Наличие ощутимого вклада предравновесных частиц в экспериментальных спектрах даст возможность определить полную временную шкалу процесса. Это будет достигнуто путем анализа ФПМ-ФПМ корреляций, триггером в которых будет выступать предравновесная частица.

FISSION AND NUCLEAR LIQUID-GAS PHASE TRANSITION

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Critical temperature for liquid-gas phase transition, T_c, is crucial characteristic related to the nuclear equation of state. The main source of the experimental information for T_c is the yield of intermediate mass fragments (IMF, $2<Z<20$) originated in nuclear multifragmentation. In some statistical models of this process the shape of the IMF charge distribution is sensitive to the value of critical temperature. However, different experimental estimations of the critical temperature from multifragmentation data are very controversial [1]. The obtained values of T_c are spread over the range between 6 and 20 MeV depending on the model used in analysis. This is a reason to look for another observable which is sensitive to the critical temperature for the liquid-gas phase transition. It was suggested in [2] to analyze the temperature dependence of the fission probability to estimate T_c.

The fissility of heavy nuclei is determined by the ratio of the Coulomb and surface free energies: the larger the ratio, the smaller the fission barrier. The surface tension vanishes at the critical temperature. As temperature approaches the critical one from below, the surface tension (and surface energy) gradually decreases, fission barrier becomes lower. Thus, the measurement of fission probability as a function of the excitation energy gives a chance to estimate how far the system is from the critical point.

In present paper we compare the measured fission cross-sections for $^{4}He + {}^{144}W \rightarrow {}^{188}Os^{*}$ collisions (at excitation energies from 40 to 117 MeV) [3] with calculated ones. The thermal liquid drop model is applied to find the temperature dependent fission barrier with T_c as a free parameter. The following reliable approximation is used for the surface tension coefficient:

$$\sigma(T) = \sigma(0)\left[\frac{T_c^2 - T^2}{T_c^2 + T^2}\right]^{5/4}$$

To estimate the fission and evaporation rates, the statistical model is used. The multi-step character of the compound nucleus disintegration is taken into account.

It is concluded from the best description of the data that critical temperature is equal to

$$T_c = (19 \pm 3)\ \text{MeV}.$$

References

1. Karnaukhov V. A. et al. Nucl. Phys. A**734** (2004) 520.
2. Karnaukhov V. A. Яд. Физ. **60** (1997) 1625.
3. Moretto L. G. et al. Phys. Lett. B**38** (1972) 471