

**CENTRE D'ÉTUDES NUCLÉAIRES DE  
BORDEAUX-GRADIGNAN**

**Vendredi 23 Mars 2018**

**à 11H**

*Un café sera servi à partir de 10h45*

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**On the saw-tooth structure  
of neutron multiplicity**

We have applied the four-dimensional Langevin approach to the description of fission of  $^{235}\text{U}$  by neutrons and calculated the dependence of the excitation energy of fission fragments on their mass number.

For this we have fitted the compact just-before-scission configuration obtained by the Langevin calculations by the two separated fragments and calculated the intrinsic excitation and the deformation energy of each fragment separately taking into account accurately the shell and pairing effects and their dependence on the temperature and mass of the fragments. For the sharing of energy between the fission fragments we have used the simplest and most reliable assumption - the temperature of each fragment immediately after the neck rupture is the same as the temperature of mother nucleus just before scission.

The calculated sum of the two contributions to the total excitation energy (deformation and excitation at scission) for  $^{236}\text{U}$  as a function of the fragment mass clearly shows a saw-tooth behaviour in qualitative agreement with the measured dependence of the prompt neutron multiplicity.

Thus, the saw-tooth structure of neutron multiplicity is not a mystery anymore. It is a natural consequence of shell effects in the deformation and intrinsic excitation energies at low excitations (temperatures). This conclusion is based on the results of 4-dimensional Langevin calculations that lead to the realistic configuration at the scission point - the heavy fragment is almost spherical and light - very deformed.

**Salle des Séminaires du CENBG**

*Le Haut Vigneau - BP 120 - F-33175 Gradignan Cedex*