Contribution ID: **28** Type: **Plenary report**

PHOTONUCLEAR RESEARCH: STATUS OF EXPERIMENTS

Saturday, 25 September 2021 10:35 (35 minutes)

The majority of total and partial photoneutron reaction cross sections were obtained for about 150 nuclei from 3H to 239Pu at Livermore (USA) and Saclay (France) [1]. Those data [2] are widely used in many basic research and applications. For 19 nuclei (51V, 75As, 89Y, 90Zr, 115In, 116,117,118,120,124Sn, 127I, 133Cs, 159Tb, 165Ho, 181Ta, 197Au, 208Pb, 232Th, and 238U) investigated at both laboratories it was found [3] that photoneutron yield reaction cross sections (σ(□,xn) = σ(□,1n) + 2σ(□,2n) + 3σ(□,3n) + ⋯) obtained in various experiments disagree to each other by about 10% but partial reaction cross sections, first of all σ(□,1n) and σ(□,2n), disagree much more –up to 100% of values. Those disagreements are definitely systematic, because as a rule σ(□,1n) have larger values at Saclay, but σ(□,2n) –vice versa at Livermore. Such disagreements mean that nobody knows which results are reliable. Using the experimental-theoretical method for evaluation of partial reaction cross sections based on the objective physical criteria of data reliability it was shown that many data under discussion obtained in both laboratories using the method of neutron multiplicity sorting are not reliable because significant uncertainties of procedures for separation the events with 1 and 2 as well as with 2 and 3 neutrons. New reliable reaction cross sections were evaluated for ˜50 nuclei, primarily for many of 19 nuclei mentioned above [4]. Using the detail comparison of evaluated and experimental cross sections it was shown that disagreements between those (as well as between Livermore and Saclay once) are the results of various systematic uncertainties. The main reasons of those in many cases are unreliable (erroneous) procedures of separation the neutrons from the various partial reactions. Additional systematic uncertainties of experiments carried out at Livermore are because of errors of separation the neutrons from the reactions (□,2n) and (□,1n1p) in the cases of relatively light nuclei (51V, 59Co, 75As), and the loss of many neutrons from the reaction (□,1n) in the cases of 75As, 127I, 181Ta, and 206,207,208Pb. All reliable evaluated cross sections are included into the international nuclear reaction database [2] and were used for updating of the IAEA digital photoneutron data library.

1. S.S. Dietrich et al., Atom. Data Nucl. Data Tables 38, 199 (1988).
2. http://cdfe.sinp.msu.ru/index.ru.html; http://www-nds.iaea.org/exfor; http://www.nndc.bnl.gov/exfor/exfor00.htm.
3. V.V. Varlamov et al., IAEA NDS, INDC(CCP)–393, IAEA, Vienna, Austria, 1994.
4. T. Kawano et al., Nuclear Data Sheets, 163, 109 (2020).

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Session Classification: Plenary

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