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## Oversize of the average prompt neutron multiplicity measured by the double energy method in the symmetric region of thermal neutron-induced fission of $^{239}\text{Pu}$

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Using a Monte Carlo method, the measurement by the double energy technique (2E) of the average prompt neutron multiplicity as a function of the mass of fragments from the thermal neutron-induced fission of  $^{239}\text{Pu}$  is simulated. The input data, associated with the masses of complementary primary fragments ( $A, A'$ ), consist of the yield ( $Y$ ), the average total kinetic energy ( $\langle \text{TKE} \rangle$ ) and its standard deviation ( $\sigma_{\text{TKE}}$ ), the average prompt neutron multiplicity ( $\bar{\nu}_s$ , a sawtooth approach of an experimental curve  $\bar{\nu}$ ), and the inverse slope of  $\nu(\text{TKE})$ . The output data, associated with the pseudo masses of complementary fragments ( $\mu, \mu'$ ) calculated with the double energy method, consist of the corresponding to the simulated as measured quantities  $Y, \langle \text{TKE} \rangle, \sigma_{\text{TKE}}, N$ , respectively. In comparison with  $\bar{\nu}_s, N$  and  $\bar{\nu}$  are oversized in the region of light fragment masses near the symmetric fission. To interpret the results, the neighboring masses ratio  $R(A) = Y(A+1)/Y(A)$  and the term  $F(A) = (1 - \bar{\nu}_s(A)/A) / (1 - \bar{\nu}_s(A')/A')$  are defined. It is shown that i) if  $F > 1$  the  $N - \bar{\nu}_s$  and  $\bar{\nu} - \bar{\nu}_s$  are correlated with  $R-1$  ii) if  $F < 1$  then  $N - \bar{\nu}_s$  and  $\bar{\nu} - \bar{\nu}_s$  are anticorrelated with  $R-1$ . It is concluded that the oversize of  $\bar{\nu}$  relative to  $\bar{\nu}_s$  is due to the interplay of the prompt neutron emission and the slope of the mass yield curve.

Keywords: Nuclear Fission; Fission Product Yield; Prompt Neutron Multiplicity; Fission Fragment Kinetic Energy; Plutonium 239.

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