Role of octupole deformed shell on fission

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Mean-field of independent particles (fully microscopic)









superconductivity superfluidity

Pairing correlations



No parameter:

Only input is the interaction (Energy Density Functional)





G. Scamps et al., PRC 2015



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Total Kinetic Energy

Pear shapes at scission

Direct evidence of octupole deformation in ^{144,146}Ba Bucher et al, PRL 2016, 2017

Asymmetric modes

A	N_H	Z_H	def. H.	N_L	Z_L	def. L.
198	63.1	43.4	Elong.	54.9	36.6	Comp.
196	62	43.4	Elong.	54	36.6	Comp.
194	61.7	43.5	Elong.	52.3	36.5	Comp.
	65	45.5	Elong.	49	34.5	Elong.
192	60.9	43.5	Elong.	51.1	36.5	Comp.
	64.5	45.6	Elong.	47.5	34.4	Elong.
190	58.7	42.7	Elong.	51.3	37.3	Comp.
	64	46	Elong.	46	34	Elong.
188	62	45.4	Elong.	46	34.6	Elong.
186	57.3	43.2	Comp.	48.7	36.8	Elong.
184	56.9	43.5	Comp.	47.1	36.5	Elong.
182	56.1	44	Comp.	45.9	36	Elong.
180	55.8	44.5	Comp.	44.2	35.5	Elong.
178	56.1	46.1	Comp.	41.9	33.9	Elong.
176	55.6	46.4	Comp.	40.4	33.6	Elong.
	A 198 196 194 192 190 188 186 184 182 180 178 176	A N_H 198 63.1 196 62 194 61.7 65 64 192 60.9 64.5 64 190 58.7 64 64 188 62 186 57.3 184 56.9 182 56.1 180 55.8 178 56.1 176 55.6	A N_H Z_H 198 63.1 43.4 196 62 43.4 194 61.7 43.5 194 61.7 43.5 192 60.9 43.5 192 60.9 43.5 192 60.9 43.5 192 60.9 43.5 190 58.7 42.7 64 46 188 62 45.4 186 57.3 43.2 184 56.9 43.5 182 56.1 44 180 55.8 44.5 178 56.1 46.1 176 55.6 46.4	A N_H Z_H def. H.19863.143.4Elong.1966243.4Elong.19461.743.5Elong.19461.743.5Elong.19260.943.5Elong.19260.943.5Elong.19464.5 45.6 Elong.19058.742.7Elong.19058.742.7Elong.18862 45.4 Elong.18862 45.4 Elong.18456.943.5Comp.18256.144Comp.18055.844.5Comp.17856.146.4Comp.17655.646.4Comp.	A N_H Z_H def. H. N_L 198 63.1 43.4 Elong. 54.9 196 62 43.4 Elong. 54 194 61.7 43.5 Elong. 52.3 65 45.5 $Elong.$ 49 192 60.9 43.5 Elong. 51.1 64.5 45.6 $Elong.$ 47.5 190 58.7 42.7 Elong. 51.3 64 46 $Elong.$ 46 188 62 45.4 $Elong.$ 46 188 62 45.4 $Elong.$ 46 188 62 45.4 $Elong.$ 46 188 56.9 43.5 Comp. 48.7 184 56.9 43.5 Comp. 47.1 182 56.1 44 Comp. 45.9 180 55.8 44.5 Comp. 44.2 178<	A N_H Z_H def. H. N_L Z_L 198 63.1 43.4 Elong. 54.9 36.6 196 62 43.4 Elong. 54 36.6 194 61.7 43.5 Elong. 52.3 36.5 65 45.5 Elong. 49 34.5 192 60.9 43.5 Elong. 51.1 36.5 64.5 45.6 Elong. 47.5 34.4 190 58.7 42.7 Elong. 51.3 37.3 64 46 Elong. 46 34.6 188 62 45.4 Elong. 46 34.6 186 57.3 43.2 Comp. 48.7 36.8 184 56.9 43.5 Comp. 47.1 36.5 182 56.1 44. Comp. 45.9 36 180 55.8 44.5 Comp. 41.9

Z=40

N=54

 Z_H def. H. Z_L def. L. N_H N_L A198 63.1 43.4 36.6 Elong. **54.9** Comp. Elong. 196 62 43.4 36.6 **54** Comp. 194 61.7 43.536.5 Elong. **52.3** Comp. 65 45.5 49 34.5Elong. Elong. 192 60.9 43.5Elong. 51.1 36.5 Comp. 64.5 45.6 47.534.4 Elong. Elong. 190 58.742.7**51.3** 37.3 Comp. In addition to symmetric modes Elong. 64 46 46 34 Elong. Elong. stabilised by N=52-56 188 62 34.6 45.4 Elong. 46 Elong. 186 57.3 43.2 Comp. 36.8 48.7Elong. ¹⁸⁸Hg 184 **56.9** 43.547.136.5 Comp. Elong. Sym. 182 **56.1** 44 45.9**36** Comp. Elong. 180 55.8 44.5Comp. 44.235.5 Elong. 178 **56.1** Comp. 33.9 46.141.9Elong. Comp. 17655.6 46.4 40.4 33.6 Elong.

Asymmetric modes

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