Contribution ID: **448** Type: **Oral talk (15 min + 5 min questions)**

ESTIMATİON OF THE REACTION CROSS SECTION Li(n,α)T

Tuesday, 12 July 2022 17:30 (20 minutes)

The presented work is carried out analyzes and evaluation of available experimental data on the Li(n,α)T reaction cross section in order to obtain the recommended data. The reaction cross section Li(n,α)T–σnα (En) in neutron physics is often used as a reference quantity. In the neutron energy range En from 0.025 eV to 100 keV, the cross section is known with an accuracy of 1÷3%. In the energy range 500 KeV<En<1.7 MeV, the accuracy is about 15%. As for the energy interval from 100 keV to 500 keV, there are significant uncertainties due to the strong resonance around the neutron energy of 250 keV. In estimating [1] for this energy range, the values of the cross section were recommended, which were obtained from the condition of the best description of the total cross section, the neutron elastic scattering cross section, and the reaction cross section (n,α). Recently, new data on the Li(n, α)T reaction cross section have appeared. The behavior in the energy range 100 keV≤En≤500 keV was studied in particular detail. As noted at the meeting on neutron data, the results of work performed in the energy range 150 KeV≤En≤400 KeV are consistent with each other within ±4%, if we accept a systematic shift in energy (about 5 KeV) of the work results and renormalize the cross sections obtained in work [2] down by 5%.
In this paper, was compared the results of parametrization of experimental data for the energy range 2 KeV≤En≤1500 KeV by the least squares method using a number of different approximations. In this case, the results of different authors are accepted as equal and the errors they cite are not taken into account. As a first approximation, an expression was used that includes the resonant term in the dependence 1/v (1):
(1)
Here, A, B and are constants, E0 is the resonance energy, Γ is the resonance width, A, B, E and are fitting parameters. As a result of processing, the following values were obtained for them:
A=0,0141; B=0,1350; E0=0,2410; Γ=0,1050 и Δσ=0,0260
In this case, the value of χ2 at the point, averaged over the region of 2÷1500 keV, was 3.5 , and the root-mean-square deviation δ0, calculated as:

and averaged over the same energy range was 7.5%. The calculation results together with the experimental data are given in the works [2,3]. In the energy range 2 KeV≤En≤500 KeV, expression (1) describes the experimental data quite well. For En≤500 KeV, the description is much worse.

References:

1. Ignatyuk A.V., Ivanov A.I., Samsonov I.N. et al.// "Neutron physics", Obninsk, 2001 part I, p.325.
2. Balashov V.V., Nikolaev M.M.// "Nuclear constants", Obninsk, 1998, part 2, p.643.
3. Linnik Yu.V.// Theory of the optimal experiment M. "Nauka", 1998.

The speaker is a student or young scientist

No

Section

1. Experimental and theoretical studies of nuclear reactions

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