A NEW SET-UP FOR TOTAL REACTION CROSS SECTION MEASURING

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The experimental method and set-up based on 4Π n-γ-technique for direct and model-independent measuring of the total reaction cross section σ_R have been presented. The excitation function $\sigma_R(E)$ for $^{6}He+^{197}Au$ reaction at the Coulomb barrier energy region has been measured. The measured data are compared with the summarized cross section which has been prepared by summing of measured cross sections of main reaction channels: 1n-transfer and $^{197}Au(^{6}He, xn)^{203-xn}Tl$ with $x = 2 \div 7$ evaporation reaction channels.

Some peculiarities of the interactions, particularly with weakly bound nuclei at the Coulomb barrier energies (such as the isotropic angular distribution of the reaction products, low value of gamma-ray multiplicity, etc.) have stimulated the development of methods for the total reaction cross section measuring.

The experimental method for the direct and model-independent measuring of the total reaction cross section σ_R [1] is illustrated by Fig.1.

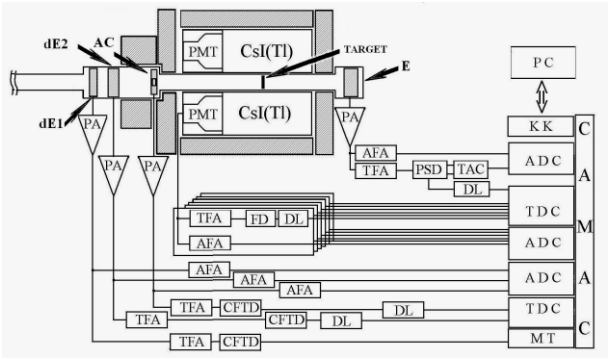

Figure 1. Block scheme of set-up.

The main idea of such measuring is based on preparing (identification and analysis of each particles passing through dEi identification detectors and AC-active collimator detectors) the event and analysis what happened with a particle hitting a target by 4П-technique in the event-by event mode.

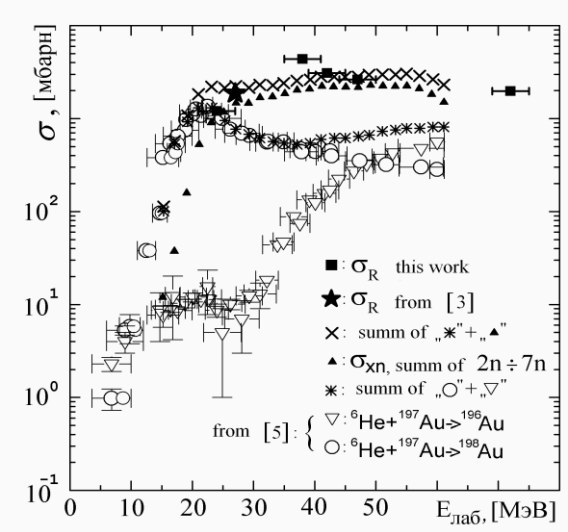

Figure 2. Block scheme of set-up

The experimental data [2] of the $\sigma_R(E)$ excitation function for $^{6}He+^{197}Au$ reaction at the Coulomb barrier energy region are shown in Fig.2. These $\sigma_R(E)$ data values have been compared with the published one [3, 4, 5].

The measured data are compared with the summarized cross section which has been prepared by summing of measured cross sections of main reaction channels: 1n-transfer and $^{197}Au(^{6}He, xn)^{203-xn}Tl$ with x = 2÷7 evaporation reaction channels which have been measured in our previous experiments [4,5], respectively.

References

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