Contribution ID: **27** Type: **Oral report**

NEW PHOTONEUTRON REACTION CROSS SECTIONS FOR Pb ISOTOPES

Wednesday 22 September 2021 15:55 (25 minutes)

The total photoneutron yield reaction cross sections ☒(☒,xn) = ☒(☒,1n) + 2☒(☒,2n) + 3☒ (☒,3n)+⋯for 208Pb were obtained in experiments carried out using bremsstrahlung, quasimonoenergetic annihilation photons (Livermore (USA) [1] and Saclay (France) [2], and tagged photons [3]. Available data were evaluated using the method of reduction –the special treatment for converting different experiments data into the form for the monochromatic photon effective spectrum [4]. The comparison of data forces one to conclude that all cross sections under discussion agree to each other with exception of Livermore one having a significantly lover value. Using the experimental-theoretical method and the objective physical criteria of data reliability partial reactions (☒,1n), (☒,2n), and (☒,3n) cross sections were evaluated [5] using the Saclay [2] cross section ☒exp(☒,xn). It was shown that significant differences between Saclay and Livermore, as well as between evaluated and Livermore, data are the results of the loss notable amount of neutrons from the reaction (☒,1n). Data for total and partial reactions for 206,207Pb were obtained only at Livermore in the same experiment as for 208Pb [1]. Because similar to the situation for 208Pb the values of both ☒exp(☒,xn) cross sections are noticeably smaller in comparison with the once theoretically calculated in the frame of the Combined PhotoNucleon Reaction Model (CPNRM) [6] both ☒exp(☒,xn) for 206,207Pb were normalized to the ☒theor(☒,xn) with the factors 1.21 (207Pb) and 1.13 (206Pb). With those normalized ☒exp(☒,xn) the reliable cross sections for (☒,1n), (☒,2n), and (☒,3n) reactions were evaluated using experimental-theoretical method. It was obtained that new evaluated cross sections are noticeably different from the experimental once. It was shown that in analogy to the situation for 208Pb such kind differences in the cases of 206,207Pb could be explained only by the loss many neutrons from the reactions (☒,1n).

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Session Classification: Section 2. Experimental and theoretical studies of nuclear reactions

Track Classification: Section 2. Experimental and theoretical studies of nuclear reactions.