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Comparison of double-differential cross sections between JENDL/PD-2016.1 and experimental data for photo-neutron production of medium-heavy nuclei at 16.6 MeV

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The double differential cross-section (DDX) of the photoneutron is an important quantity for radiation shielding and shielding calculation of the electron accelerator design. Shielding calculation is usually carried out by Monte Carlo simulation codes, which use the nuclear data library in the calculation. We measured the DDXs of the (γ, xn) reaction using 16.6 MeV polarized photon on $^{\mathrm{nat.}}\mathrm{Pb}$, $^{197}\mathrm{Au}$, $^{\mathrm{nat.}}\mathrm{Sn}$, $^{\mathrm{nat.}}\mathrm{Cu}$, $^{\mathrm{nat.}}\mathrm{Fe}$, and $^{\mathrm{nat.}}\mathrm{Ti}$ targets [1], and showed the neutron spectra including the evaporation and direct components. In this presentation, we compared the DDXs from the photonuclear data JENDL/PD-2016.1 and the experiment to check their consistency. The DDXs were extracted from the JENDL/PD-2016.1 library by our python-based software. The abundances of each target's isotopes were considered in calculating the DDXs from the JENDL/PD-2016.1 library. This comparison showed the differences in the photoneutron's energy distributions, and the differences were mostly in the direct component. The evaporation components were found in both JENDL/PD-2016.1 and the experimental data; however, they were not totally consistent. This result can be the first comparison of the DDXs from JENDL/PD-2016.1 and the experiment. The quantitative comparison and discussion will be presented at the symposium.

Keywords: differential double cross-section photoneutron, 16.6 MeV polarized photon, JENDL/PS-2016.1.

[1] T.K. Tuyet et al., "Double differential cross section of the (γ, xn) reaction on medium-heavy nuclei for 16.6 MeV polarized photons. 2020 Fall meeting of AESJ, Sep. 16th –18th.

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