Fission Fragment Angular Distribution in the ^{234}U (n, f) Reaction

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Abstract

The fission fragment angular distribution (FFAD) data are important for getting new insights into the fission process. In this study, the framework of statistical modeling is used to analyze FFAD from the neutron-induced fission of ^{234}U. The results have been compared with the recent experimental data of the ^{234}U (n, f) reaction measured at the n_TOF facility at CERN. An accurate analysis was performed in order to deduce the variance K_0^2 of the K- distribution of levels in the transition nucleus at neutron energies from a threshold up to 50 MeV. We show the method in which the quantitative values of K_0^2 are obtained. We have also studied the periodic structure of anisotropy related to the set of (n, xn) reaction in comparison with the related cross-section performed with TALYS 1.8 code. The comparison of the variance with the cross-section clearly illustrates the strong correlation between the value of the variance and the opening of a fission chance. We show that whenever the probability of a reaction in a new channel and a cross-section increases, K_0^2 decreases; so the minimum of K_0^2 can show the maximum probability of the (n, f) xn reaction. The results are in a good agreement with similar calculations in ^{232}Th (n, f) and ^{238}U (n, f) reactions.

Keywords: fission fragment angular distribution, anisotropy, statistical model, fission barrier, cross-section and ^{234}U (n, f)

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