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THE ISOSPIN SPLITTING OF GDR AND PHOTOPROTON REACTIONS ON MERCURY ISOTOPES

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There is very little experimental data on cross sections of photonuclear reactions on mercury in the literature, and for energies of the order of 50-60 MeV there is no data at all. To obtain cross sections for an equivalent quantum during the reactions of $^{nat}Hg(\gamma, inkp)$, a sample of natural mercury was irradiated with a beam of bremsstrahlung from the RTM-55 linear electron accelerator of SINP MSU with an upper limit of 55 MeV.

As a result of the experiment, cross sections for an equivalent quantum on a natural mixture of mercury isotopes were calculated using the formula:

$$\sigma_q^{prod} = \frac{\sum_i \eta_i \int_{E_{thresh}}^{E^m} \sigma(E) \cdot W(E, E^m) dE}{\frac{1}{E^m} \int_0^{E^m} E \cdot W(E, E^m) dE},$$

in this formula, $W(E, E^m)dE$ is the number of γ-quanta in the energy range dE per electron of the accelerator hitting the braking target, $\sigma(E)$ is the cross section of the studied photonuclear reaction, E is the energy of γ-quanta of bremsstrahlung, $E^m = 55$ MeV is the kinetic energy of electrons incident on the inhibitory target, E_{thresh} is the threshold energy of the reaction under study, η_i is the percentage of the initial nuclei in the natural mixture.

The obtained cross sections were compared with the results of theoretical calculations performed using the combined model of photonucleon reactions developed at SINP MSU [1-2] and according to the TALYS program [3]. As can be seen from comparative table 1, the experimental data are in good agreement with calculations within the framework of the CMFR, which takes into account not only the isospin splitting of the giant dipole resonance (GDR) and the quasi-neutron photoabsorption mechanism, but also the contribution to the cross section of the isovector quadrupole resonance and the overtone of the GDR (GDR2). For photoproton reactions, the results obtained under the TALYS program were underestimated.

Also, experimentally and using CMFR [1-2], cross sections for an equivalent quantum for $T_>-$ and $T_<-$components were obtained, which allow us to observe the isospin splitting of the GDR.

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Section

Experimental and theoretical studies of nuclear reactions

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