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Progress in Measurement of the Capture Reaction Cross Section of 242Pu Induced by Thermal Neutron Based on Activation Method

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The relative deviation of the thermal capture cross-section of 242Pu in the mainstream nuclear database is more than 10%, and the uncertainty of its capture cross-section in the intermediate and fast neutron region is over 30%. In this paper, the thermal capture cross-section measurement of 242Pu was carried out based on activation method. The irradiation experiment was carried out on the running-rabbit irradiation channel of Xi'an pulse reactor. The neutron flux was measured with the thermal capture cross section of 197Au. The capture reaction product 243Pu was analyzed by the γ energy spectrum, and 243Am was analyzed by mass spectrometry. The thermal capture cross-section obtained by γ energy spectrum analysis are 21.12 ± 2.36b. Mass spectrometry experiments and data processing are being carried out. The main contributions of the uncertainty of that are the peak counts and branch ratio of 84keV of 243Pu.The next step is to optimize the matrix material and shielding method of the sample, and to carry out the measurement of 243Pu characteristic ray branch ratio based on the combined analysis of mass spectrometry and energy spectrum, so as to reduce the uncertainty of thermal capture cross-section based on the γ spectrum analysis.

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