

Empirical systematics of spontaneous fission half-lives of heavy and superheavy nuclei

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The exact calculation of half-lives in spontaneous fission remains an open problem in nuclear physics. In this work, a new systematics of half-lives in spontaneous fission was proposed. For nuclei with the same value of neutron excess (isospin) and charge numbers $90 \leq Z \leq 102$, a linear correlation was found between the decimal logarithm of the half-life of spontaneous fission and the alpha decay energy. An empirical formula has been proposed to determine the half-life of spontaneous fission of even-even nuclei depending on the alpha decay energy and neutron excess. We then extended this formula to calculate the half-lives for odd- A and odd-odd nuclei, as well as for nuclei with $Z \geq 103$. The experimental half-lives were reasonably reproduced using this formula with average deviations of 1.15 for 105 experimentally known nuclei, which means that the formula is reliable for predictions.

Section

Nuclear structure: theory and experiment

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