Abstract Submitted
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Brownian shape motion: Fission fragment mass distributions[1]
J. RANDRUP, LBNL, P. MOLLER, LANL — Exploiting the expected strongly damped character of nuclear dynamics, we treat the nuclear shape evolution in analogy with Brownian motion and perform random walks on five-dimensional fission potential-energy surfaces which were calculated previously and are the most comprehensive available. Test applications give good reproduction of a selection of diverse experimental mass yields. This novel general approach requires only a single new global parameter, the critical neck size at which the mass partition is frozen in, and the results are remarkably insensitive to its specific value. A deeper understanding of these results can be achieved by including the friction tensor for the shape motion which appears to have only a minor effect on the resulting mass partition. Relative to previously employed models, the present approach represents a significant advance with regard to predictive power. It can be readily employed in regions of the nuclear chart that are of special astrophysical interest and it may, for example, help to clarify the importance of fission recycling for the r-process. Taking explicit account of the equilibration process, the treatment extends in a natural way the compound nucleus concept and it builds directly on the general picture of low-energy nuclear dynamics as being dissipation dominated. [PRL 106 (2011) 132503]

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