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## TAGS SPECTRA ANALYSIS AND BETA DECAY STRENGTH FUNCTION STRUCTURE

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Successful applications of the total absorption  $\gamma$ -spectroscopy (*TAGS*) for the  $\beta$ -decay strength function  $S_\beta(E)$  resonance structure study, methods of *TAGS* spectra interpretation, and results of analysis of  $S_\beta(E)$  structure both for the Gamow-Teller (*GT*)  $\beta^+/EC$  and *GT*  $\beta^-$ -decays were summarized in [1,2]. Development of experimental technique allows application of methods of nuclear spectroscopy with high energy resolution for  $S_\beta(E)$  fine structure measurement [2-4]. First results of the  $S_\beta(E)$  fine structure study were summarized in [2,3]. The combination of the *TAGS* with high resolution nuclear spectroscopy may be applied for detailed decay schemes construction [2]. It was shown [2-4] that the high-resolution nuclear spectroscopy methods give conclusive evidence of the resonance structure of  $S_\beta(E)$  for *GT* and first-forbidden (*FF*)  $\beta$ -transitions in spherical, deformed, and transition nuclei. High-resolution nuclear spectroscopy methods [2-5] made it possible to demonstrate experimentally the reveal splitting of the peak in the  $S_\beta(E)$  for the (*GT*)  $\beta^+/EC$ -decay of the deformed nuclei into two components.

The operating principle of a total-absorption  $\gamma$ -spectrometer is based on summation of the energies of the cascade  $\gamma$ -rays produced after  $\beta$ -decay to excited levels of the daughter nucleus in  $4\pi$ -geometry. There are two methods of the *TAGS* spectra analysis [1]. In the first one it is necessary to identify the total absorption peaks in *TAGS* spectra and have  $4\pi$ -spectrometer with exponential energy dependence of the photoefficiency (i.e., the ratio of the number of pulses in the total absorption peak to the number of  $\gamma$ -ray incident on the detector) for  $\gamma$ -ray registration. Only in this case the efficiency of *TAGS* peak registration does not depend on the details of decay scheme [1,3]. This method gives good results, but can be applied for nuclei with total  $\beta$ -decay energy  $Q_\beta$  less than 5 – 6 MeV. Quantitative characteristics may be obtained as a rule only for one ( $\beta^-$ -decay) peak and for two peaks ( $\beta^+/EC$ -decay) in  $S_\beta(E)$  [1-3].

The second method is based on so called response function application, but a lot of assumption must be done for extraction the  $S_\beta(E)$  shape from the *TAGS* spectrum shape. Analysis depends on the assumptions [1] about the decay scheme which as a rule is not known. It is very difficult to estimate the associated systematic errors of such analysis [1] and only qualitative information about  $S_\beta(E)$  may be obtained.

*TAGS* can't distinguish the *GT* and *FF* transitions and don't take into account the conversion electron emission, which give the systematic uncertainties, especially for high  $Z$  both for  $S_\beta(E)$  and decay heat estimation. In this report some results of *TAGS* spectra analysis are considered. It is shown that only combination of *TAGS* with high resolution nuclear spectroscopy methods may give the quantitative information about  $S_\beta(E)$ .

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