Statistical Analysis of Deformation Effects on Level Densities and Fission Probabilities in Superheavy Nuclei*

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We employ a statistical approach to investigate the influence of axial asymmetry on nuclear level density (NLD), entropy, and decay probabilities along the fission pathways of the superheavy nucleus ^{296}Lv. These pathways are determined in multidimensional deformation spaces, and our analysis reveals a significant impact of triaxiality on the entropy and the fission scenario, particularly at elevated excitation energies where shell effects are suppressed. We derive a deformation-dependent level density parameter, essential for estimating a superheavy nucleus's survival probability. Using the master equation formalism, we compute the time-dependent fission probabilities and the ratio of decay probabilities along axially symmetric and asymmetric paths. Furthermore, we analyze the isospin dependence of the level density parameter ratios at the fission saddle point and in residual nuclei following light charged particle emission, relative to the neutron channel. Our results indicate a weak isospin dependence in both the damping parameters and level density parameter ratios, confirming the robustness of statistical predictions in modeling fission dynamics of superheavy nuclei.

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