INFLUENCE OF NUCLEAR TEMPERATURE ON ISOSCALING PARAMETER IN PHOTOFISSION

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Isoscaling is the exponential dependence of the ratio of the yields of R isotopes with the same number of neutrons N and protons and Z from two different targets 1 and 2:

$$R(N,Z) = Y_1(N,Z) / Y_2(N,Z) = C\exp(\alpha N + \beta Z),$$

where C is the normalization coefficient, and α and β are the parameters of isoscaling.

Our earlier attempt to extract information on the temperature of the fissioning nuclear system from the isoscaling parameters in the yields of Kr and Xe fragments from the photofission of nuclei in the light actinide region [1] show the strong shell effect in the region of asymmetric peaks in the distribution of mass of fission products, arising under the influence of neutron spherical shell $N = 82$ and deformed shell $N = 88$.

In this paper we calculate the values of isoscaling parameters in the framework of liquid drop model, using the fact that the masses of all Kr and Xe isotopes whose yields are measured by us and almost all the fission fragments associated with them are known from experiments, and several remaining ones were calculated with good accuracy [2].

The use of tabular data does not allow us to obtain an analytical expression for the dependence of the isoscaling coefficients on the temperature of the fission. Therefore, we calculated the value of R_{teor} (N,Z) for a different temperatures. Calculated values show the strong dependence from temperature, which made it possible to estimate of the temperature of the fissioning nuclei when compared with the experimental R_{exp} (N,Z).

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2. M.Wang, G.Audi, F.G.Kondev, W.J.Huang, S.Naimi, Xing Xu // Chinese Phys. C. 2017. V.41. 030003.