INVESTIGATION OF THE 24.3 keV M1 + E2 NUCLEAR TRANSITION IN ^{227}Th BY THE CONVERSION ELECTRON SPECTROSCOPY

Kovalík A.[1,2], Inoyatov A.Kh.[1], Perevoshchikov L.L.[1], Ryšavý M.[2], Filosofov D.V.[1], Dadakhanov J.A.[1], Muminov T.M.[3]

[1] *Dzhelepov Laboratory of Nuclear Problems, JINR;*[2] *Nuclear Physics Institute of the ASCR CZ, Řež near Prague, Czech Republic,* [3] *National University of Uzbekistan, Tashkent, Republic of Uzbekistan*

E-mail: inoyatov@jinr.ru

Characteristics of the 24.33(5) keV M1 + E2 [1] gamma-ray transition depopulating the 24.38(3) keV ($3/2^+$) [1] level of ^{227}Th to the ($1/2^+$) [1] ground state play important role (together with the 15.1(2) keV (M1) [1] and 9.3(1) keV (E2) [1] gamma-ray transitions) not only in the spin-parity assignment of the lowest excited levels of ^{227}Th and its ground state but consequently also the spin sequence and band structures of higher levels. Though this nuclear transition is not essential one, we decided to re-investigated its characteristics by means of the internal conversion electron spectroscopy applying the methods and apparatus developed in our laboratory for the low energy nuclear electron spectroscopy. For the investigation, a source of ^{227}Ac (prepared by a sorption on a carbon polycrystalline foil) was used as in its β^-decay only the ground state and the three lowest excited states of ^{227}Th are generated. Altogether, 10 spectrum lines of the measured $L_{1,2,3}$ and $M_{1,2,3}$ conversion electron spectra were evaluated. A preliminary value of 24344.2(19) eV was determined from the obtained data for the transition energy. This value agrees with the adopted one of 24330(50) eV [1] but it is by a factor of 26 more precise. The multipolarity of the investigated nuclear transition was confirmed to be M1 + E2 with the preliminary admixture parameter δ^2(E2/M1) = 0.012(2). The obtained value matches within one standard deviation the adopted one of 0.009(1) [1] as well as that of 0.010(1) [2] determined from the $M_{1,2,3}$ subshell ratios measured with the iron-free orange spectrometer. Moreover, our value agrees also with that of 0.01 deduced in the pioneer work [3] also from the ratios of the measured $M_{1,2,3}$ subshell conversion lines.

[1] Nucl. Data Sheets. 2016. V.132. P.331.
[2] U.Müller *et al.* // Phys. Rev. C. 1997. V.55. P.2267.
[3] G.I.Novikova *et al*. // Zh. Eksp. Teor. Fiz. 1959. V.37. P.928.