

Fission barriers and half-lives of super-heavy nuclei in a microscopic approach

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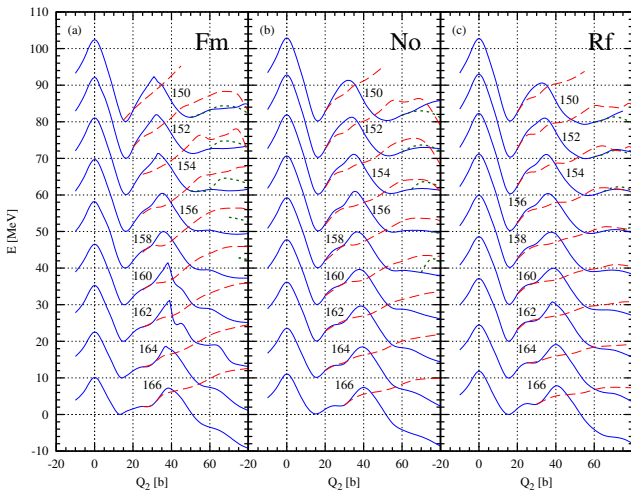
Erbismühle, 13/16-05-2012

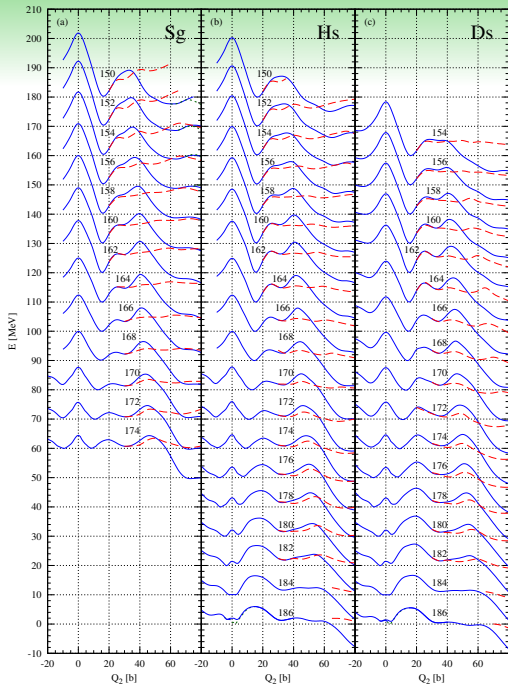
Calculations of potential energy surfaces

- Selfconsistent calculations in Hartree-Fock-Bogolubov theory with D1S Gogny parameter set
- Constrains on quadrupole and octupole moments
- Axial calculations (triaxial in some nuclei)
- Half-lives determined in WKB approximation
- Systematic calculations of 160 SHE fission barriers

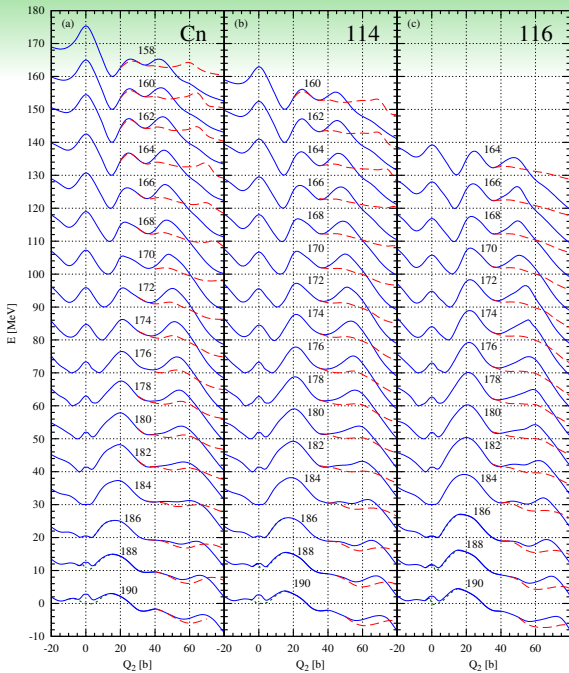
arXiv:1204.5867 [nucl-th]

Fission barriers: Fm, No, Rf



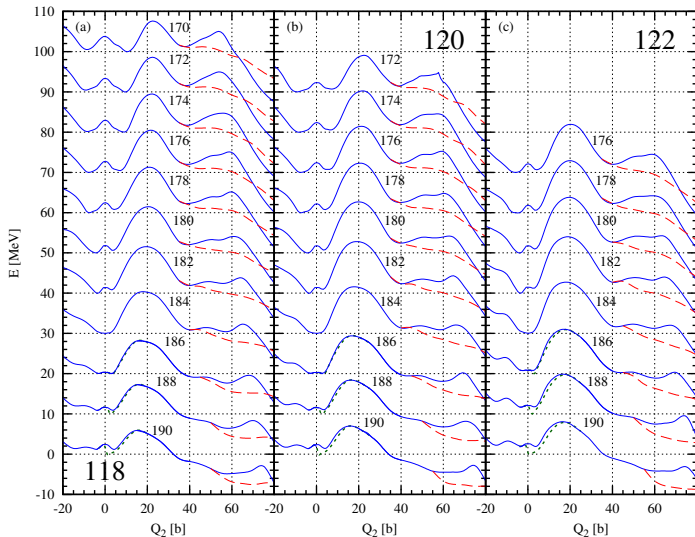


Fission barriers:
Sg,Hs,Ds

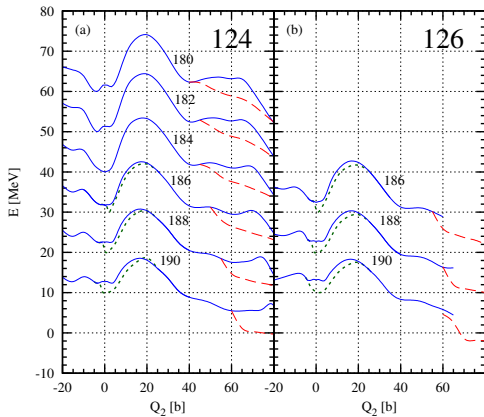


Fission barriers:
Cn, Z=114,116

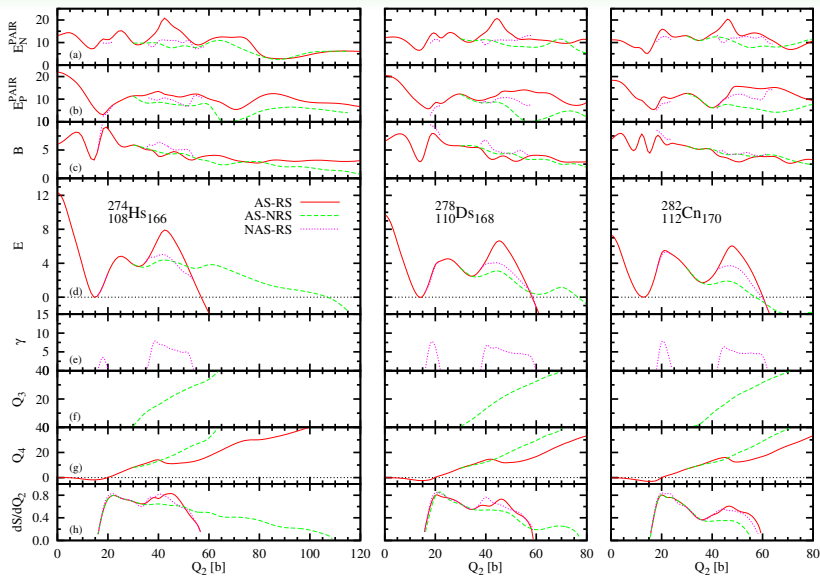
Fission barriers: $Z=118,120,122$



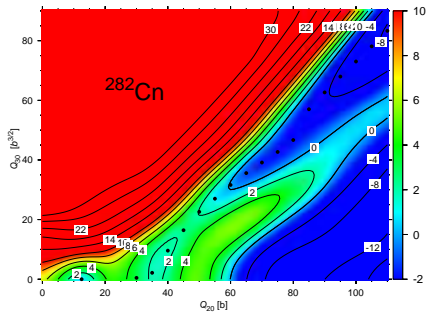
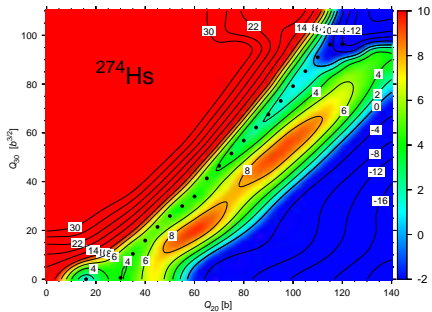
Fission barriers: $Z=124,126$

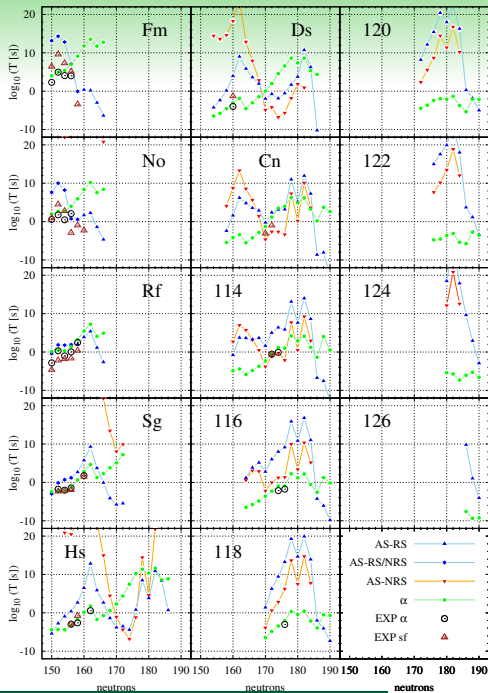


Fission barriers – reflection symmetric, reflection asymmetric and triaxial



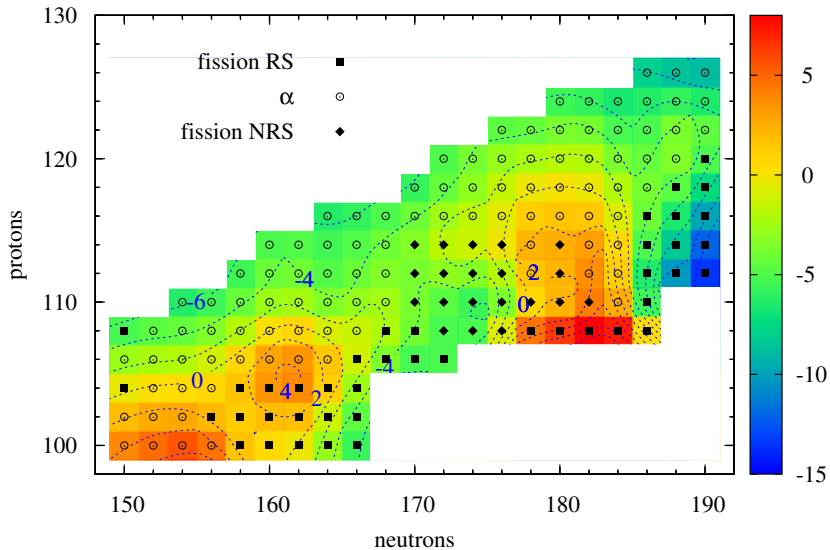
Fission barriers in ^{274}Hs and ^{282}Cn





Fission and α -decay half-lives

Fission and α -decay half-lives

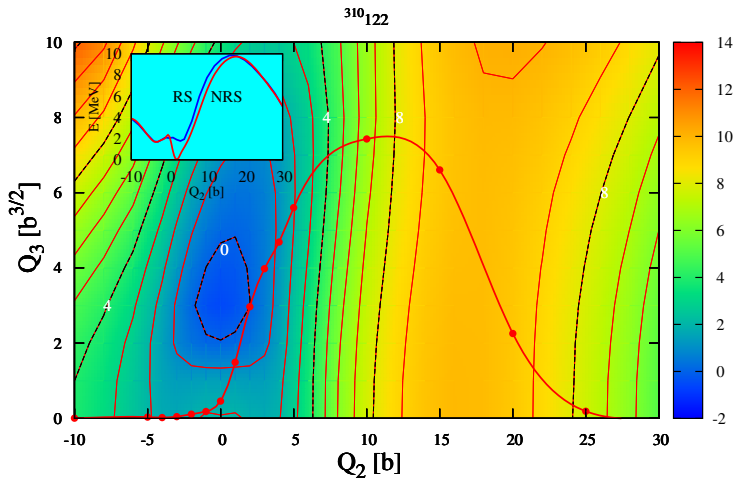


Conclusions:

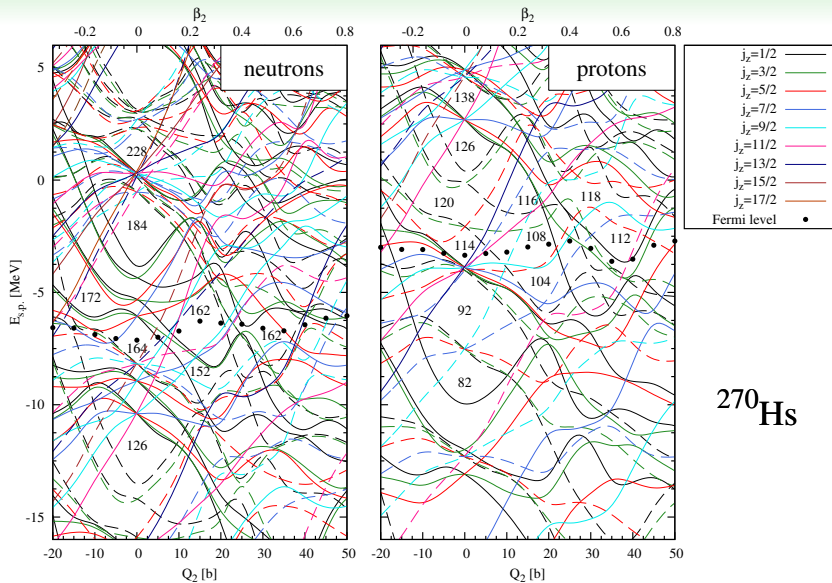
- Fission barriers have been determined in self-consistent procedure in HFB theory with Gogny D1S force
- Octupole asymmetry and triaxiality is important mostly on the second barrier
- Reflection asymmetric fission barrier is smaller than symmetric one for $170 \leq N \leq 182$
- Octupole deformed ground state for $N \geq 184$
- Good agreement with available experimental data of half-lives

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Octupole ground state for N=188

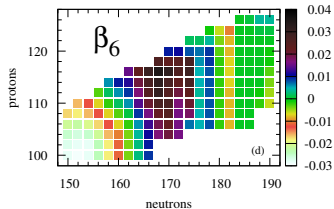
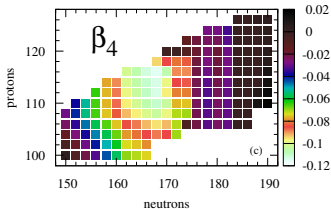
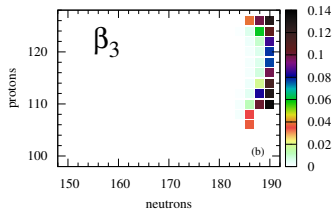
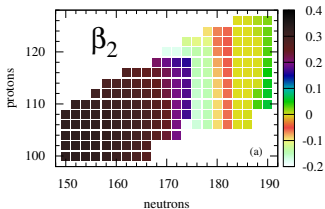


Single particle energies

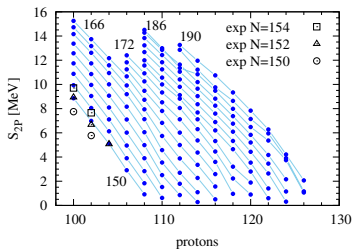
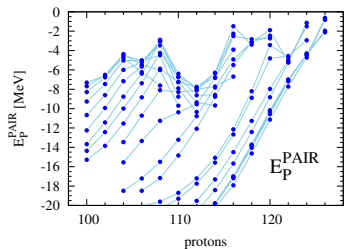
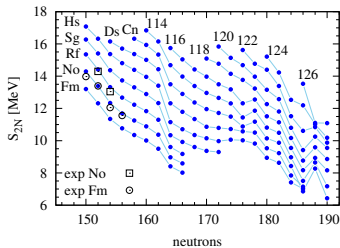
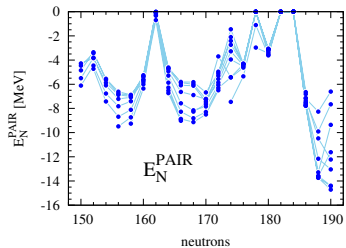


^{270}Hs

Ground state deformations



Pairing energies, 2-nucleon separation energies



$$Q_\alpha$$

