The understanding of the nature of low energy fission dynamics remains an outstanding problem. In this context, the amplitude of proton odd-even effect $\delta p$ for an even nuclear charge $Z_F$ fissioning nucleus and its variation with $Z_F$ is the most relevant observable. The experimental data allow one to construct the correlated yield surface $Y(A_L, Z_L, E_L)$ for the light fragment group; here $A_L$, $Z_L$ and $E_L$ are, respectively, the light fragment mass, its nuclear charge and its kinetic energy. Apart from the mean value of $\delta p$, one can study the differential quantities $\delta p(I_i)$, where $I_0 = E_L$; $I_1 = E_K$, the total fission kinetic energy; $I_2 = \langle Q \rangle (A_L) - E_K$, where $\langle Q \rangle$ is the mean reaction energy for $A_L$; and $I_3 = (Q(A_L, Z_L) - E_K)$. In this communication, we present the $232U(n_{th}, f)$ data obtained with the Cosi fan tutte spectrometer installed at the Grenoble high flux reactor [1,2]. The differential $\delta p(I_i)$ values for $i = 0,1,2$ behave in a similar way: the proton odd-even effect goes up as $I_0$, $I_1$ increase and $I_2$ decreases; but the behaviour of $\delta p(I_3)$ is quite different and opposite to that of the others. We show that this behaviour of $\delta p(I_3)$ results from a biasing against the even $Z$ yields, when this parameter is used. However, the average value $\delta p$ is, as it should be, the same and independent of the choice of the parameter. We show also that the $\delta p$ and its amplitude stem from the dynamics of the process and not from the reaction energy $Q$-line. Finally, we discuss the nature of this dynamics that englobes both the binary [3] and the light-particle- accompanied ternary fission [4] processes.

References

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