CROSS SECTIONS OF THE REACTION ^{115}In$(\gamma, \gamma')^{115m}$In IN THE E1 GIANT RESONANCE REGION

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Isomeric metastable states of nuclei, having spins, which differ essentially from spins of ground states, and relatively high times of life $T_{1/2}$ may be populated in reactions of inelastic photon scattering off nuclei (reactions $(\gamma, \gamma')^m$). $(\gamma, \gamma')^m$-reactions were studied at photon energies E_γ in the region of the Electric Dipole Giant Resonance (E1GR) using registration of produced activities for a set of medium-heavy and heavy nuclei (see [1] and references therein). In each such a case a cross-section $\sigma(\gamma, \gamma')^m$ has a peak at E_γ near a threshold of (γ, n)-reaction, caused by increasing of a total absorption cross section σ_{total} and growing of probability to populate an isomeric state from one hand and steep growing of competition from the neutron channel of E1GR-decay with increasing of E_γ on the other hand.

But in some of these studies (especially for ^{115}In [2]), made at cyclic electron accelerators with internal radiators, it was also reported about the second peaks in $\sigma(\gamma, \gamma')^m\{E_\gamma\}$ at E_γ higher than for σ_{total}-maximum in the region of E1GR, what was considered [3] as a big surprise for physics of photonuclear reactions even in spite of some attempts for explanations [4].

In our measurements in the region of E1GR [1] it was shown for the case of ^{115}In that yield of $(\gamma, \gamma')^m$-reaction after its growth, connected with the first peak in $\sigma(\gamma, \gamma')^m\{E_\gamma\}$, is almost constant, and that the pointed out second peak in $\sigma(\gamma, \gamma')^m\{E_\gamma\}$ with integral value, comparable with that for the first peak, is not observed. Later there was reported in [5] about the similar results for the reaction $(\gamma, \gamma')^m$ as for ^{115}In as for ^{103}Rh. The results [1, 5] permit to suppose that this old disturbing question in physics of photonuclear reactions may be removed from the agenda. In any case it is a difficult task to find mistakes in experimental works made in other laboratories, but it seems to be a possible reason for these discrepancies troubles for cyclic electron accelerators with monitoring of electron and bremsstrahlung beams from internal radiators (see e.g. [6]). For external electron beams and radiator, which were used in [1, 5], monitoring of electron and photon beams seems to be much more trustworthy.

It is important to note that mentioned above yield features of ^{115}In$(\gamma, \gamma')^{115m}$In – reaction and value of $T_{1/2} \cong 4.486$ h for ^{115m}In permit to suggest using of In foils as monitor ones in activation studies of photonuclear reactions for many cases.

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