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THEORETICAL PREDICTIONS OF THE FRAGMENT AND PROMPT NEUTRON CHARACTERISTICS IN THE SPONTANEOUS FISSION OF SUPERHEAVY NUCLEI.

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The consistent theoretical model for the calculations of the mass, charge and energy of fission fragment and the prompt fission neutron energy and multiplicity distributions [1, 2] is applied for the description of the spontaneous fission of the superheavy nuclei. The prompt fission neutron characteristics are formed during emission at descent from the fission barrier to the scission point and the evaporation from the fully accelerated heated fragment after neck rupture. The neutron emission during the saddle-to-scission descent time is important in the spontaneous fission of the heavy elements with Z > 96. For accurate calculations of nucleon composition and excitation energy of the fissioning nucleus at the scission point, the time-dependent statistical model with inclusion nuclear friction effects was used. Monte Carlo simulation method is used to describe the neutron emission at the limited descent time.

For each member of the compound nucleus ensemble at the scission point, the primary fission fragment characteristics: kinetic and excitation energies and their yields are calculated using the scission-point fission model with deformed nuclear shell and pairing effects. Isovector quantal excitations during the collective motion from saddle to scission point influence on the charge polarization and charge splitting between fission fragments. The charge distribution of the primary fragment isobaric chain was considered as result of the frozen quantal fluctuations of the isovector nuclear matter density at the finite scission neck radius in the harmonic approximation [3]. The collective isovector potential was calculated for the di-nuclear system of deformed fragment at the minimum of potential energy at scission point. The deformation energy at scission point is calculated using the macroscopic-microscopic approach. The average charge asymmetry and the stiffness parameter of the collective potential were obtained by the parabolic approximation of the calculated potential energy at the fixed mass asymmetry. The charge width of the fission fragment isobaric chain are determined mainly by the of collective ground-state wave function. Results of calculations of the spontaneous fission characteristics of the superheavy nuclei of element chains with $104 \le Z \le 118$ will be presented.

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2. V.A. Rubchenya, Physics Procedia 47 (2013) 10.
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