Effects of variations on slopes of yield and average kinetic energy curves as a function of fragment mass on standard deviation of final kinetic energy distribution from thermal neutron induced fission of ^{235}U

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Resumen

Mediante la simulación con el método Monte Carlo se ha estudiado la distribución de masas y energía cinética de los fragmentos de fisión del ^{235}U inducido por neutrones termales. En un trabajo anterior [1] reproducimos do picos pronunciados en la desviación standard (DS) de la distribución de la energía cinética de los fragmentos finales alrededor de los números másicos *m* = 109 y 125, respectivamente, lo cual está en concordancia con los datos experimentales obtenidos por Belhafaf *et al*.[2]

Abstract

The mass and kinetic energy distributions of fragments from thermal neutron induced fission of ^{233}U have been studied using a Monte-Carlo simulation. In our previous work [1] we reproduce the two pronounced broadenings in the standard deviation (SD) of the kinetic energy distribution of the final fragment at mass number around m=109, and m=125, respectively, which is agreement with the experimental data obtained by Belhafaf *et al*. [2].

Keywords:Monte-Carlo; neutron-induced fission; ^{235}U; standard deviation, fragment kinetic energy distribution.

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In a new attempt to obtain Monte Carlo simulation results in better agreement with experimental data we succeeded to produce a broadening of SD around m=118, which also agrees with experimental data obtained by Belhafaf *et al.* [2].

Our Monte Carlo simulation also predicts an enhancement at m=130. This seems to be contrary to experimental data from Belhafaf *et al*. [2]. Nevertheless, if one superpose this experimental data with that obtained by Brissot *et al.* [3], we discover that from m=129 to m=130, the standard deviation SD increase from 3.9 MeV to 4.5 MeV, which seems to be the lower mass region of a new SD enhancement.

Studying our input and input data from our Monte Carlo simulation we conclude that SD enhancements are produced in regions where there is prompt neutron emission and variation of the slope of yield or average kinetic energy curves as a function of fragment mass.

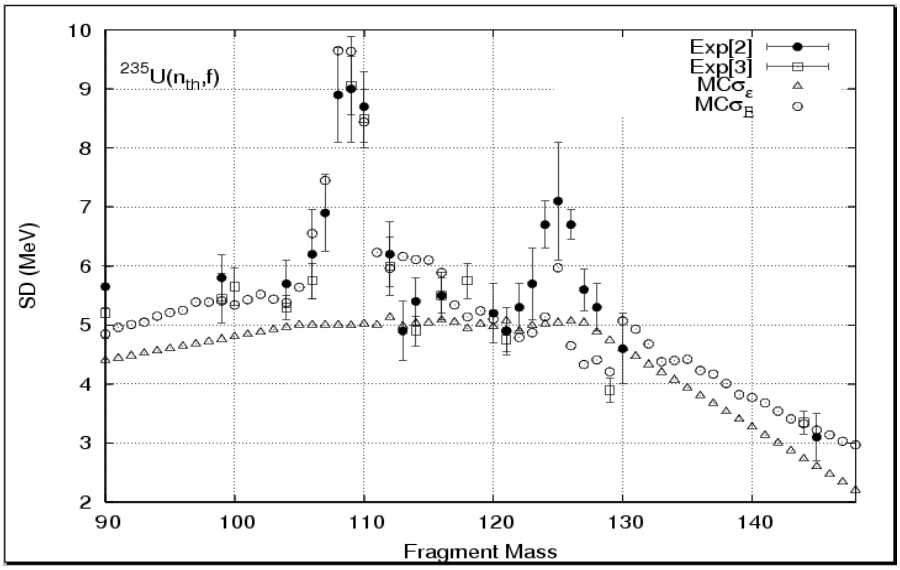

Figure 1. Standard deviation (SD) of fragment kinetic energy distribution as function of final mass (m) from Ref. [2] (full circles) and Ref. [3] (full squares) to be compared with our Monte Carlo results for final fragments (circles) and for primary fragments (triangles).

References

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