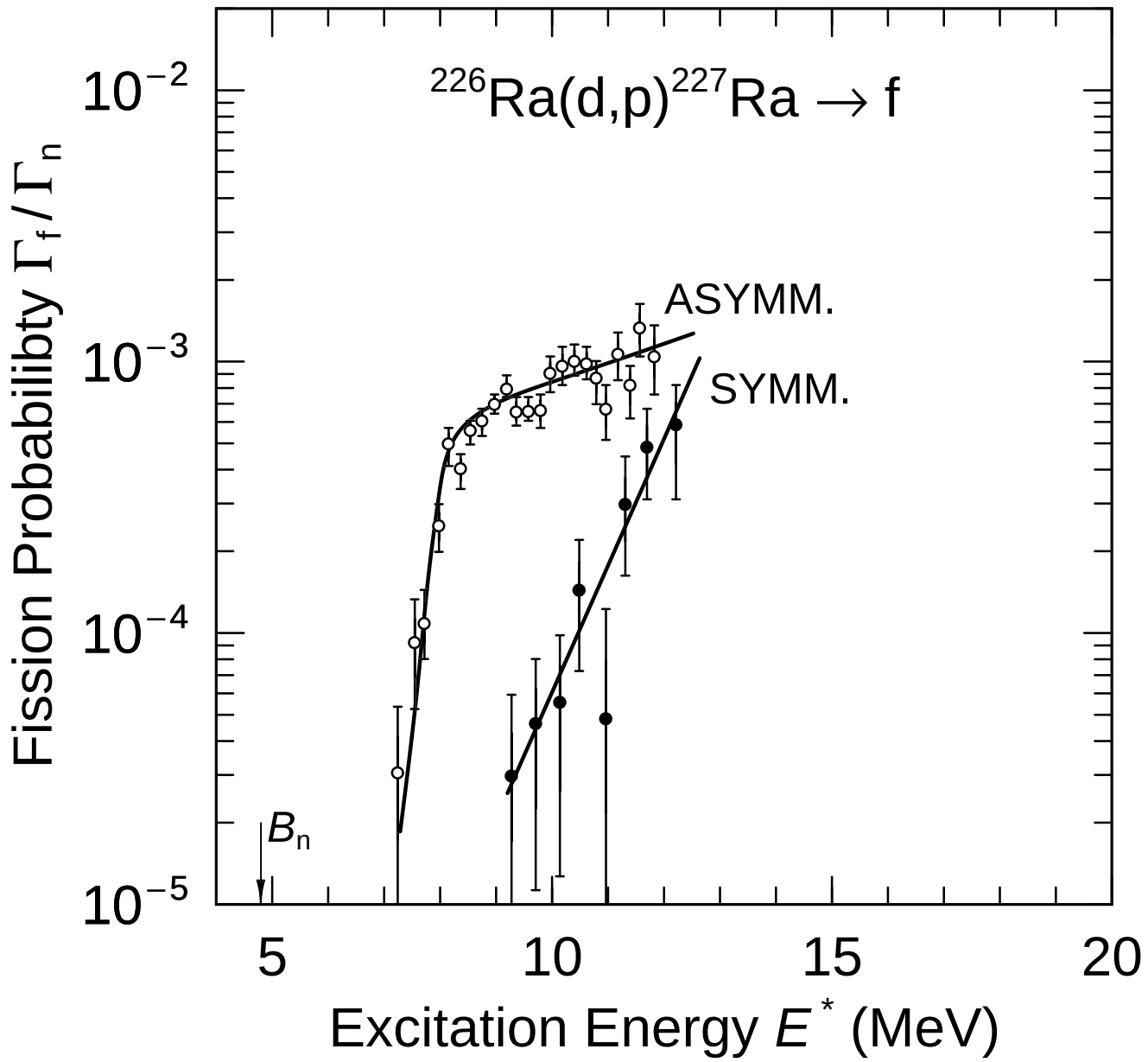
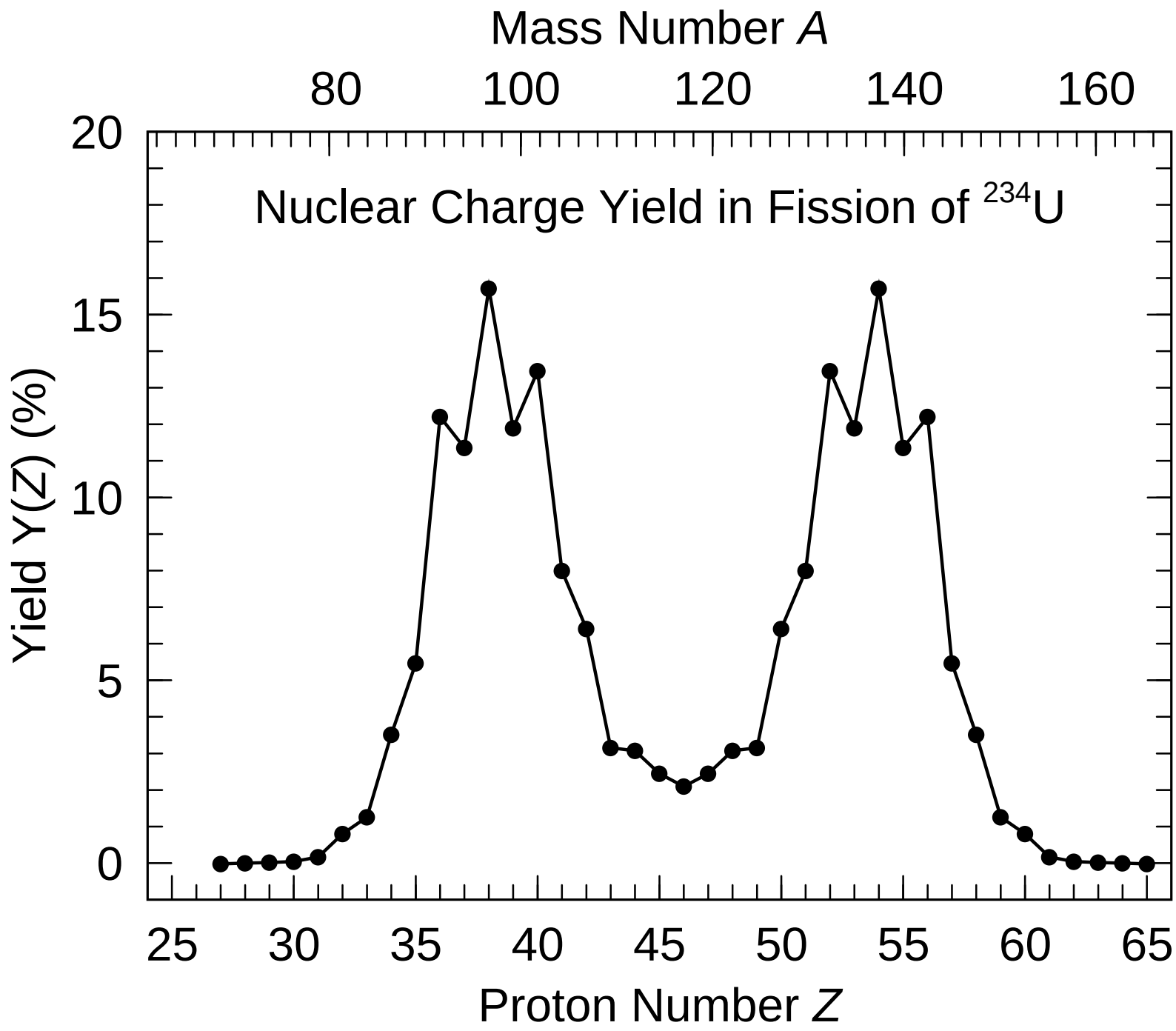
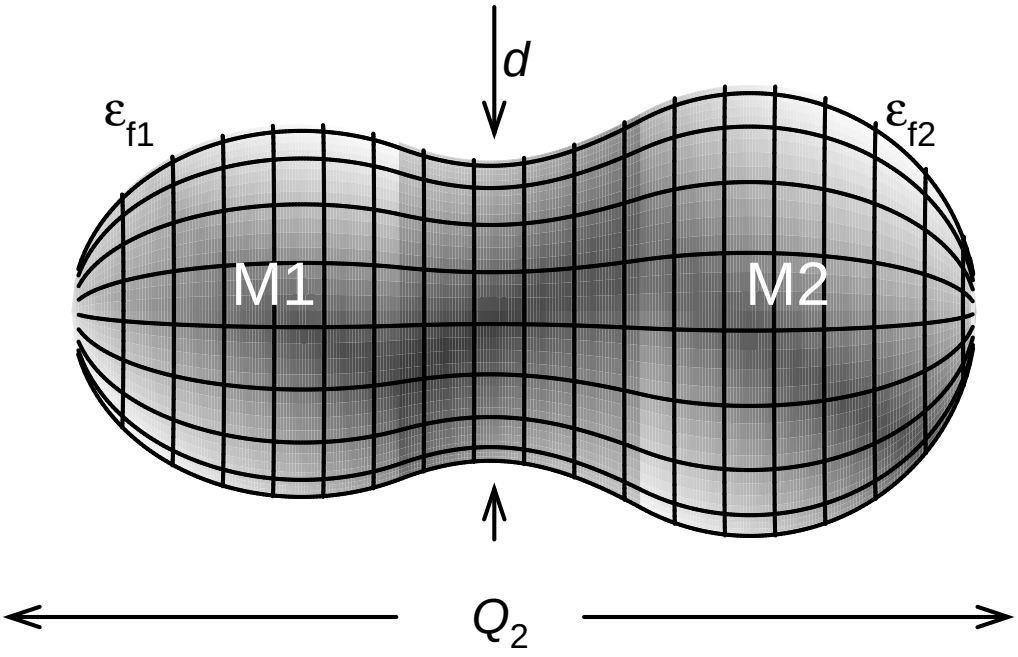

^{226}Ra(d,p)^{227}Ra → f
ASYMM.
SYMM.
B_n
Fission Probabilibty Γ_f / Γ_n
10^{-2}
10^{-3}
10^{-4}
10^{-5}
5
10
15
20
Excitation Energy E^* (MeV)


Mass Number A
80
100
120
140
160
20
15
10
5
0
Yield Y(Z) (%)
Nuclear Charge Yield in Fission of 234U
25
30
35
40
45
50
55
60
65
Proton Number Z

Five Essential Fission Shape Coordinates

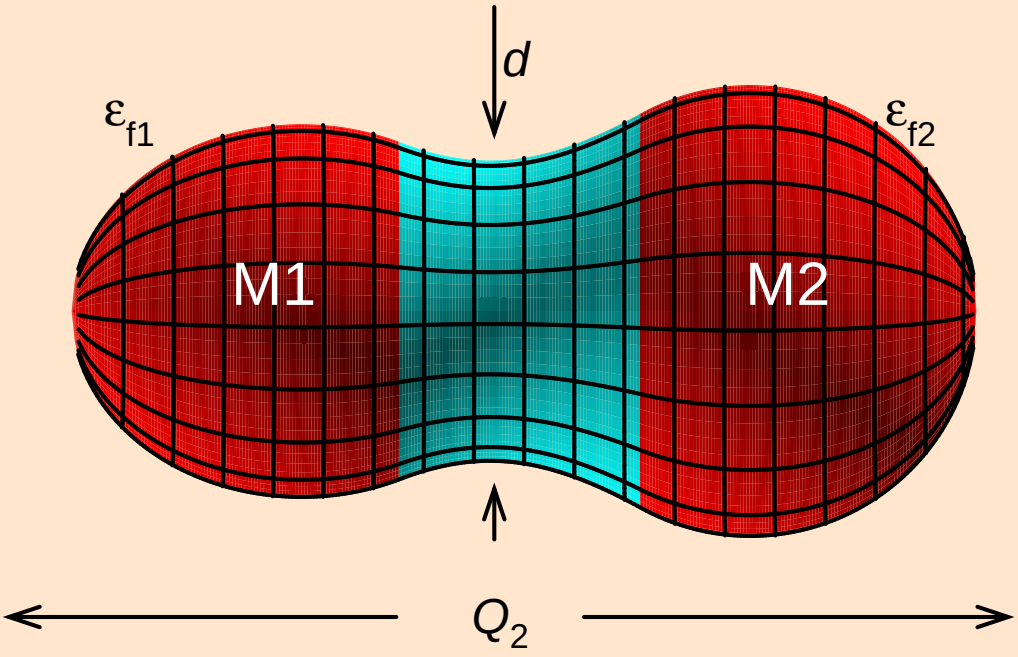


41	Q_2 ~	Elongation (fission direction)
⊗		
20	α_g ~	(M1-M2)/(M1+M2) Mass asymmetry
⊗		
15	ε_{f1} ~	Left fragment deformation
⊗		
15	ε_{f2} ~	Right fragment deformation
⊗		
15	d ~	Neck

⇒ 2 767 500 grid points – 156 615 unphysical points

⇒ 2 610 885 physical grid points

Five Essential Fission Shape Coordinates



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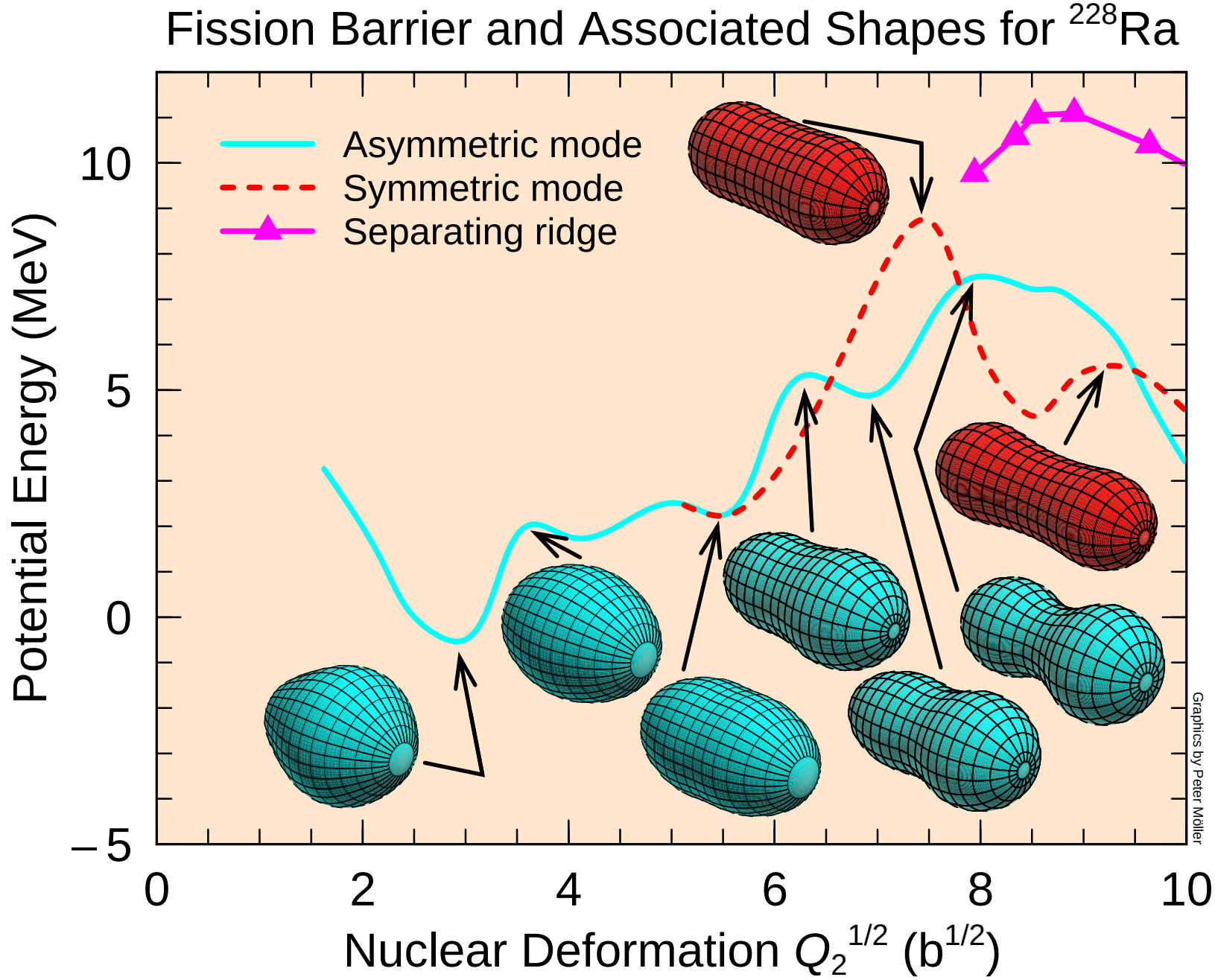
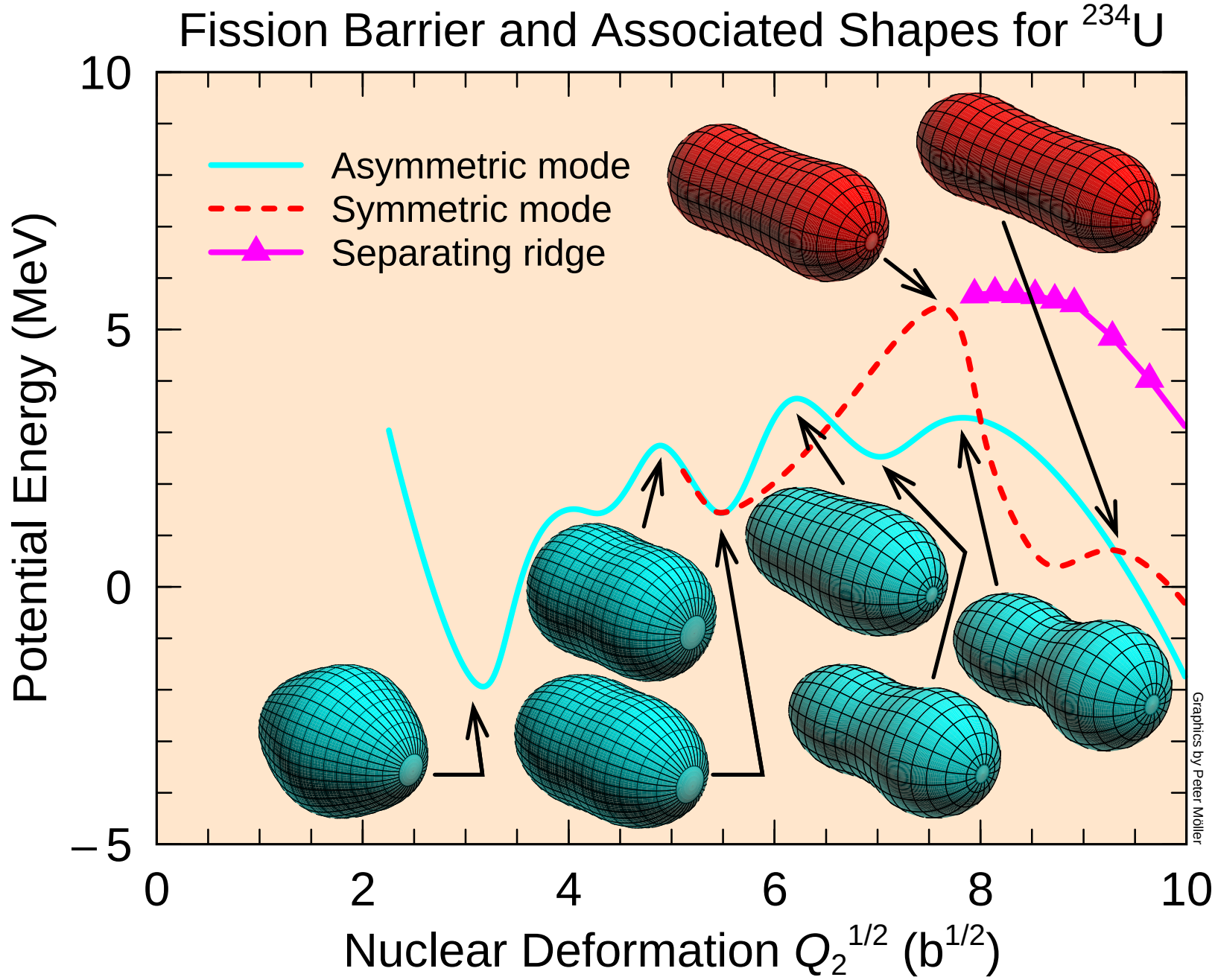

Fission Barrier and Associated Shapes for ^{228}Ra
Asymmetric mode
Symmetric mode
Separating ridge
Potential Energy (MeV)
10
5
0
−5
0
2
4
6
8
10
Nuclear Deformation $Q_2^{1/2}$ (b$^{1/2}$)
Graphics by Peter Möller

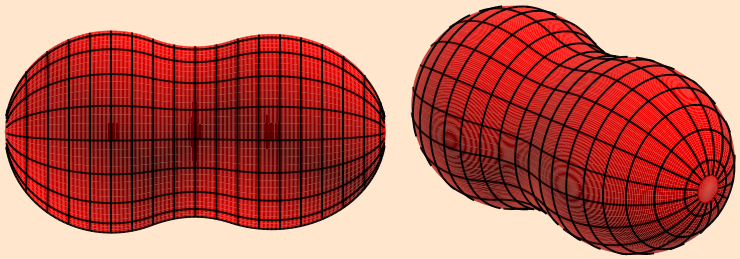

Fission Barrier and Associated Shapes for ^{234}U
Asymmetric mode
Symmetric mode
Separating ridge
Potential Energy (MeV)
10
5
0
−5
0
2
4
6
8
10
Nuclear Deformation $Q_2^{1/2}$ (b$^{1/2}$)
Graphics by Peter Möller

Graphics by Peter Möller

Fermium Bimodal Saddle-Point Shapes

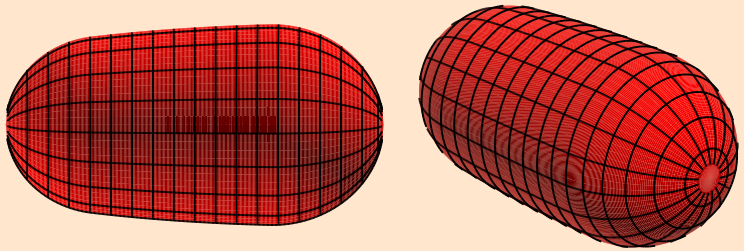
^{256}Fm: Higher outer saddle (Towards high TKE)

$\varepsilon_{f1} = 0.1500$ $\varepsilon_{f2} = 0.0500$ $M_H/M_L = 128.0/128.0$



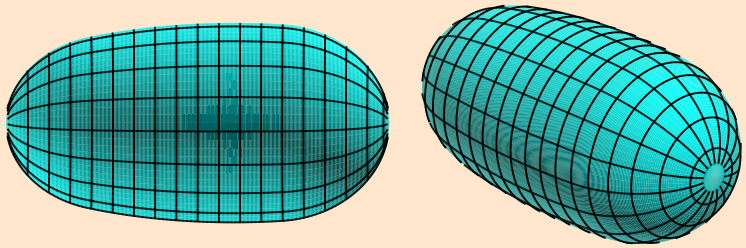
^{258}Fm: Higher outer saddle (Towards low TKE)

$\varepsilon_{f1} = 0.1000$ $\varepsilon_{f2} = 0.1000$ $M_H/M_L = 152.2/105.8$



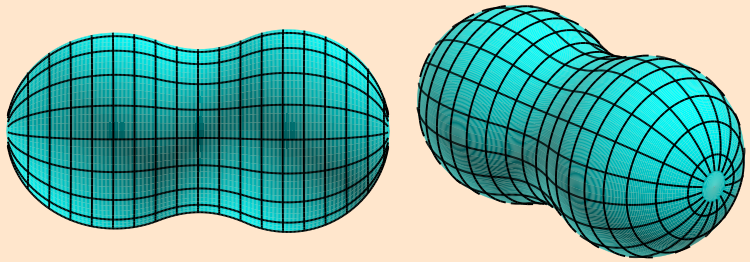
^{256}Fm: Lowest outer saddle (Towards low TKE)

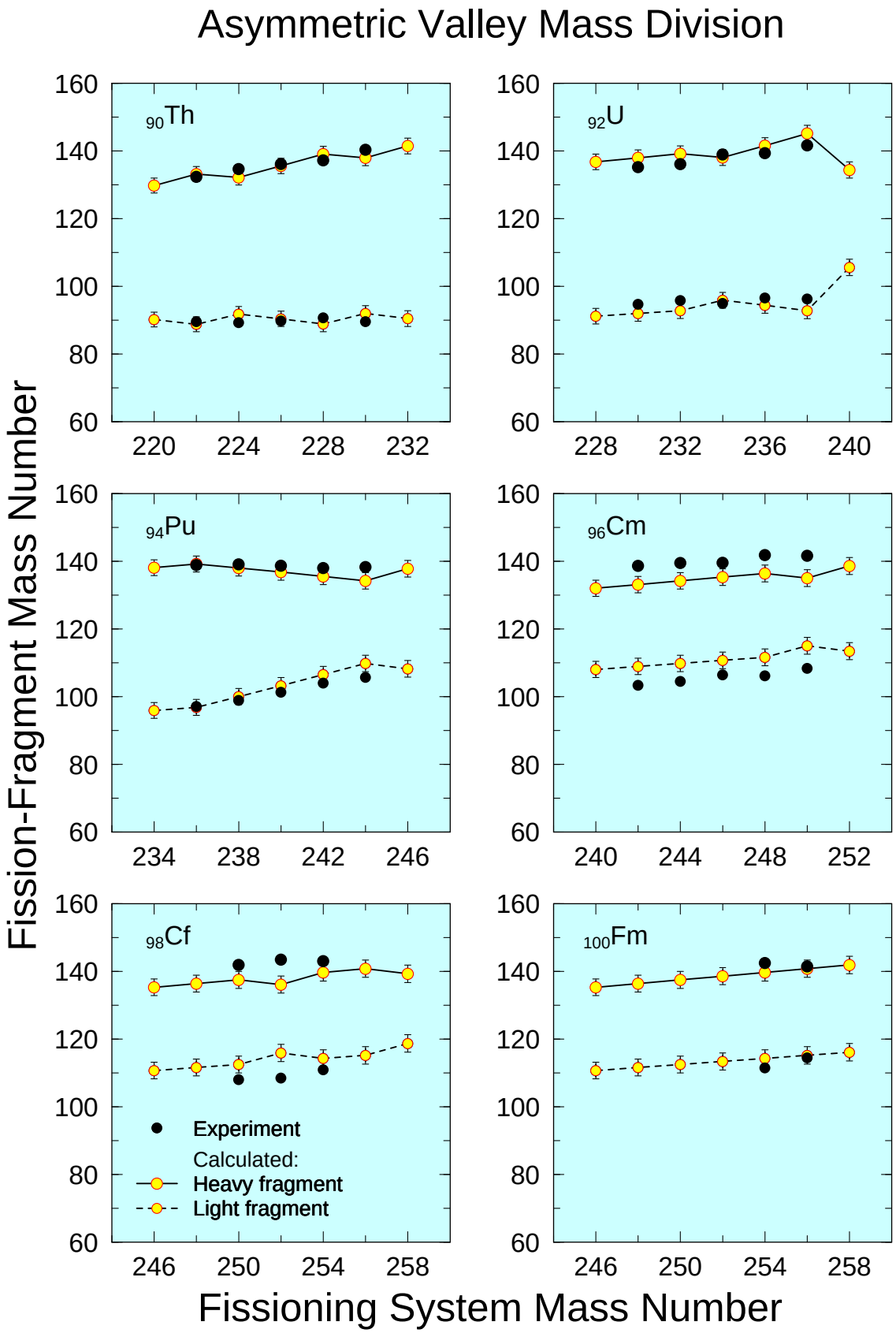
$\varepsilon_{f1} = 0.1500$ $\varepsilon_{f2} = 0.2000$ $M_H/M_L = 145.9/110.1$



^{258}Fm: Lowest outer saddle (Towards high TKE)

$\varepsilon_{f1} = 0.0000$ $\varepsilon_{f2} = 0.1000$ $M_H/M_L = 129.0/129.0$




Asymmetric Valley Mass Division
Fission-Fragment Mass Number
Fissioning System Mass Number
90Th
92U
94Pu
96Cm
98Cf
100Fm
Experiment
Calculated:
Heavy fragment
Light fragment