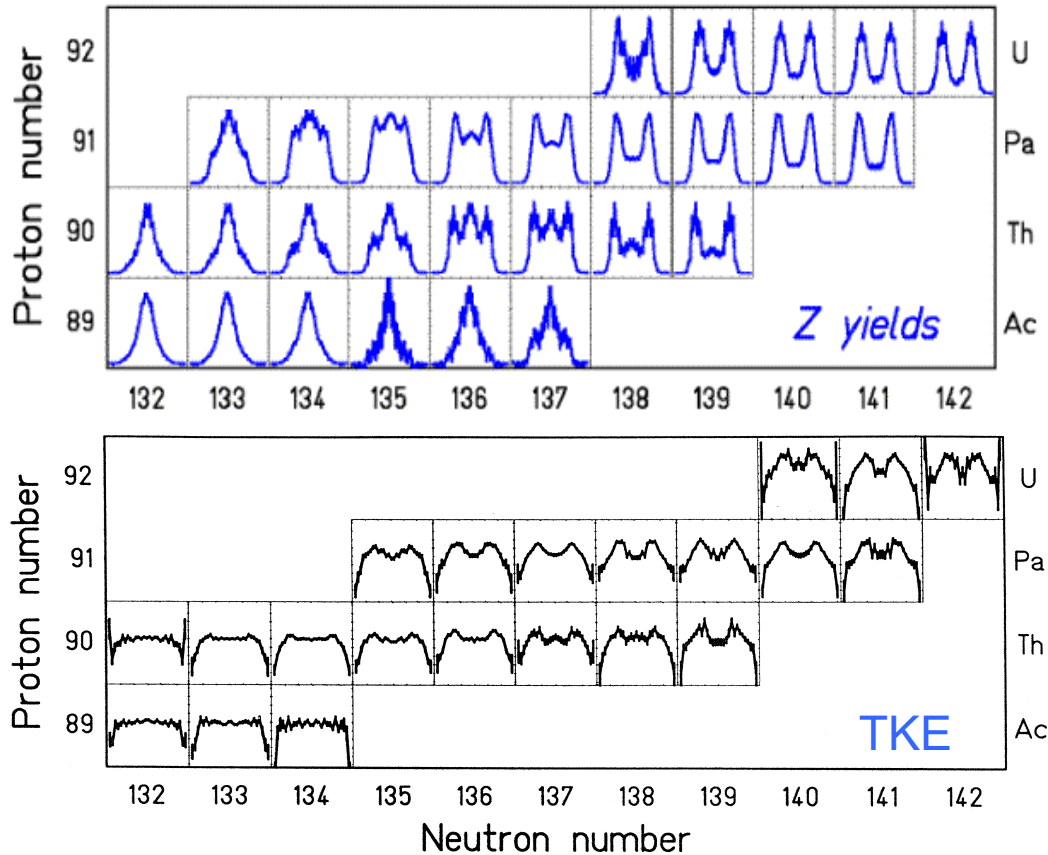
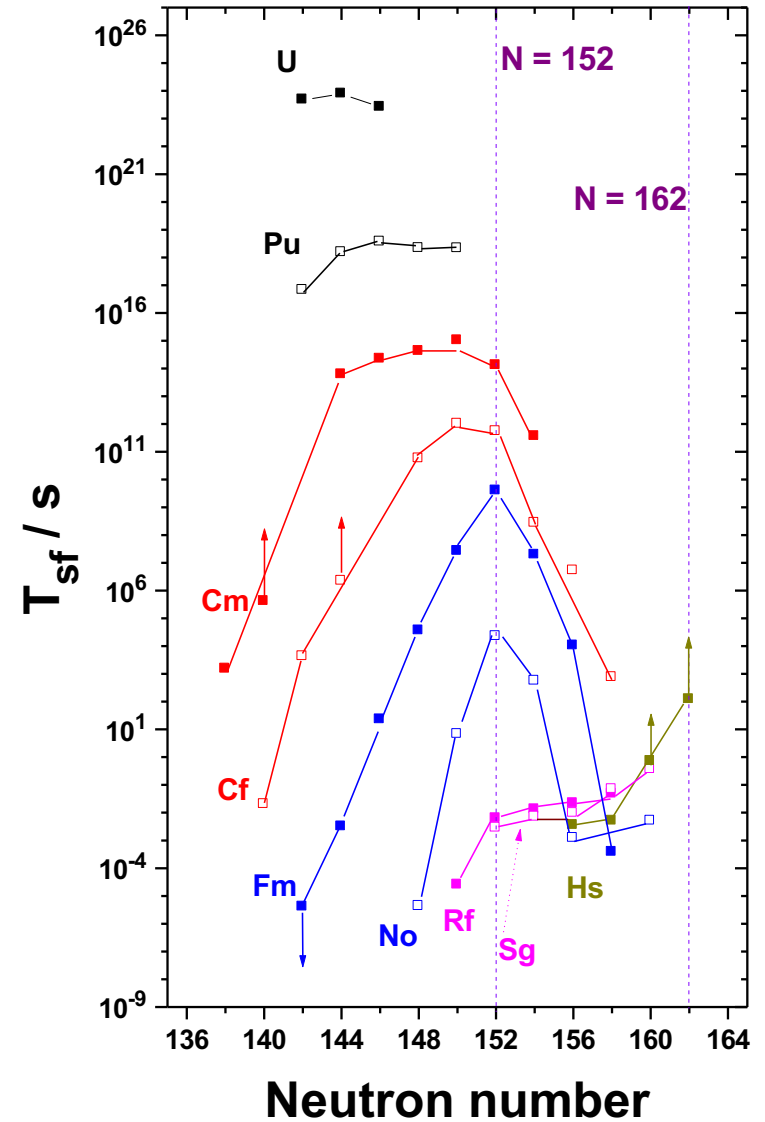


^{238}U lives 4.5 billion years
 ^{250}No No fissions after $4.2 \mu\text{s}$



EM fission of RNBs at GSI, $E^* \sim 11 \text{ MeV}$
 K-H Schmidt et al., NPA 665, 221 (2000)





<https://www.youtube.com/watch?v=mBdVK4cqiFs>

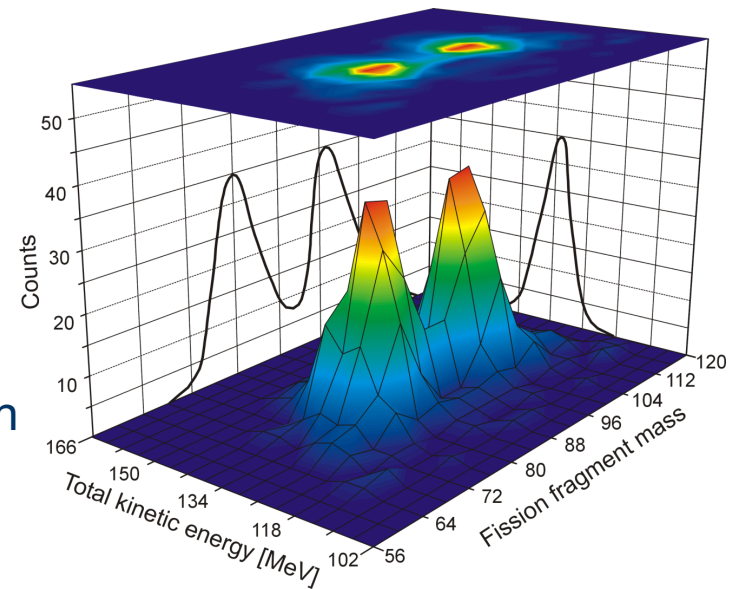
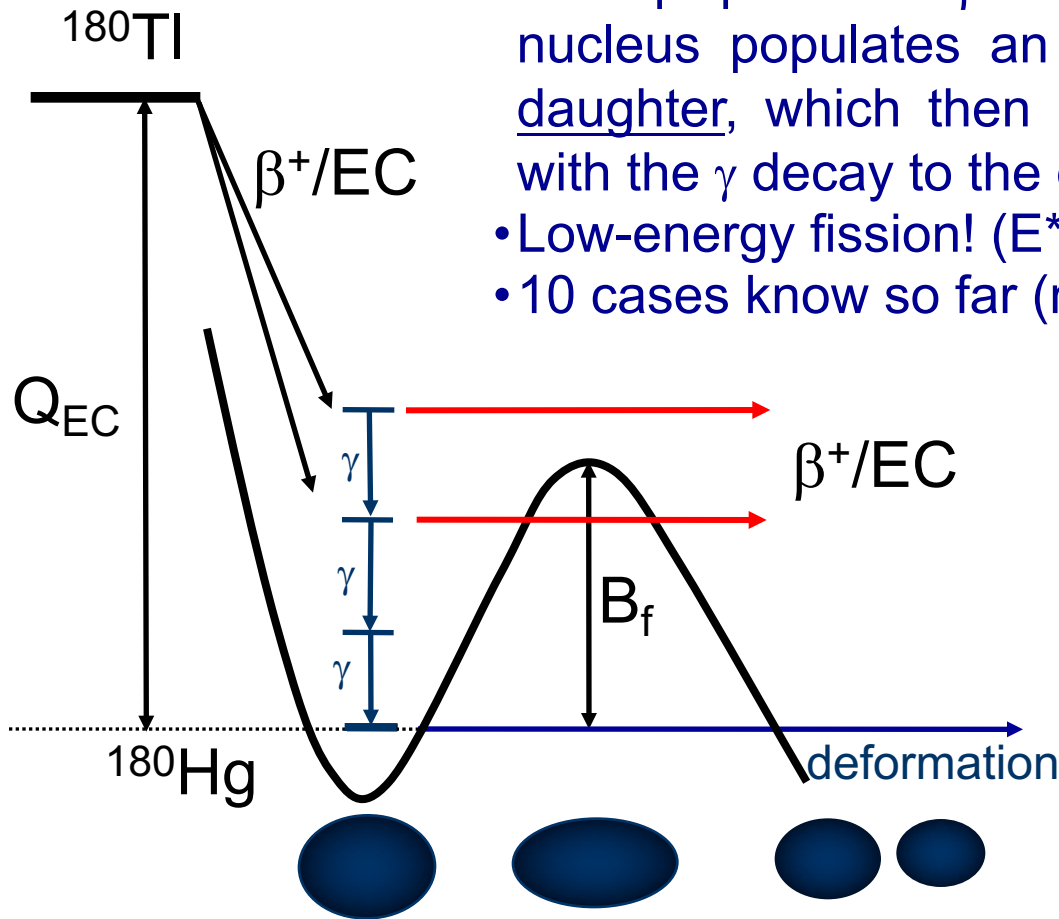
Fact Check

HW: How accurate is the description of fission presented in this video? If you find inaccuracies, list them.

Curious Fission of ^{180}Hg

<http://www.nature.com/news/2010/101201/full/news.2010.642.html>

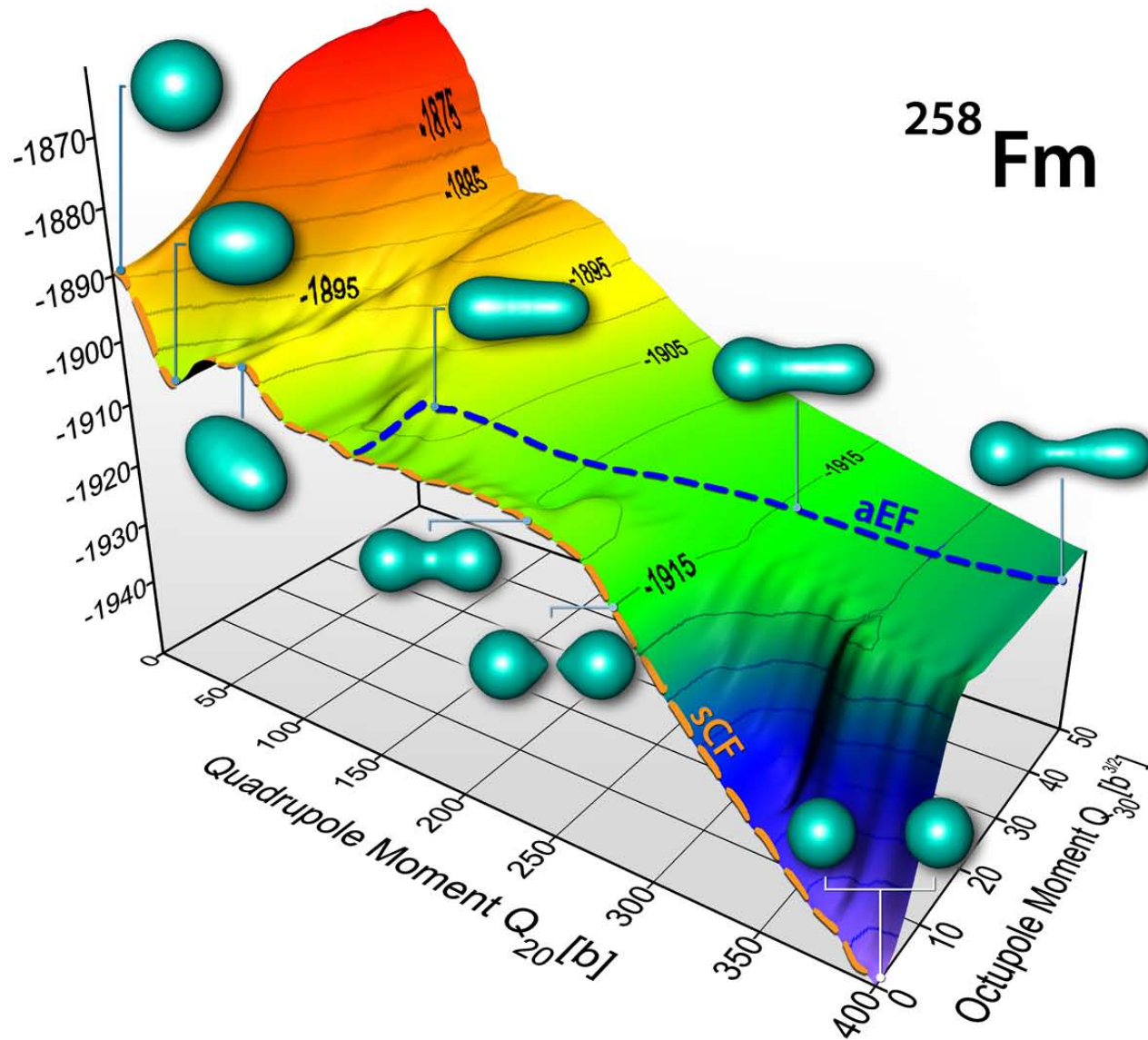
- 2 step process: β^+/EC decay of a parent ^{180}Tl nucleus populates an excited state in the ^{180}Hg daughter, which then might fission (in competition with the γ decay to the g.s.)
- Low-energy fission! ($E^* < Q_{\text{EC}} = 10.8 \text{ MeV}$)
- 10 cases known so far (neutron-def. Uranium region)



Phys. Rev. Lett. 105, 252502 (2010);
Rev. Mod. Phys. 85 1541 (2013)

- Before the ISOLDE experiment: expected SYMMETRIC split in two semi-magic ^{90}Zr
- The most probable fission fragments are ^{100}Ru ($N=56, Z=44$) and ^{80}Kr ($N=44, Z=36$)

Fission pathways...



Fission half-lives: depend on potential, friction, and inertia terms

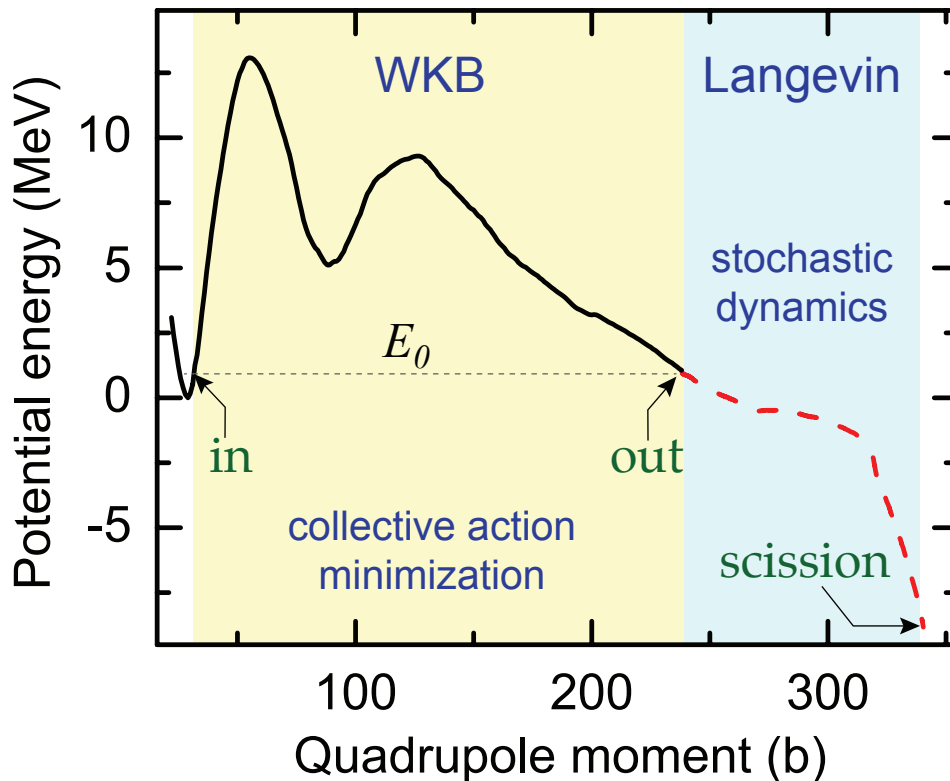
$$T_{1/2} = \ln 2 / (nP) \quad n = 10^{20.38} \text{sec}^{-1} \quad P = 1 / (1 + e^{2S})$$

WKB:
$$S(L) = \int_{s_{\text{in}}}^{s_{\text{out}}} \frac{1}{\hbar} \sqrt{2\mathcal{M}_{\text{eff}}(s) (V(s) - E_0)} ds$$

The action has to be minimized!

collective inertia
(mass parameter)

multidimensional space of
collective parameters



Fission half-lives: depend on potential, friction, and inertia terms

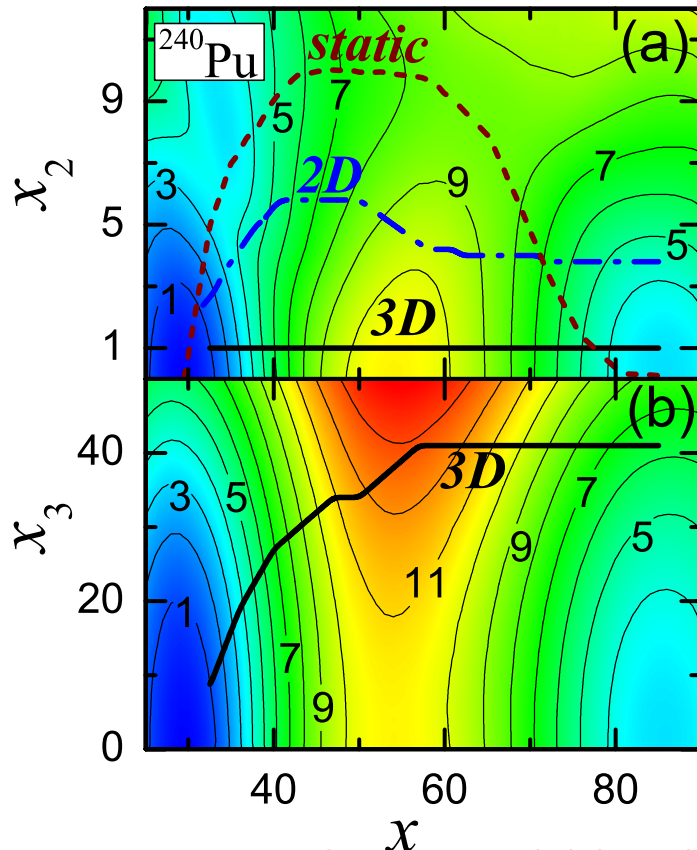
$$T_{1/2} = \ln 2 / (nP) \quad n = 10^{20.38} \text{sec}^{-1} \quad P = 1 / (1 + e^{2S})$$

WKB:
$$S(L) = \int_{s_{\text{in}}}^{s_{\text{out}}} \frac{1}{\hbar} \sqrt{2\mathcal{M}_{\text{eff}}(s) (V(s) - E_0)} ds$$

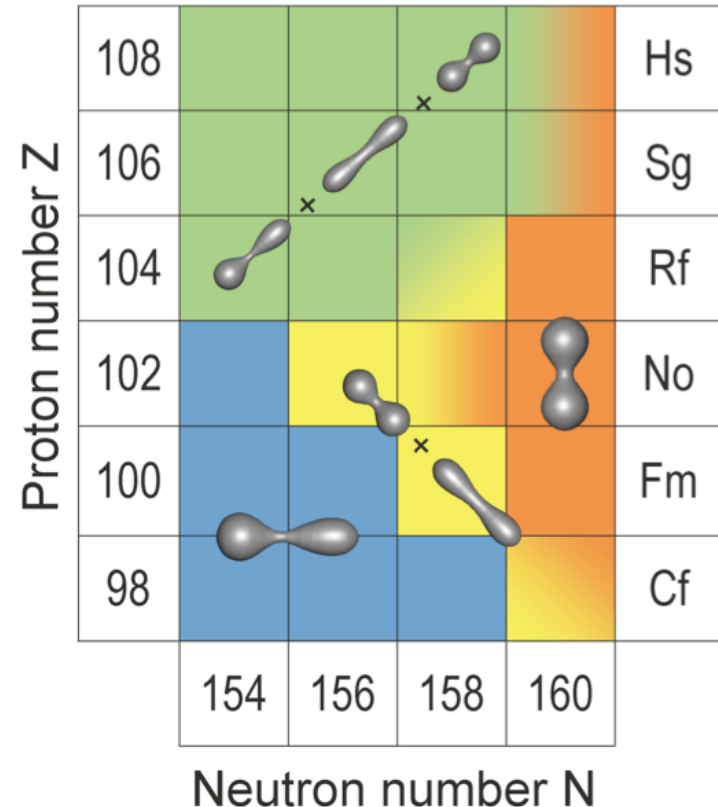
The action has to be minimized!

collective inertia
(mass parameter)

multidimensional space of
collective parameters



Phys. Rev. C 90 061304(R) (2014)



Phys. Rev. C 80, 014309 (2009)

Low-energy fission: theoretical strategy

<https://people.nsl.msui.edu/~witek/Talks/Fission-JINA.pptx>

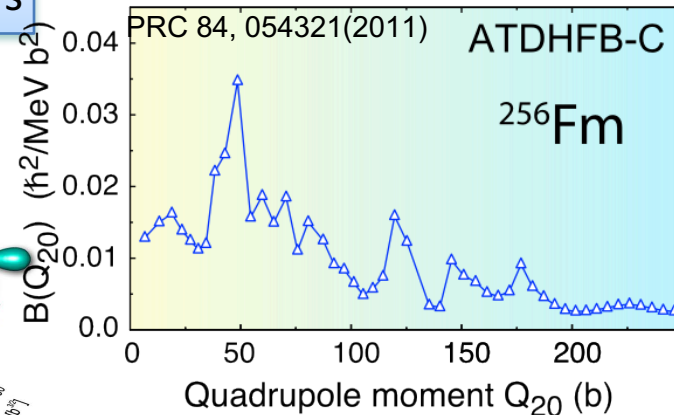
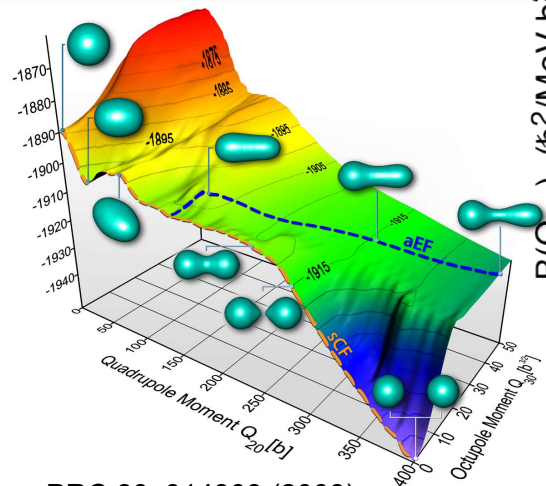
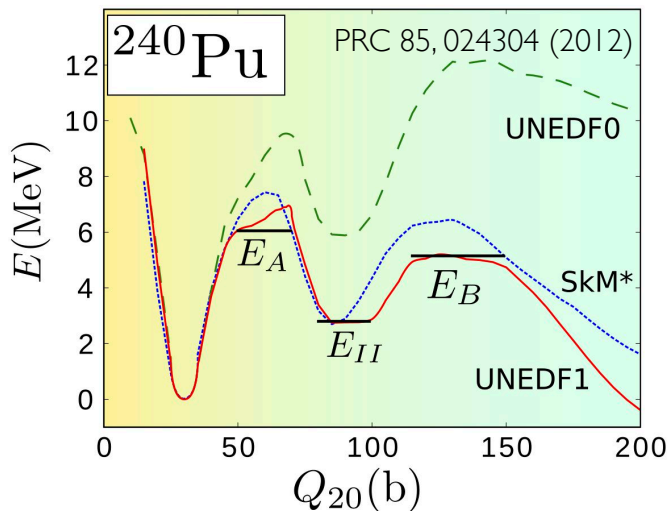
<http://science.energy.gov/ascr/highlights/2015/ascr-2015-08-a/>



Quality Input

Large-scale Simulations
on Leadership-class Computers

Dynamics



Confrontation with
experiment; predictions

Numerical Techniques

