Charge radii around $A \sim 180$ with GSk1 and 2

W. Ryssens, G. Scamps, E. Olsen and S. Goriely.

Université Libre de Bruxelles

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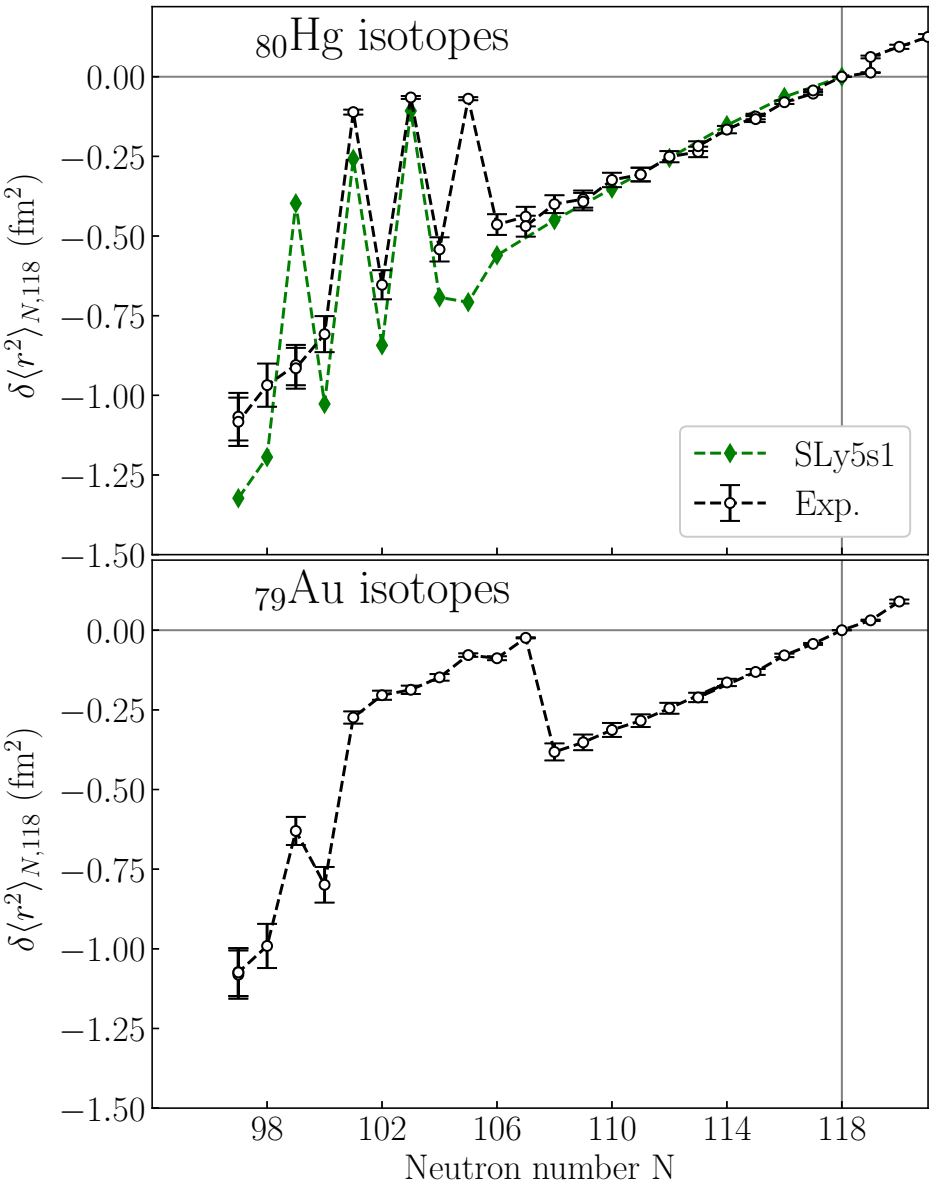
Introduction

(See previous talks)

Patterns in charge radii



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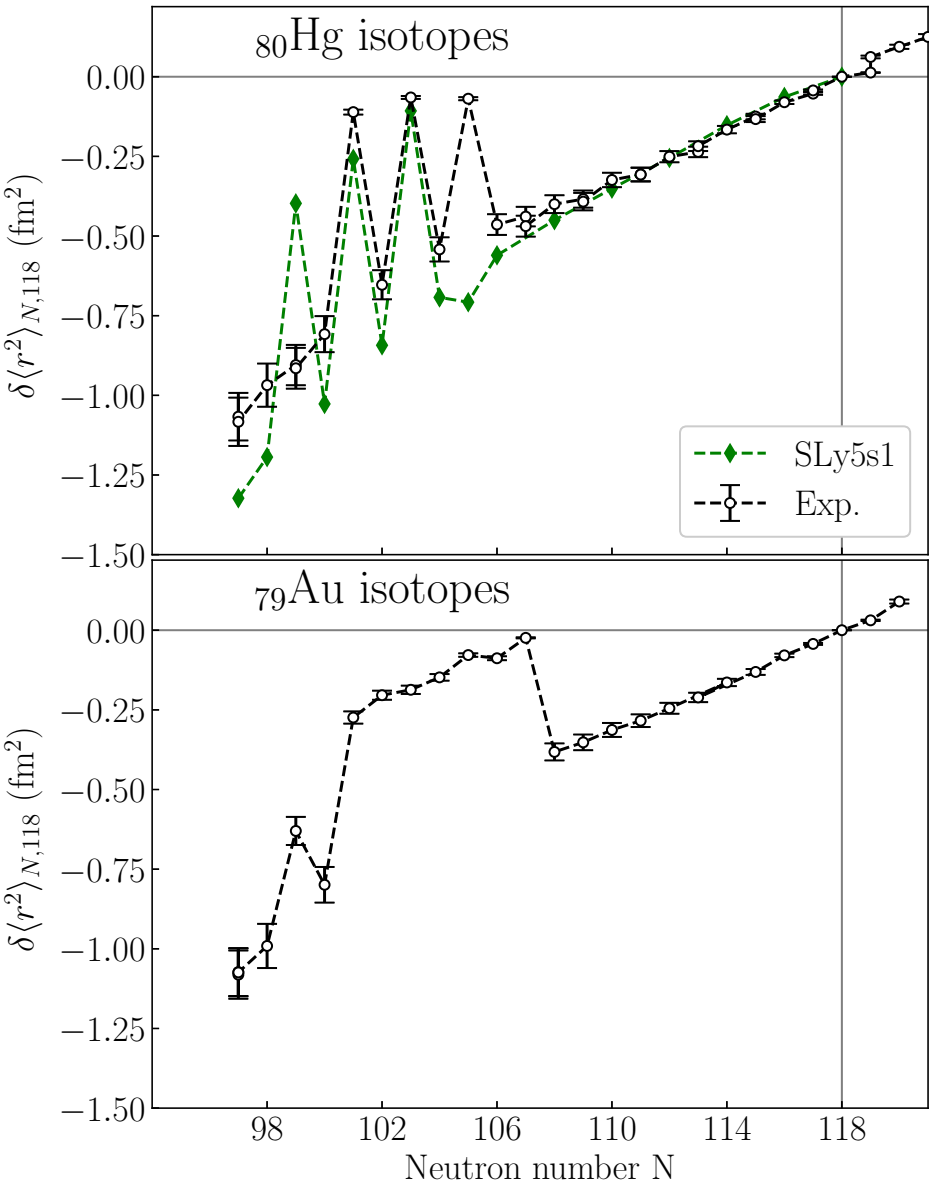

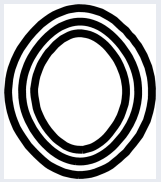

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$\beta_{20} \sim -0.15$

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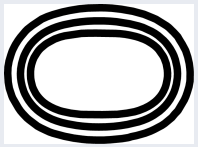

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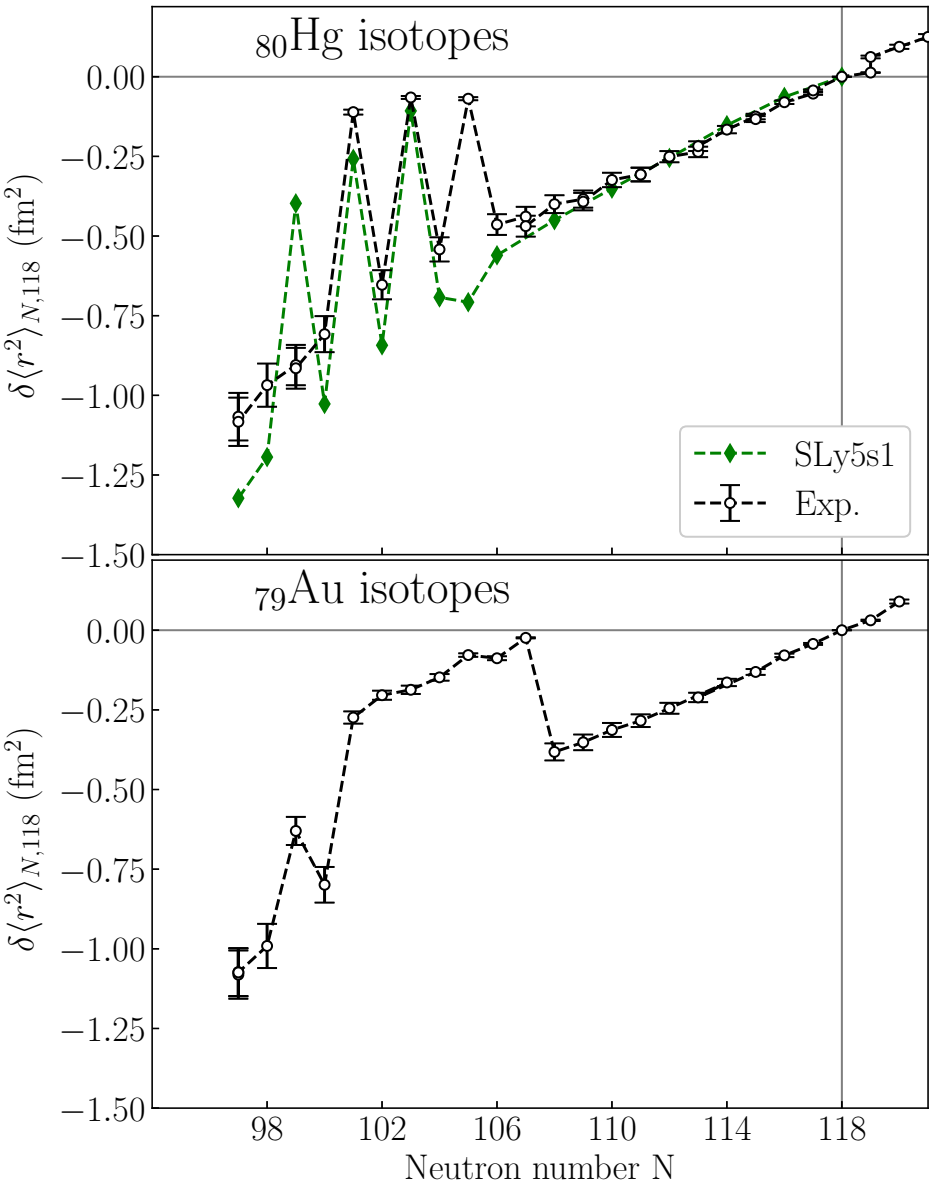

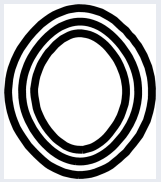

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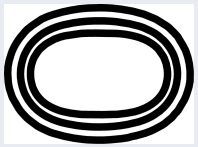

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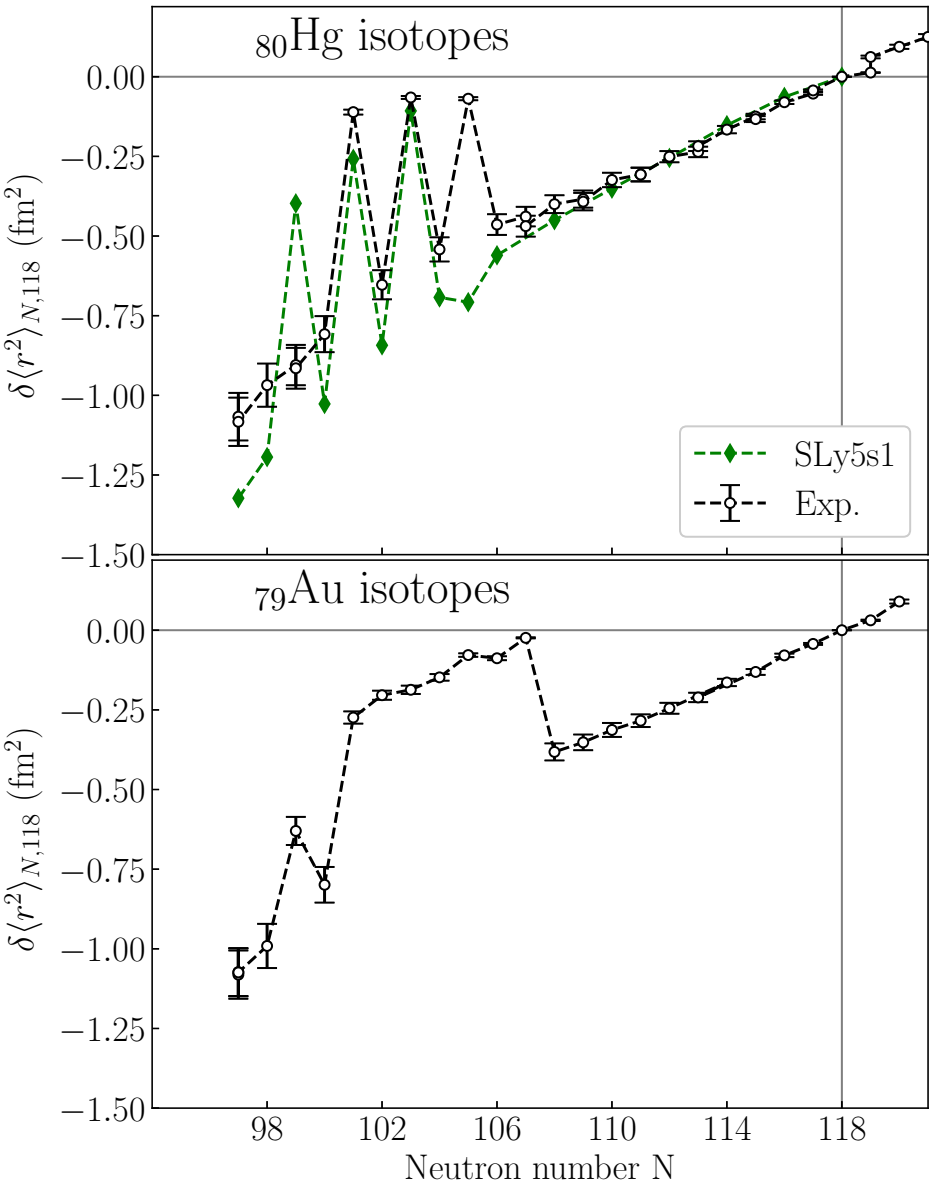

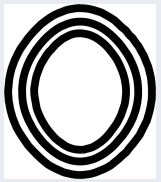

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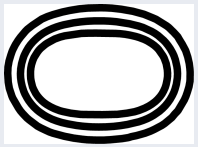

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- Now more data for Au!

  and other isotopes ...

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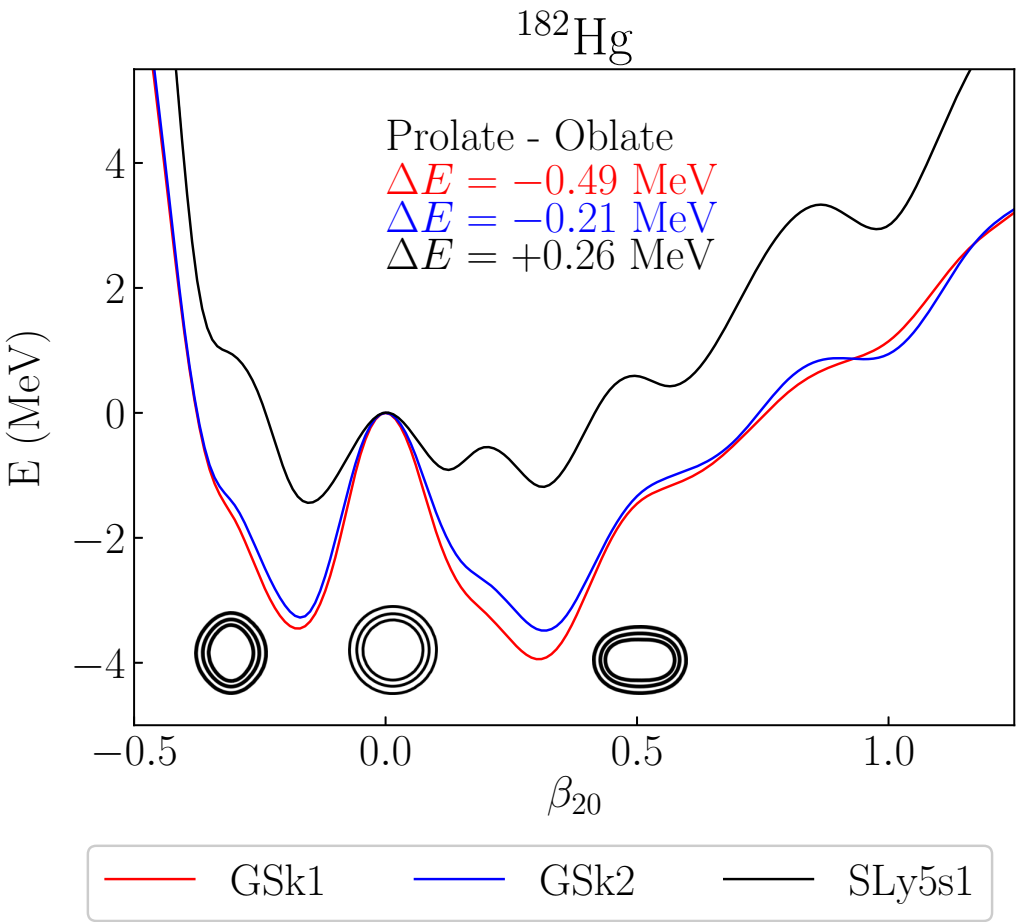
Axial deformation



- Balance is intricate
- Influenced by many things

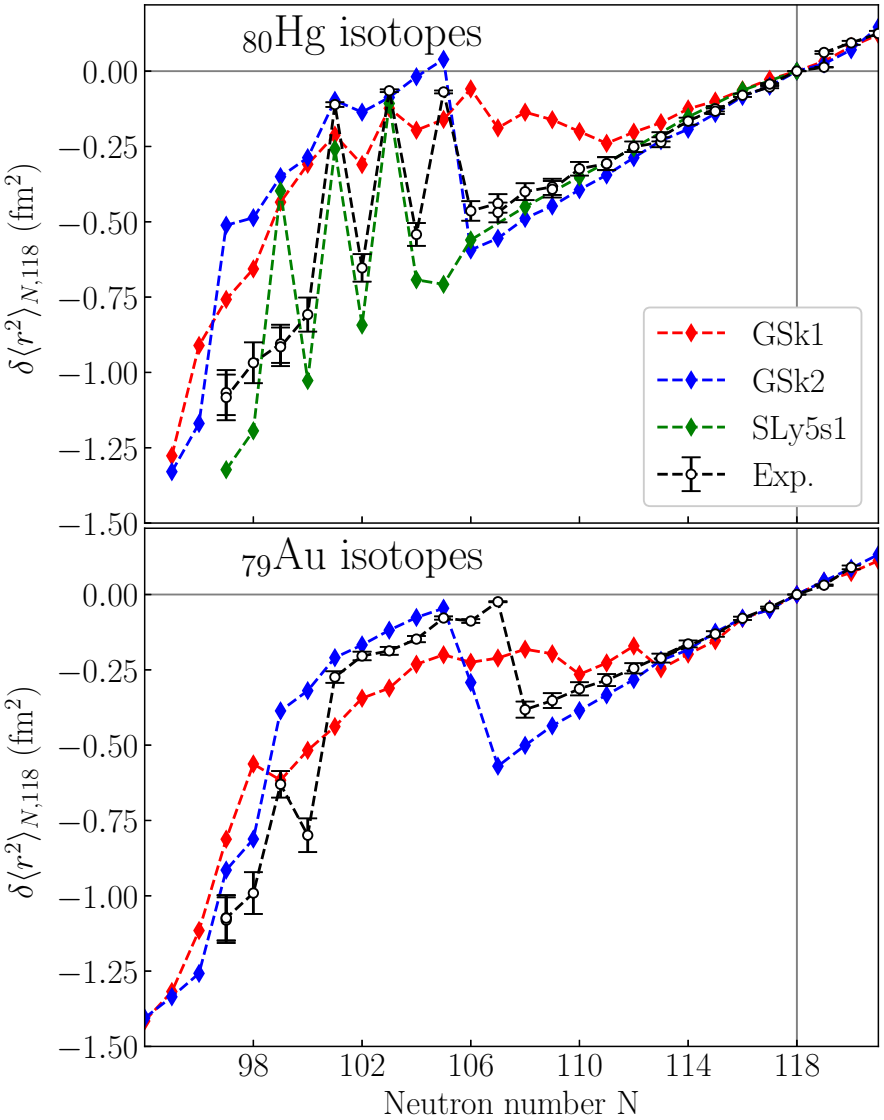
  Surface energy, shell structure, . . .
- Even worse for odd nuclei

  Many competing quasiparticle configurations

  sometimes $\Delta E \sim 20$ keV

SLy5s1: R. Jodon et al., PRC **94** 024335 (2016).
GSkX: G. Scamps et al., submitted to PRL.

Charge radii



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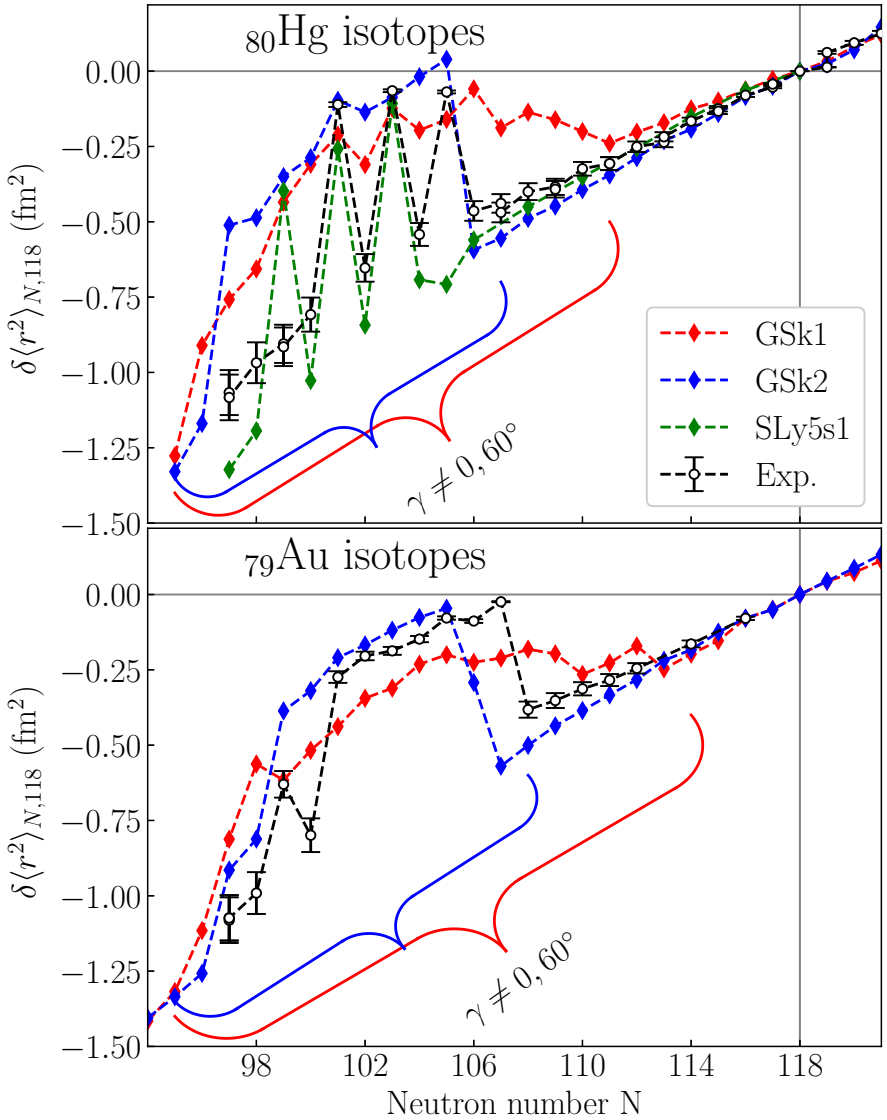

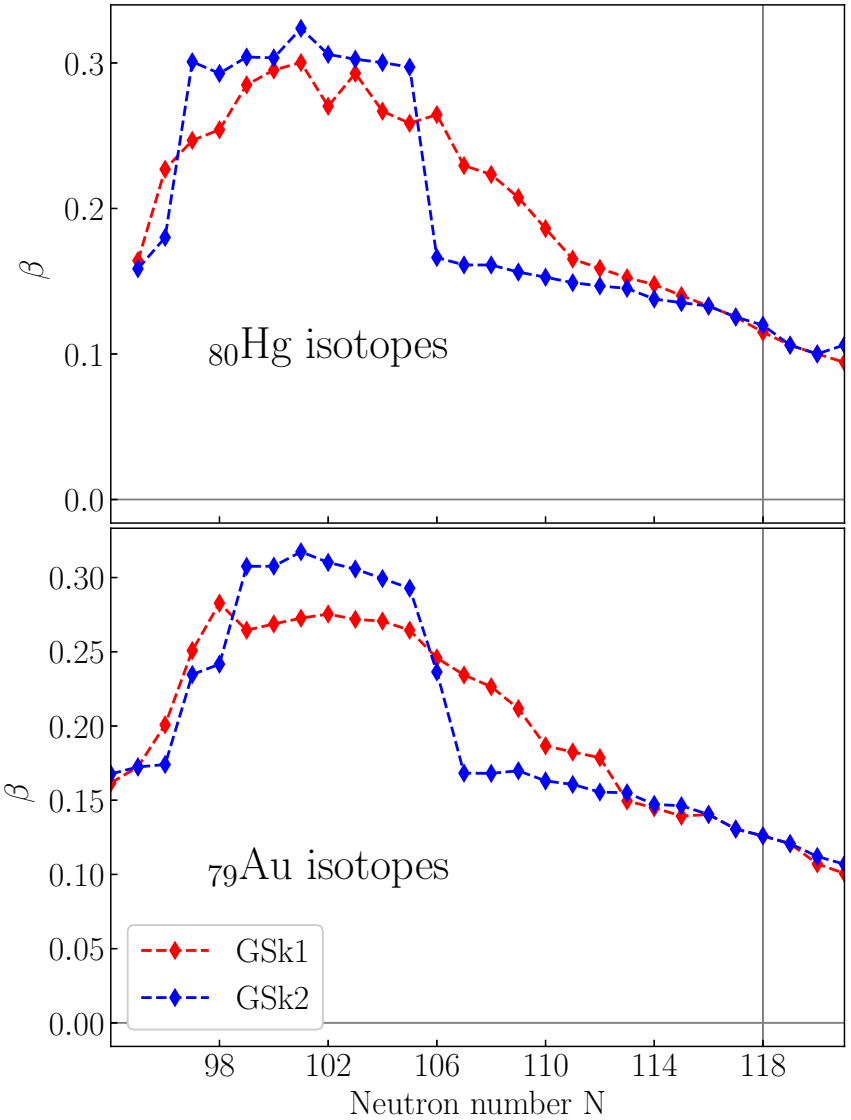

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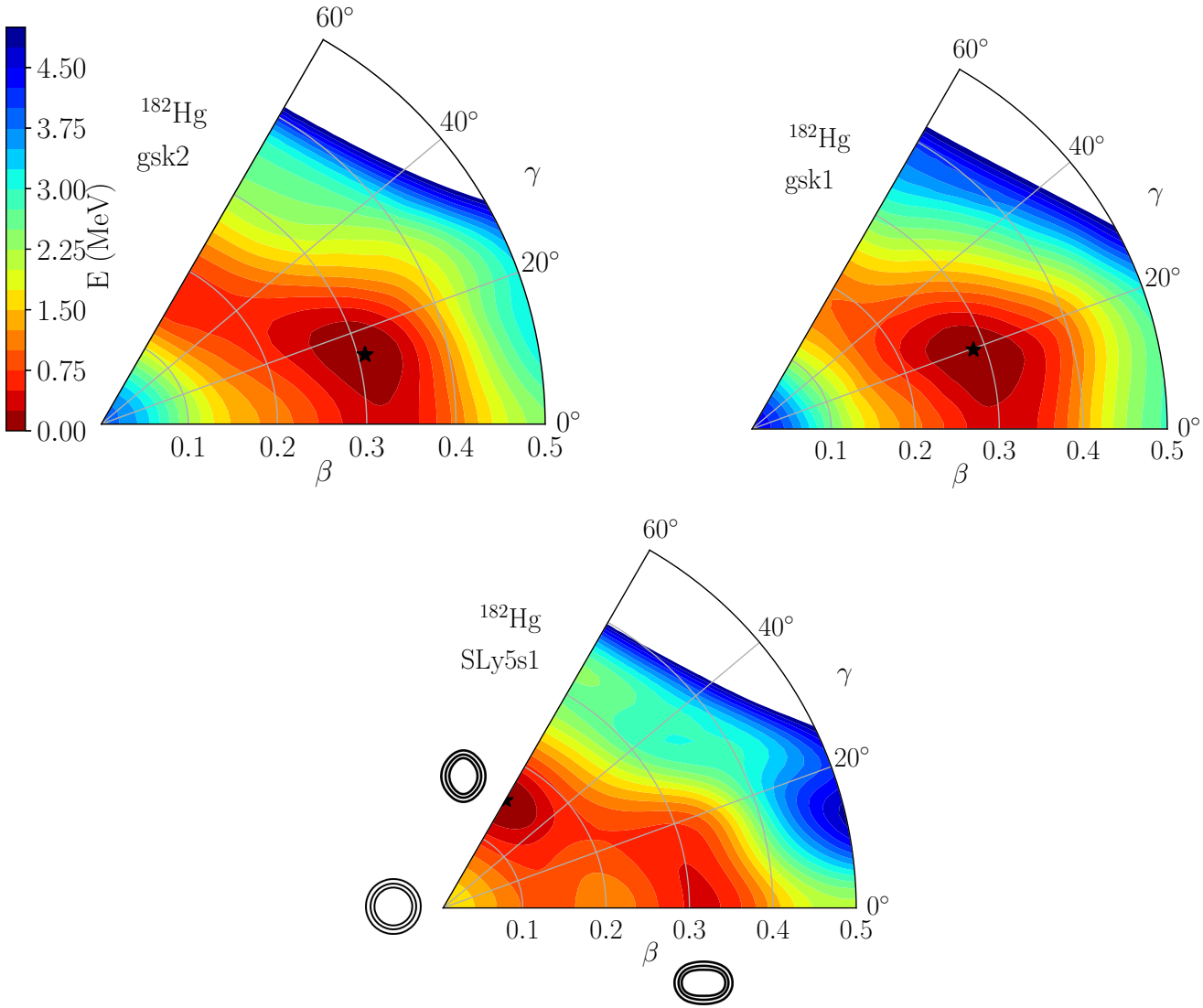
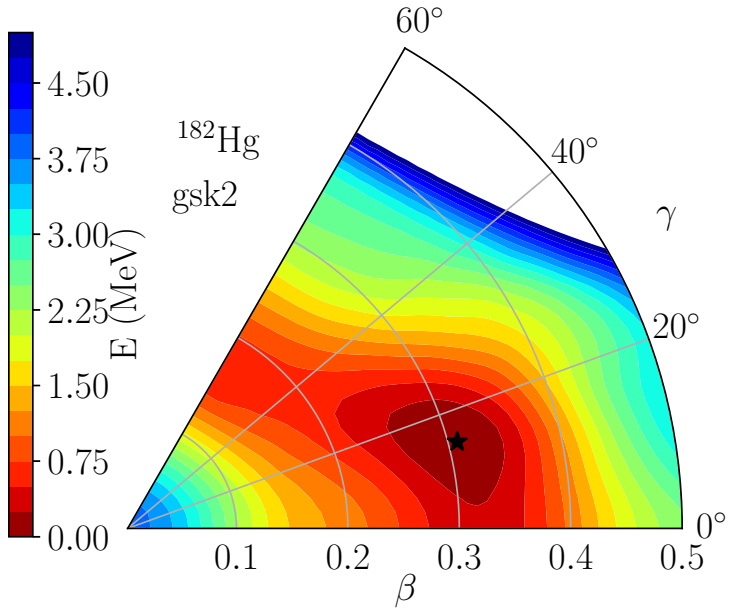
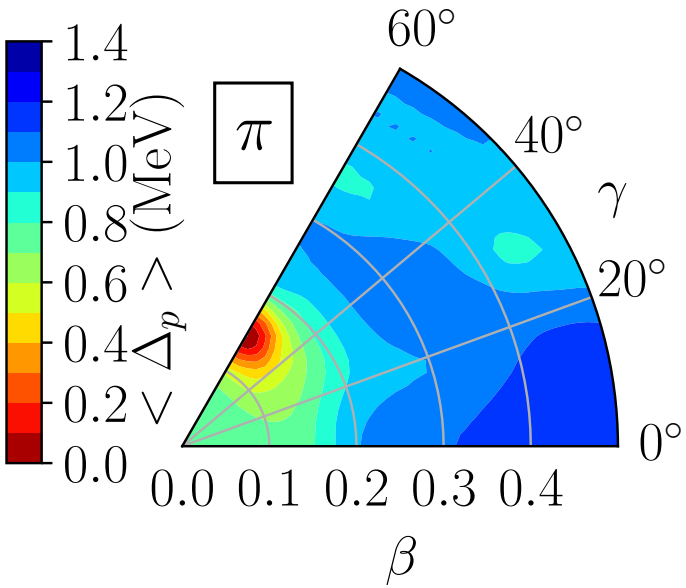
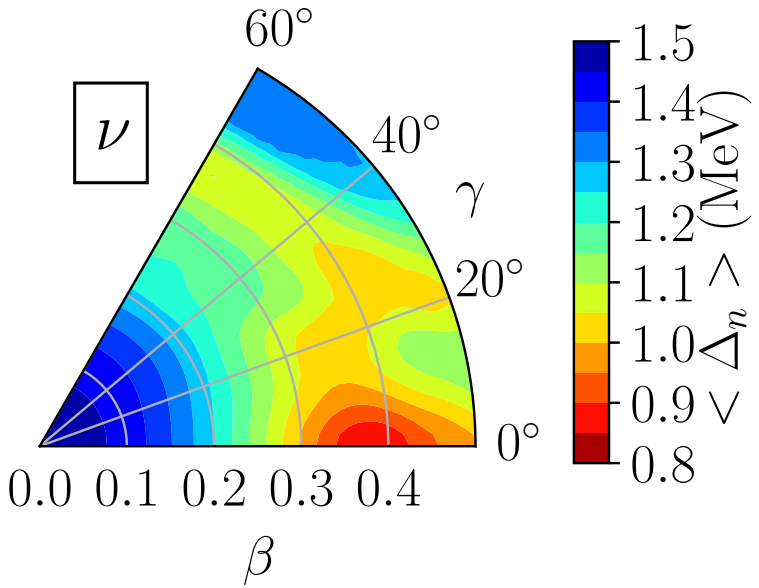
Triaxial deformation



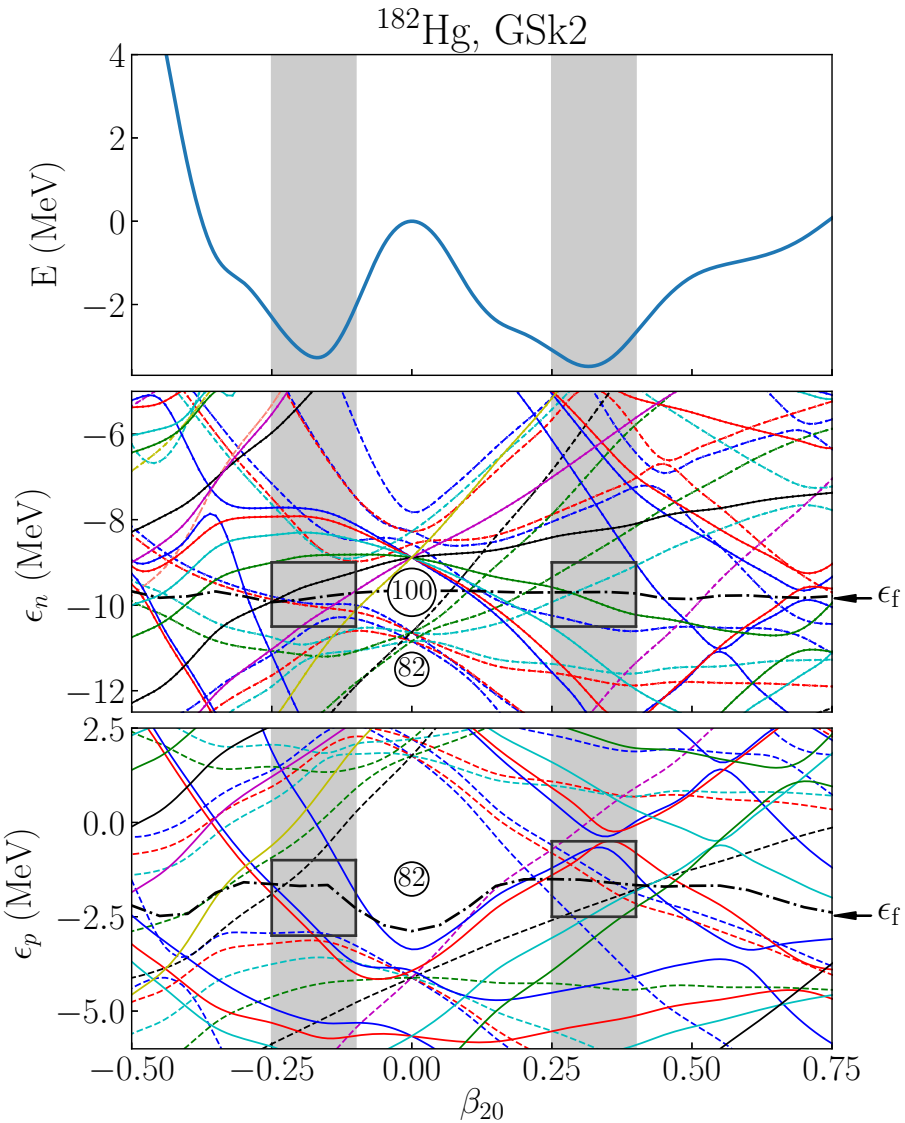
Pairing competition

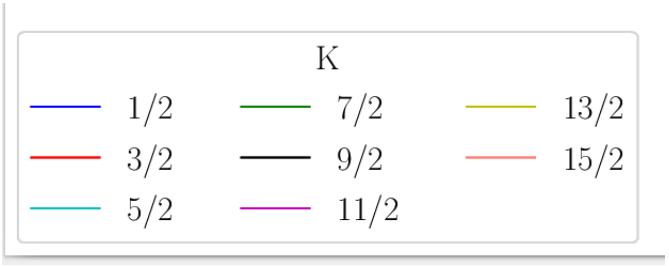






Single-particle origin





Origin: π vs. ν sp level density

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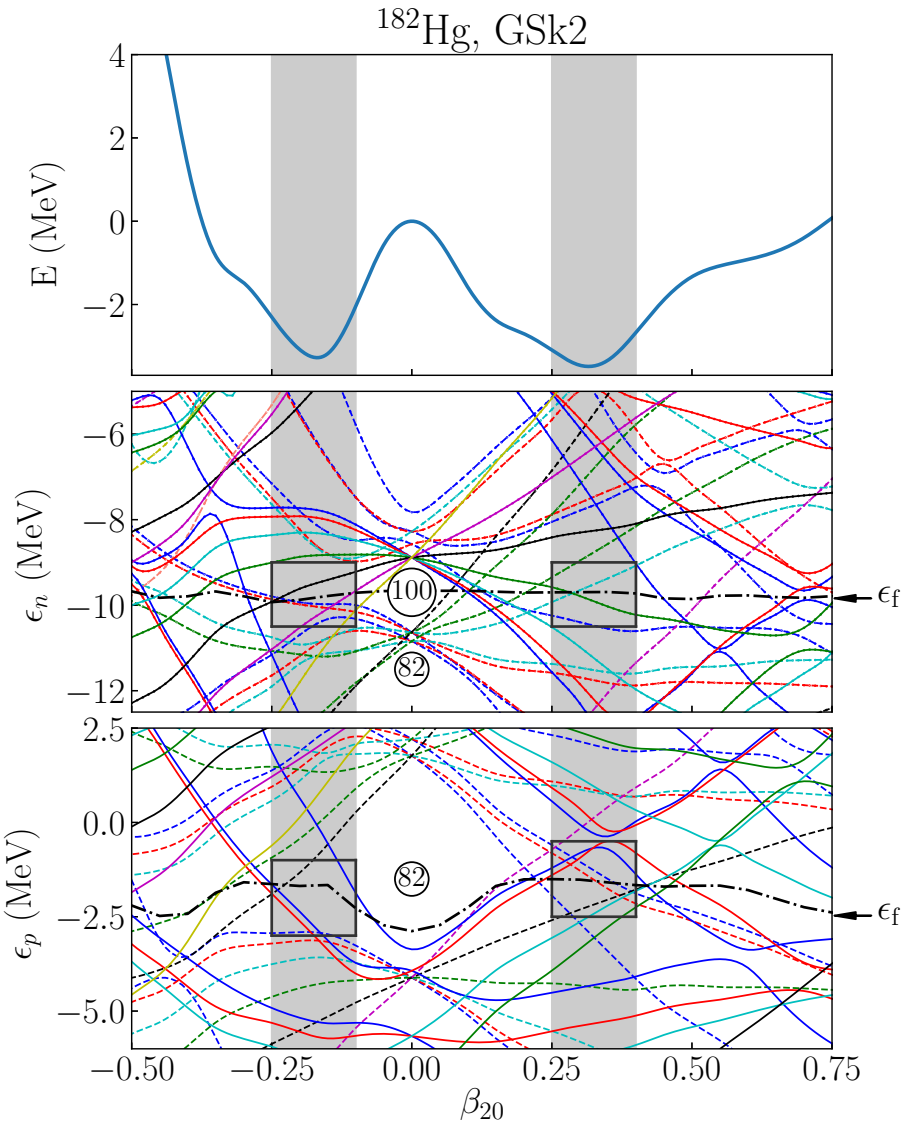

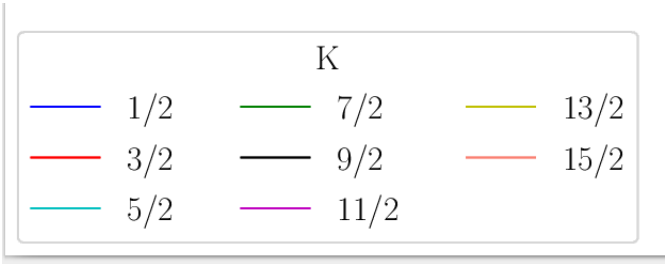

Origin: π vs. ν sp level density

- single-particle spectrum comparable to SLy5s1…
- …and hence most Skyrme parameterizations
- Rather bad predictions of ground-state spins and parities

Applying the lesson

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To explore: $V_p < V_n$.
Perhaps $V_p = 0.9 V_n$?

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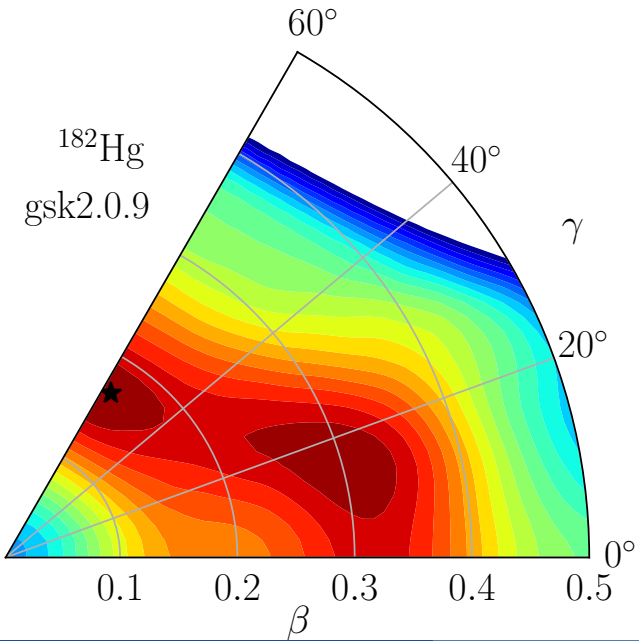

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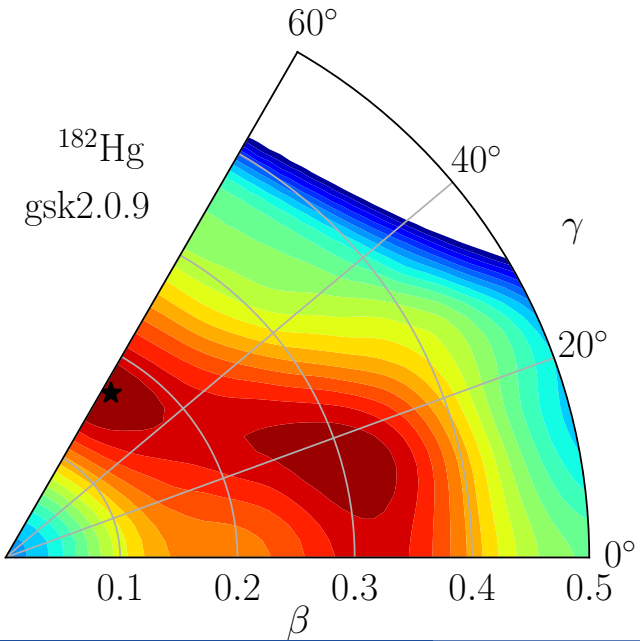
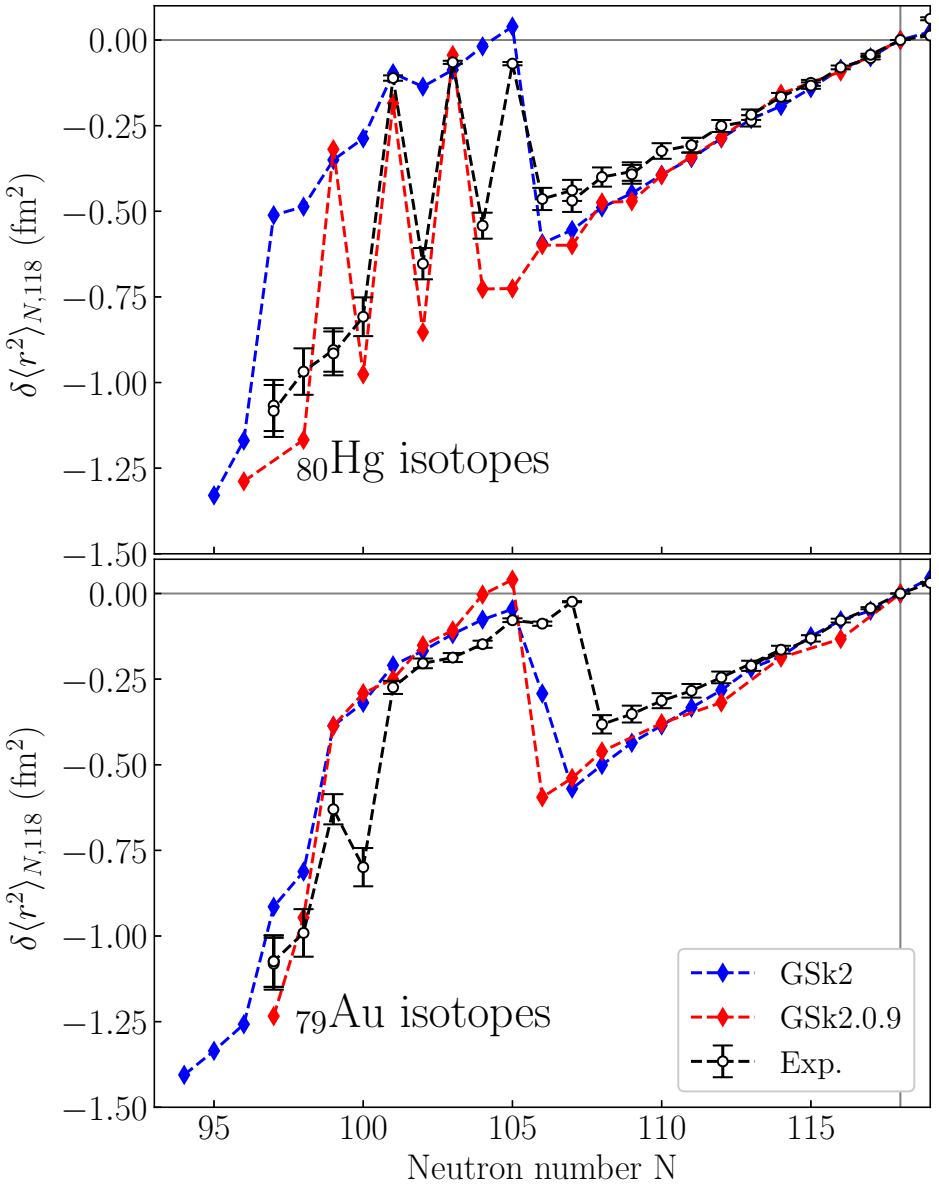
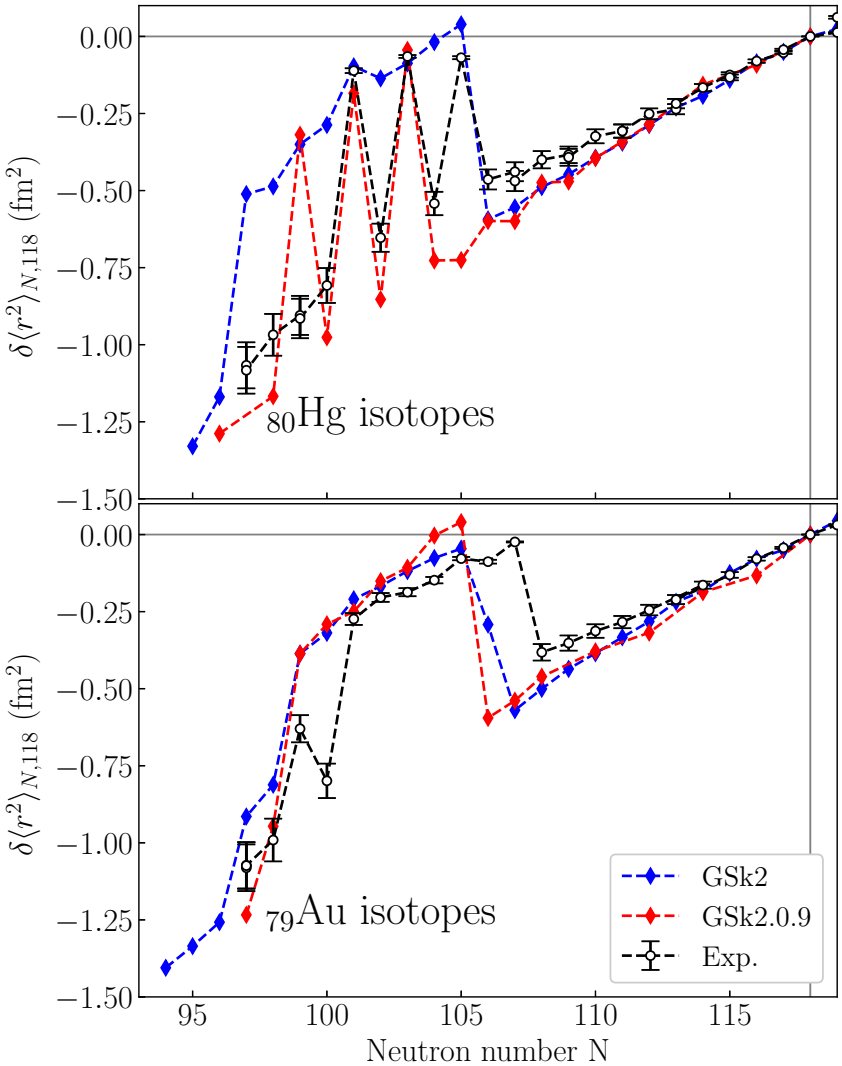




Conclusions



- Patterns can be explained through competing minima
- . . . which might be triaxial
- The balance is hard to strike
- π, ν pairing interplay for the GSkX

  (s.p. level density!)
- GSk2.0.9: promising!

Outlook: questions we want to tackle

Nuclear radii: bulk and single-particle property

In this region

- Bulk properties: ✓
  Physical mechanism: ✓
  Exact balance of minima: ✗
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Thanks!

Thanks for. . .

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- E. Olsen ULB

MOCCa

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- M. Bender IP2I

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