

PROMPT FISSION NEUTRON SPECTRA OF ^{235}U AND ^{239}Pu

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Pre-fission neutrons influence the observed prompt fission neutron spectra (PFNS), TKE, average number of prompt fission neutrons, (n,F) and (n,xn) reaction cross sections. Though pre-fission neutrons in $^{235}\text{U}(n,F)$ were first observed around $E_n \sim 14$ MeV [1] and then at $E_n \sim 7$ MeV [2], only now measured data base [3-6] allows to demonstrate the complex influence of fissility of nuclides ^{236}U and ^{240}Pu on the PFNS shape. The model parameters are fixed at thermal neutron energy [7] and the renormalized for the TKE measured data.

The PFNS shapes at $E_n \sim 6-7$ MeV are strongly correlated with nuclide fissilities in $^{235}\text{U}(n,xnf)$ and $^{239}\text{Pu}(n,xnf)$ reactions and competition of (n,xnX) reactions. Calculated exclusive $(n,n\gamma)$, $(n,2n)^{1,2}$ and $(n,nf)^1$ pre-fission neutrons spectra allow to demonstrate that the amplitude of (n,nf) spectra is the largest for $^{235}\text{U}(n,F)$ at $E_n \sim 6.5$ MeV (Fig.1) while for $^{239}\text{Pu}(n,F)$ at $E_n \sim 6.0$ MeV (Fig. 2). When (n,nf) reaction competes only with $(n,n\gamma)$ reaction, the pre-FNS shapes are rather similar ($E_n \sim 5.5$ MeV), though the contribution of $(n,nf)^1$ is much higher in case of $^{235}\text{U}(n,F)$ reaction. When the $(n,2n)$ reaction channel opens, the pre-FNS shapes reveal drastic influence of $(n,2n)^1$ and $(n,2n)^2$ neutron spectra. The fig. 1 demonstrates partials for $^{235}\text{U}(n, F)$ reaction, the numerical data [8] are compatible with data [4,5]. The fig. 2 demonstrates partials for $^{239}\text{Pu}(n, F)$ reaction, while the data [3-6] are compatible with predicted (n,xnf) contributions [9]. The lower curves and data points show the partitioning of the PFNS into the (n, f) , (n,nf) and $(n,nf)^1$ contributions.

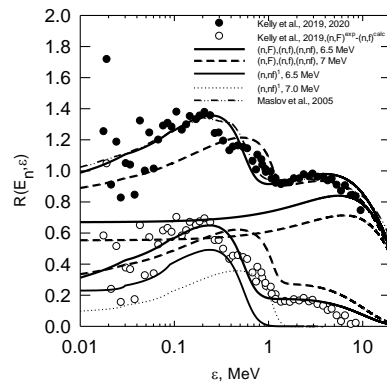


Fig. 1

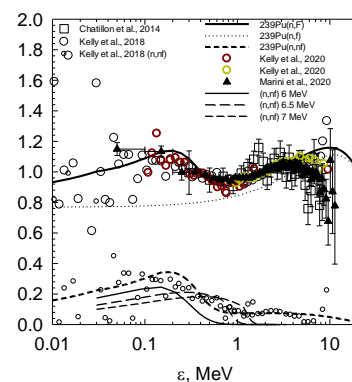


Fig. 2

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