

4 π -METHODS FOR TOTAL REACTION CROSS SECTION MEASUREMENTS

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A review and analysis of experimental 4 π -methods for total reaction cross section σ_R measurements are presented. The methods for σ_R measurements are based on the 4 π -technique of registering prompt γ -quanta and neutrons in a solid angle close to the full angle $\Omega = 4\pi$.

The description the method applied to measuring γ -detection efficiency $\varepsilon(M_\gamma)$ for various values of γ -multiplicity M_γ are presented. The experimental facility and 4 π scintillation spectrometer for M_γ measurement are described.

The comparison and analysis of the two experimental 4 π -methods developed at FLNR JINR, Dubna for σ_R measurements in the reactions with neutron-rich weakly bound nuclei are presented. The first method is based on the mean value of the detection efficiency $\langle\varepsilon\rangle$ which does not depend on γ -multiplicity M_γ [1]. In the second method, we use the experimentally obtained response function $w_M(k)$ (the distribution of the numbers of triggered detectors k in registration of γ -cascade with a fixed value of M_γ) [2].

1. Yu.E. Penionzhkevich, Yu.G. Sobolev, V.V. Samarin, and M.A. Naumenko, Phys. Atom. Nucl. 80, 928 (2017).
2. Yu.E. Penionzhkevich, Yu.G. Sobolev, V.V. Samarin, M.A. Naumenko, N.A. Lashmanov, V.A. Maslov, I. Siváček, and S.S. Stukalov, Phys. Rev. C 99, 014609 (2019).

The speaker is a student or young scientist

Yes

Section

1. Applications of nuclear methods in science and technology

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