

FISSION AND NEUTRON CAPTURE REACTION RATES IN MASSIVE URANIUM TARGET UNDER RELATIVISTIC BEAM IRRADIATION

In the period of 2011 - 2016 within the framework of collaboration "Energy and Transmutation of RAW" a series of experiments aimed at fission and neutron capture (^{239}Pu nuclei production) reaction investigation was carried out. The QUINTA assembly massive uranium target (512 kg natU) was irradiated by deuteron and ^{12}C beams with an energy range 0.5 –4 AGeV. The experiments were performed at the accelerators Nuclotron JINR, Dubna. Spatial distributions of the neutron capture reaction and fission reaction rates over the volume of the uranium target were obtained and the comparison with standard code simulation was performed. Also the reaction total numbers in the entire volume of the uranium target per 1 primary particle were estimated. It was shown that the total numbers of fission and neutron capture reactions per unit of primary beam power don't depend (or weakly depend) on the primary beam energy within experimental errors.

Also the possibility of medical radionuclide $^{64,67}\text{Cu}$ production in spallation neutron spectrum induced by primary beams has been studied. Spallation neutron spectrum averaged cross sections for the $\text{natZn}(n,x)^{67}\text{Cu}$, $\text{natZn}(n,x)^{64}\text{Cu}$ reactions were estimated.

Primary author: Ms ZHADAN, Alina (NSC KIPT)

Co-authors: Dr BALDIN, Anton (JINR); TYUTYUNNIKOV, Sergey (JINR); Dr SOTNIKOV, Vladimir (NSC KIPT); Dr VORONKO, Vladimir (National Science Center Kharkov Institute of Physics and Technology, Ukraine)

Presenter: Ms ZHADAN, Alina (NSC KIPT)

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