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Multiplicity of Scision Neutrons from Density Functional Scission Dynamics

The time evolution of the nuclear density of the fissioning system ^{240}Pu during the scission process is obtained from the time-dependent superfluid local-density approximation (TDSLDA) to the density functional theory. A nuclear energy density functional based on the Skyrme force Skm* is used. The duration of the scission process Δt as well as the neck radius (r_{min}) of the 'just-before scission' configuration and the minimum separation (d_{min}) of the inner surfaces of the fragments in the 'immediately-after scission' configuration were extracted in order to calculate the multiplicity of the scission neutrons (ν_{sc}) using a phenomenological dynamical scission model (DSM). We find that ν_{sc}=1.347, i.e. half of the prompt fission neutrons measured in the reaction $^{239}Pu(n_{th}, f)$ are released at scission. After scission, the fragments are left excited and with some extra deformation energy (mainly the heavy one). In this way we can account for the evaporation of the other half and for the emission of γ-rays.

Attendance Type

In-person

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