NEW PHOTONEUTRON REACTION CROSS SECTION DATA FOR ^{153}Eu and ^{165}Ho

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The analysis of significant systematic disagreements between the results of various photonuclear experiments was carried out for ^{153}Eu [1] and ^{165}Ho [1, 2] experimental data obtained using the beams of quasimonoenergetic annihilation photons and the method of photoneutron multiplicity sorting.

The simple objective physical criteria of data reliability - ratios $F_i = \sigma(\gamma,in)/\sigma(\gamma,xn) = \sigma(\gamma,in)/[\sigma(\gamma,1n) + 2\sigma(\gamma,2n) + \ldots]$, which have values not higher than 1.00 and 0.50, correspondingly were introduced [3]. For both nuclei it was shown that experimental data are not reliable because one can see many physically forbidden negative values of $(\gamma,1n)$ reaction cross sections and correlated with those $(\gamma,2n)$ reaction cross sections for which $F_2 > 0.50$.

The experimentally-theoretical method [3, 4] was used for reliable partial reaction cross section data evaluation. In this treatment only experimental data for neutron yield cross section $\sigma^{exp}(\gamma,xn)$, free from the neutron multiplicity sorting problems, was used for partial reaction cross section evaluation together with functions F_i^{theor}, calculated in the frame of the combined model of photonuclear reactions [5, 6]. Additionally $\sigma^{exp}(\gamma,xn)$ data obtained using bremsstrahlung [7, 8] were used for analysis.

Evaluations of new reliable photoneutron reaction cross section data were carried out for both nuclei for partial reactions $(\gamma,1n)$, $(\gamma,2n)$ and $(\gamma,3n)$ and for total photoneutron reaction $(\gamma,sn) = (\gamma,1n) + (\gamma,2n) + (\gamma,3n)$. The noticeable disagreements between evaluated and experimental data were obtained and analyzed.

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