity at the BL01, NewSUBARU, Hyogo, Japan. Photoneutrons on each target are detected by six neutron detectors filled with liquid scintillator NE213, positioned at different angles. The pulse shape discrimination and time-of-flight techniques were used to select and measure the energy of neutrons. For every target, we can identify the low energy and high energy components on the DDXs. For the low energy component, we observe a flat angular distribution, while a cos(2Θ) angular distribution was observed for the high energy component. The parameters from fitting the angular distribution of experimental data were compared with those from previous studies.

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