On the Stability of Superheavy Nuclei [1]

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Abstract:

Potential energy surfaces of even-even superheavy nuclei are evaluated within the macroscopic-microscopic approximation. A very rapidly converging analytical Fourier-type shape parametrization [2]) is used to describe nuclear shapes throughout the periodic table, including those of fissioning nuclei. The Lublin Strasbourg Drop [3]) and another effective liquid-drop type mass formula [4]) are used to determine the macroscopic part of nuclear energy. The Yukawa-folded single-particle potential, the Strutinsky shell-correction method, and the BCS approximation for including pairing correlations are used to obtain microscopic energy corrections. The evaluated nuclear binding energies, fission-barrier heights, and Q_α energies show a relatively good agreement with the experimental data. A simple one-dimensional WKB model à la Świątecki [5,6]) is used to estimate spontaneous fission lifetimes, while alpha- decay probabilities are obtained within a Gamow-type model [7,8]).

References:

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