Contribution ID: **40** Type: **Poster**

Photonuclear reaction cross-section evaluation of ^{181}Ta, ^{197}Au, and ^{209}Bi considering experimental double differential cross-section data

Tuesday, 9 July 2024 17:33 (1 minute)

Photonuclear reaction cross-section data are required for wide-range applications, such as electron accelerator shielding design and possibly nuclear transmutation. So far, the nuclear data libraries, such as JENDL [1], TENDL [2], and ENDF [3], of various target materials have been prepared up to a photon energy of 200 MeV. To establish the libraries, almost all evaluations have been conducted only the experimentally obtained reaction cross-section data, i.e., cross-sections of photon absorption and photo-particle yield. However, data libraries have not been validated for the energy spectra of secondary particles because this type of experimental data was scarce when the libraries were established.

Recently, the double differential cross-sections (DDXs) on the medium and heavy targets have been measured using monoenergetic, polarized photons at energies of 13 and 17 MeV [4–6]. Using the DDX data of ^{181}Ta, ^{197}Au, and ^{209}Bi, we have been implementing evaluation for these relatively heavy nuclei, similar in mass to those used as targets and beam stoppers, but different in nuclear structures and forms. We conducted the evaluation using the CCONE code system [7], which is used for JENDL.

The main task of the evaluation was to increase the photoneutron emission from the preequilibrium process described by the two-component exciton model. For this purpose, modifications of the multiplying factor for the state density in the exciton model were made in comparison with the DDX data. The results obtained by our evaluation for reaction cross-sections and DDXs were compared with the results from JENDL-5, as well as experimental data. The evaluation shows better reproduction of photoneutron emission than JENDL-5 for DDXs at 13 and 17 MeV photon energies while maintaining consistency on the total photoneutron cross-section data.

References

[1] O. Iwamoto et al., J. Nucl. Sci. Technol., 60(1), (2023), 1-60.
[2] A.J. Koning et al., Nuclear Data Sheets 155, (2019), 1-55.
[3] D.A. Brown et al. Nucl. Data Sheets 148, (2018), 1.
[4] T. Nguyen et al., J. Nucl. Sci. Technol., 61(2), (2024), 261-268.
[5] T. Nguyen et al., EPJ Web Conf., 292, (2024), 07004.
[6] Tuyet T.K et al., Nucl. Inst. and Meth. in Phys. A, 989, (2021), 164965.
[7] O. Iwamoto et al., Nuclear Data Sheets, 131, (2016), 259-288.

Primary author: NGUYEN THI HONG, Thuong (Graduate University for Advanced Studies, SOKENDAI)

Co-authors: Dr IWAMOTO, Nobuyuki (JAEA); Prof. SANAMI, Toshiya (KEK, SOKENDAI)

Presenter: NGUYEN THI HONG, Thuong (Graduate University for Advanced Studies, SOKENDAI)

Session Classification: Poster Session

Track Classification: Nuclear data evaluation