Search for key nuclear structure states below ^{132}Sn

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Motivation

1. Competition between:

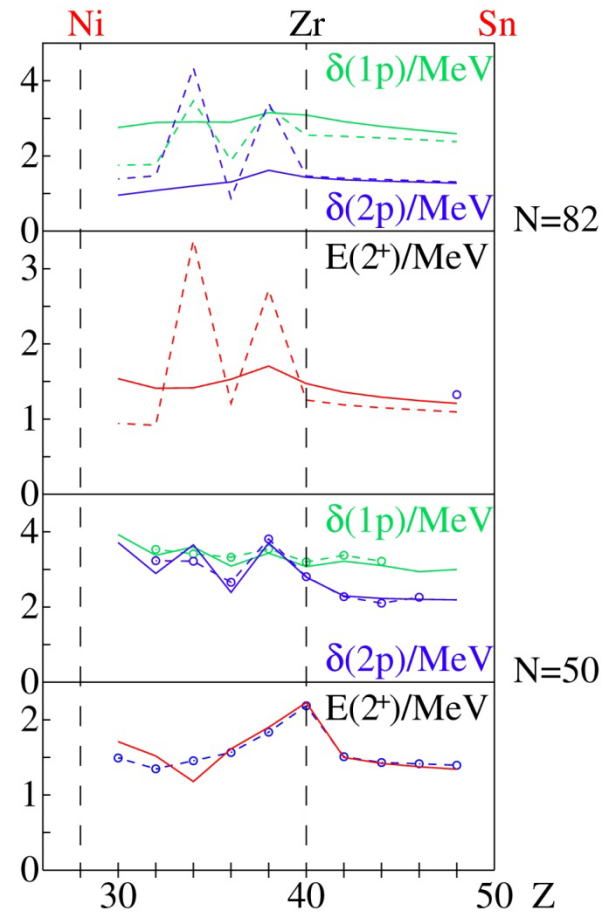
- Shell evolution in neutron rich N=82 isotones: according to presented predictions in contrast to N=50 no Z=38,40 subshells
- Shell quenching in extreme neutron rich nuclei towards ^{122}Zr : a missing Z=38,40 subshell due to coupling to low-lying 2+ proton valence state creates a minimum neutron gap near mid-proton shell at Z=38,40

2. Astrophysics

Evidence for shell evolution

- 1/2- in ^{131}In about 300 keV lower than extrapolated for ^{99}In
- low-lying 3/2- and 5/2- states in ^{131}In
- Figure shows delta(1p,2p) and 2+ energy for single hole energy sequence

  as estimated for ^{131}In and as extrapolated for ^{99}In (dashed)

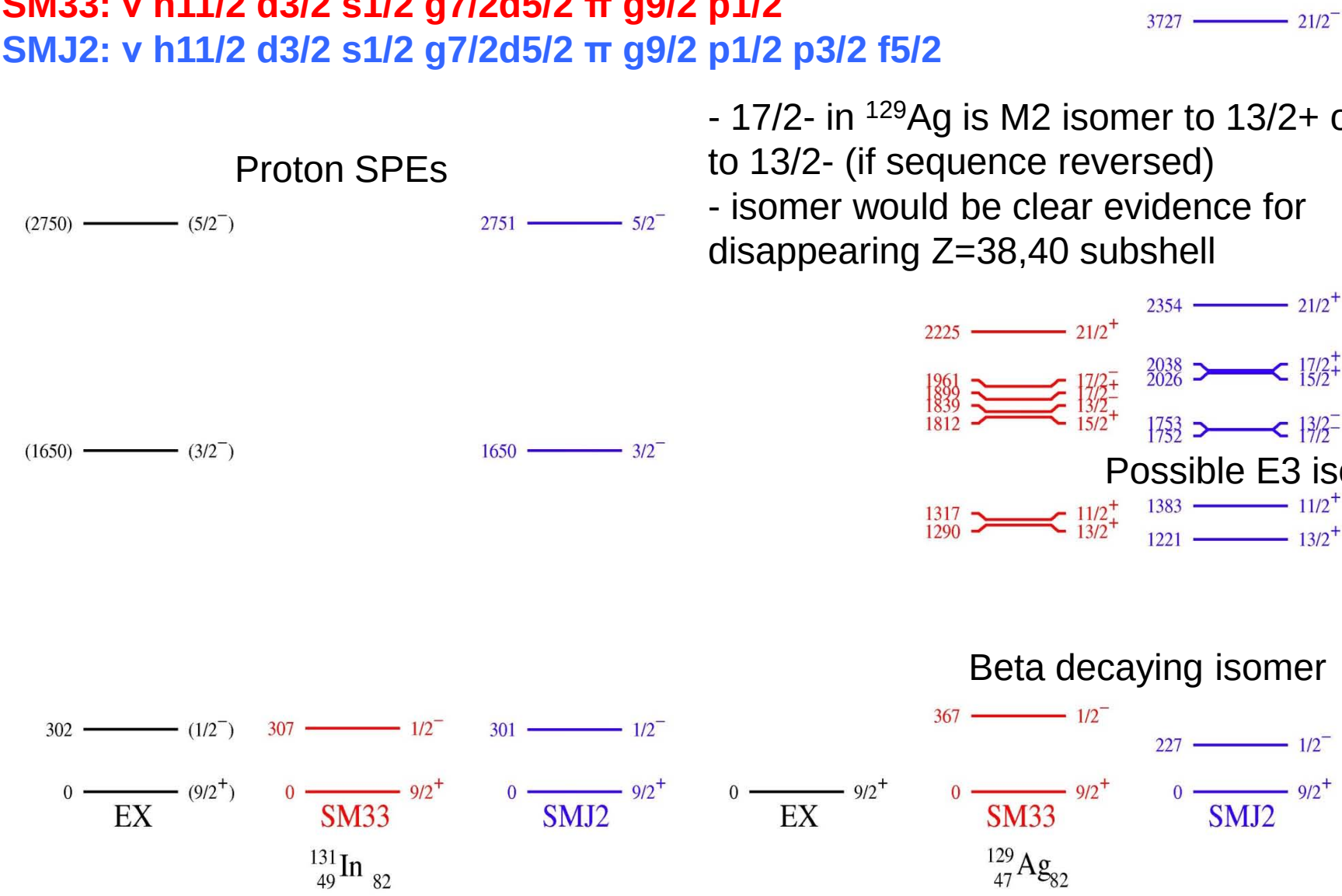


N = 82 odd mass chain

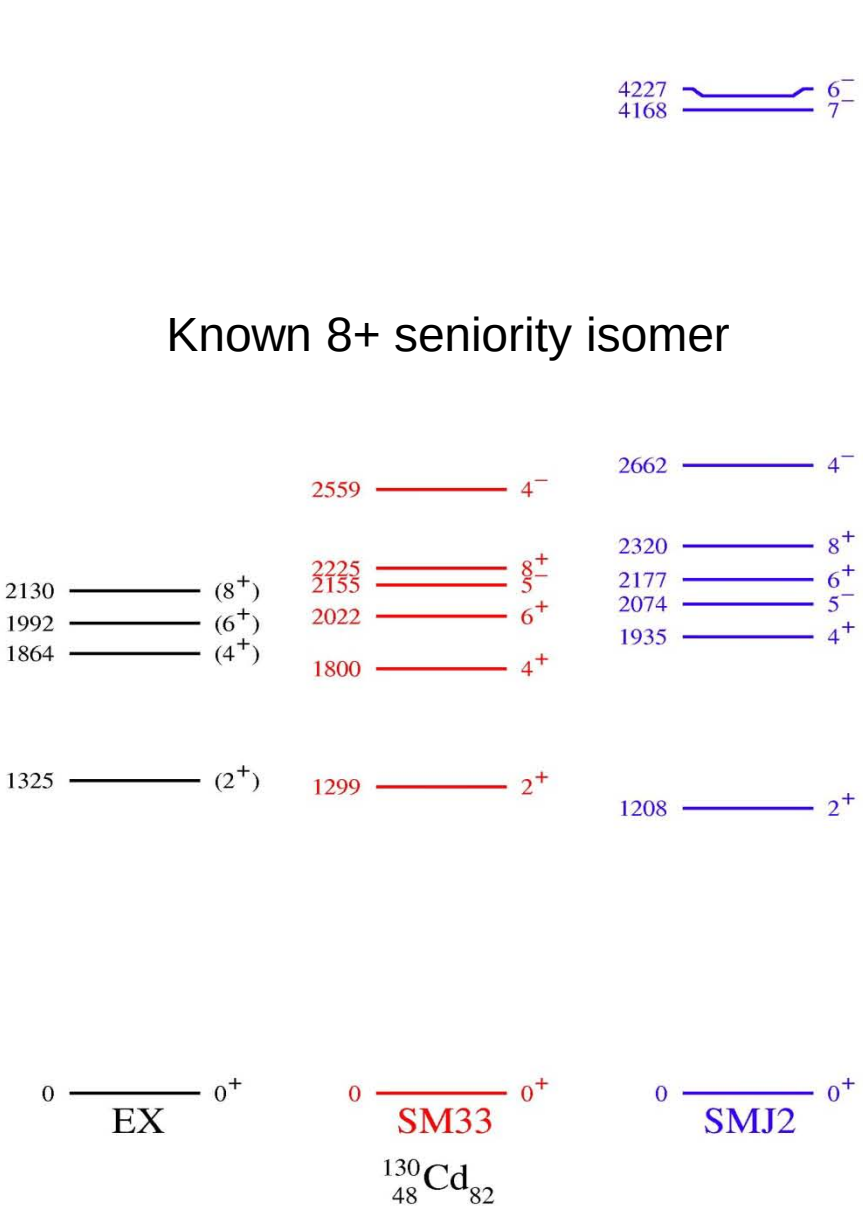
SM33: ν h11/2 d3/2 s1/2 g7/2d5/2 π g9/2 p1/2

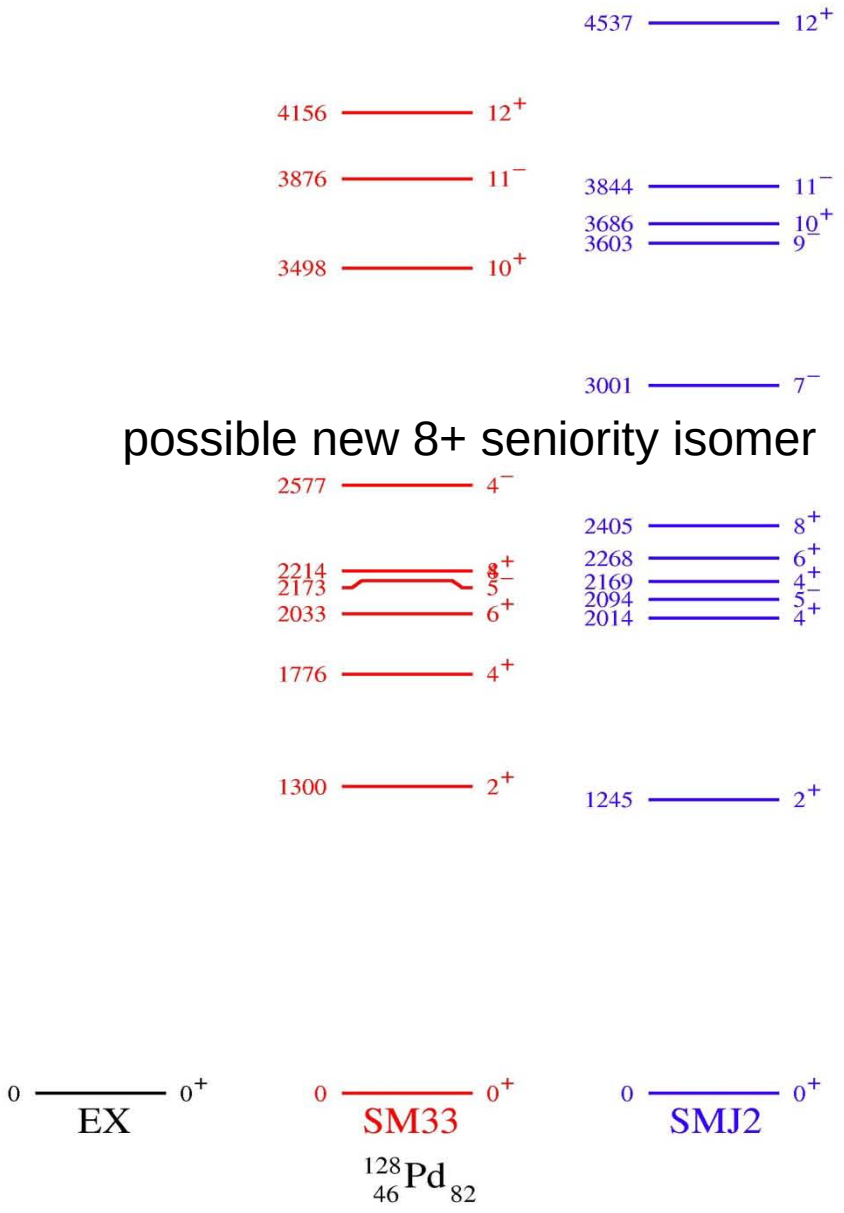
SMJ2: ν h11/2 d3/2 s1/2 g7/2d5/2 π g9/2 p1/2 p3/2 f5/2

- 17/2- in ^{129}Ag is M2 isomer to 13/2+ or E2 to 13/2- (if sequence reversed)
- isomer would be clear evidence for disappearing Z=38,40 subshell

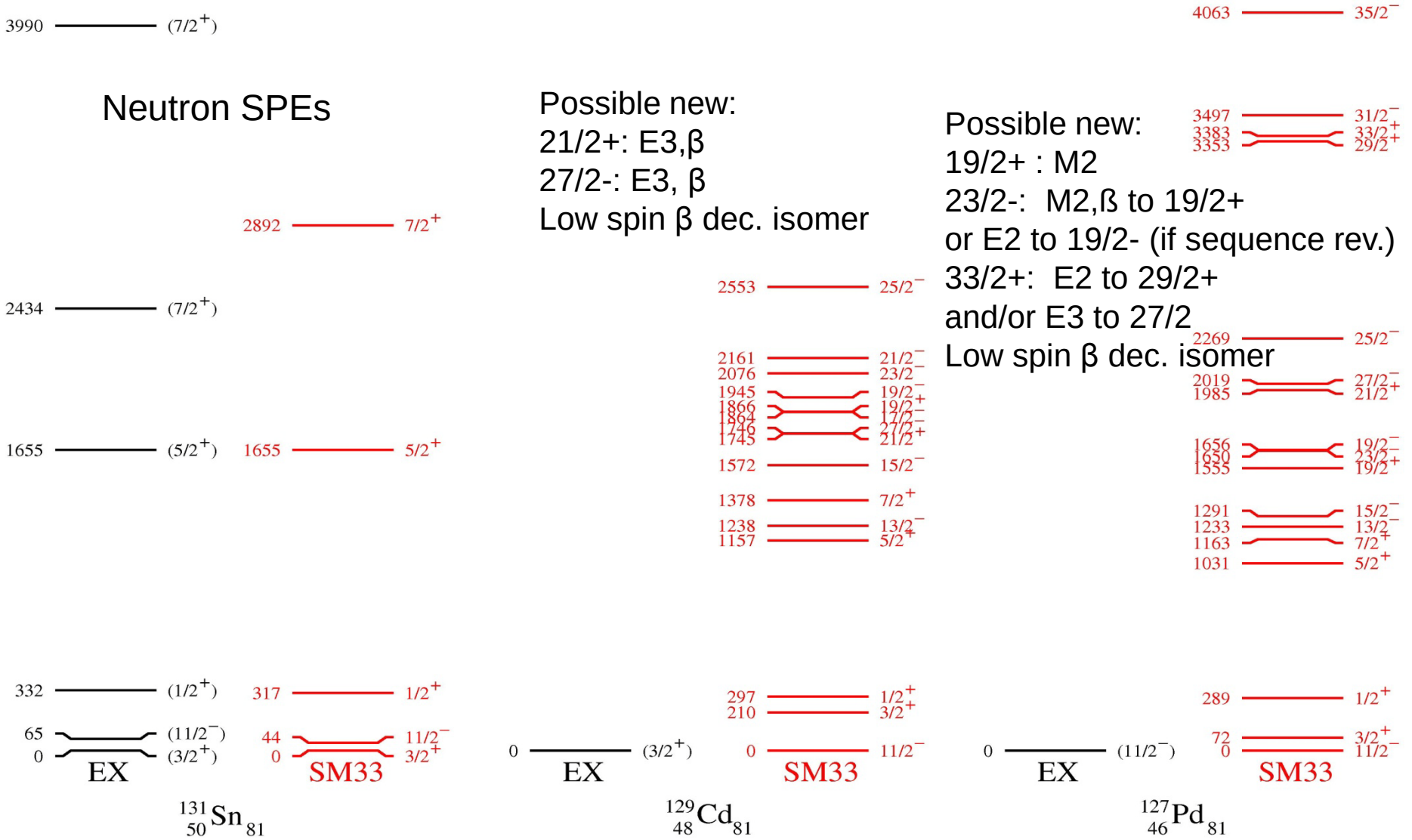


N = 82 even mass chain

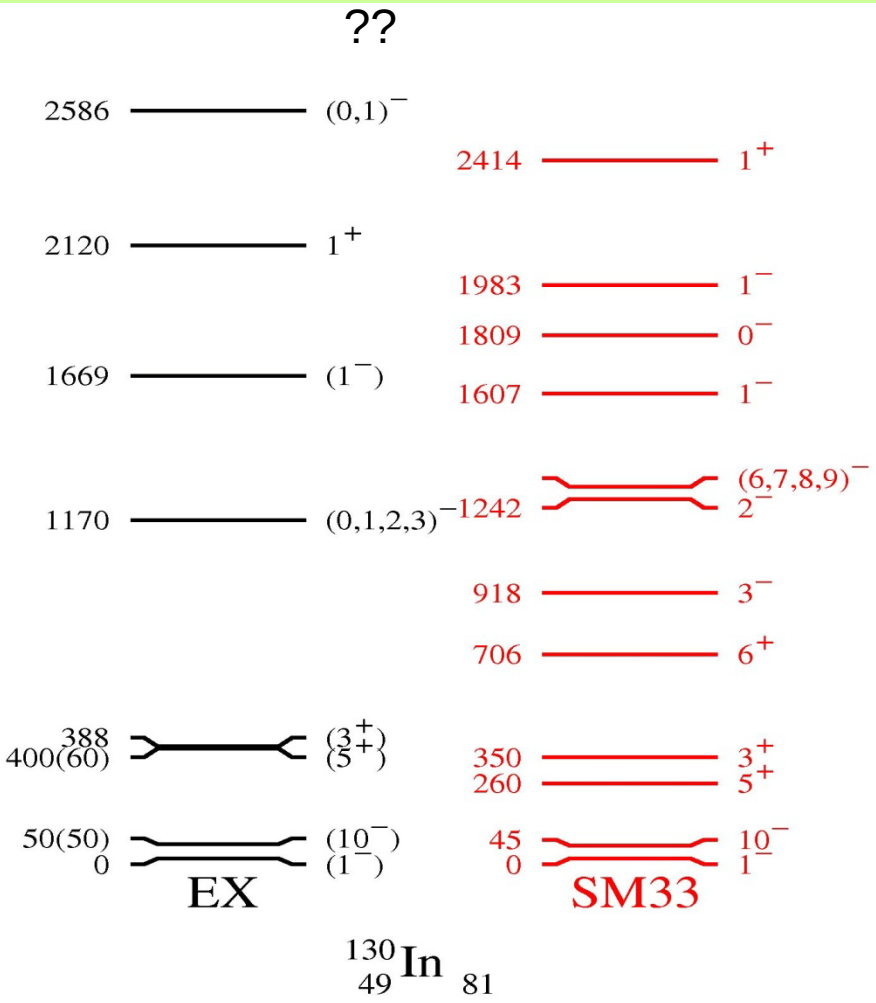




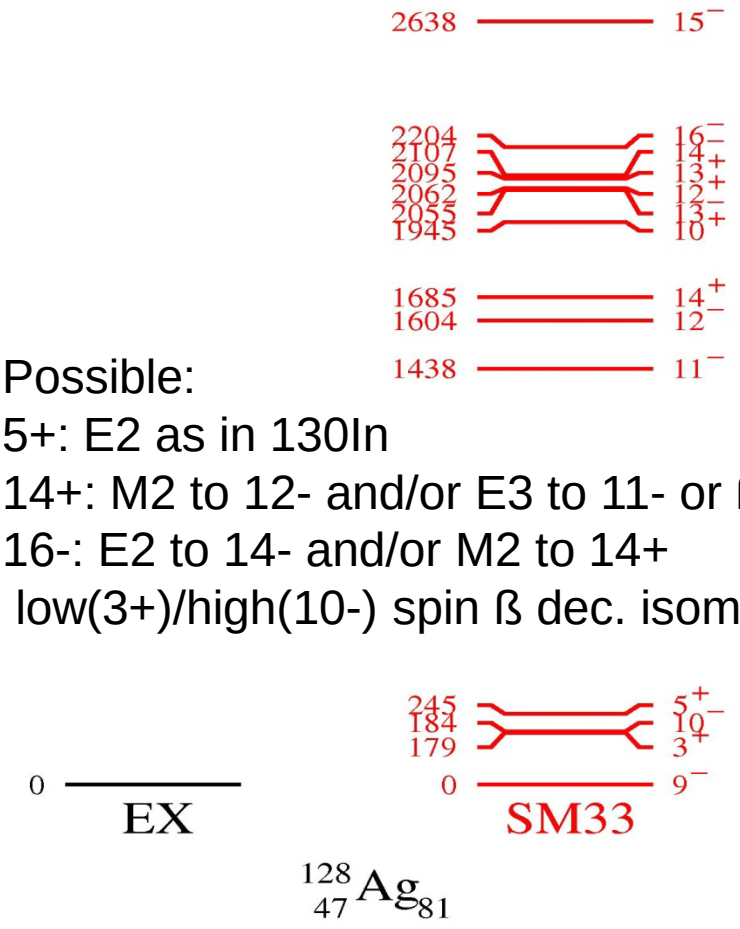
N = 81 odd mass chain



N = 81even mass chain

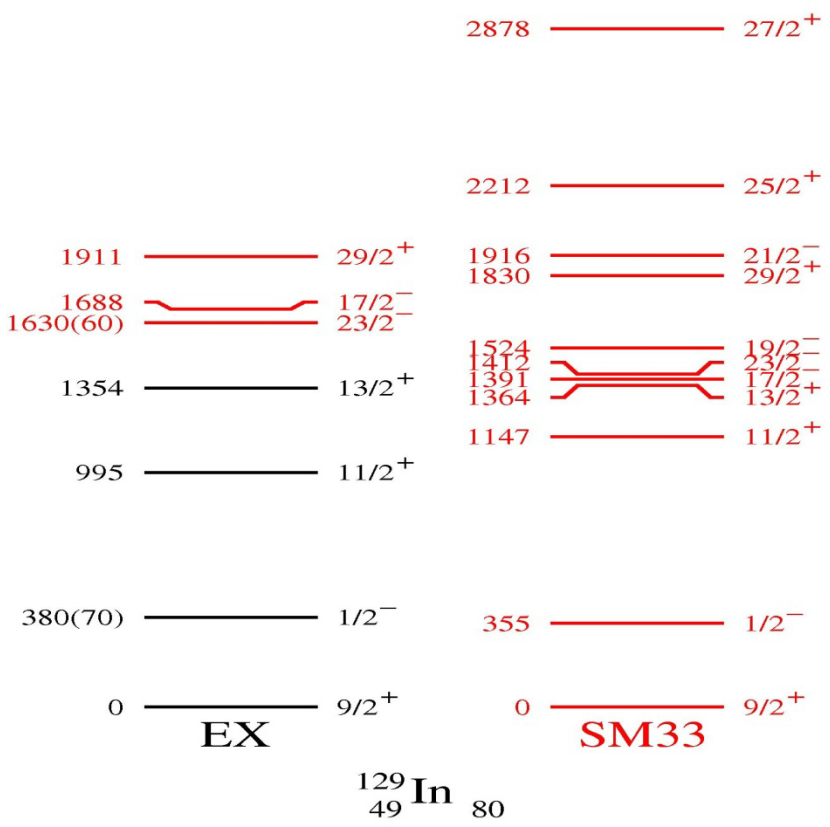


Possible:
5+: E2 as in 130In
14+: M2 to 12- and/or E3 to 11- or ß
16-: E2 to 14- and/or M2 to 14+
low(3+)/high(10-) spin ß dec. isomers

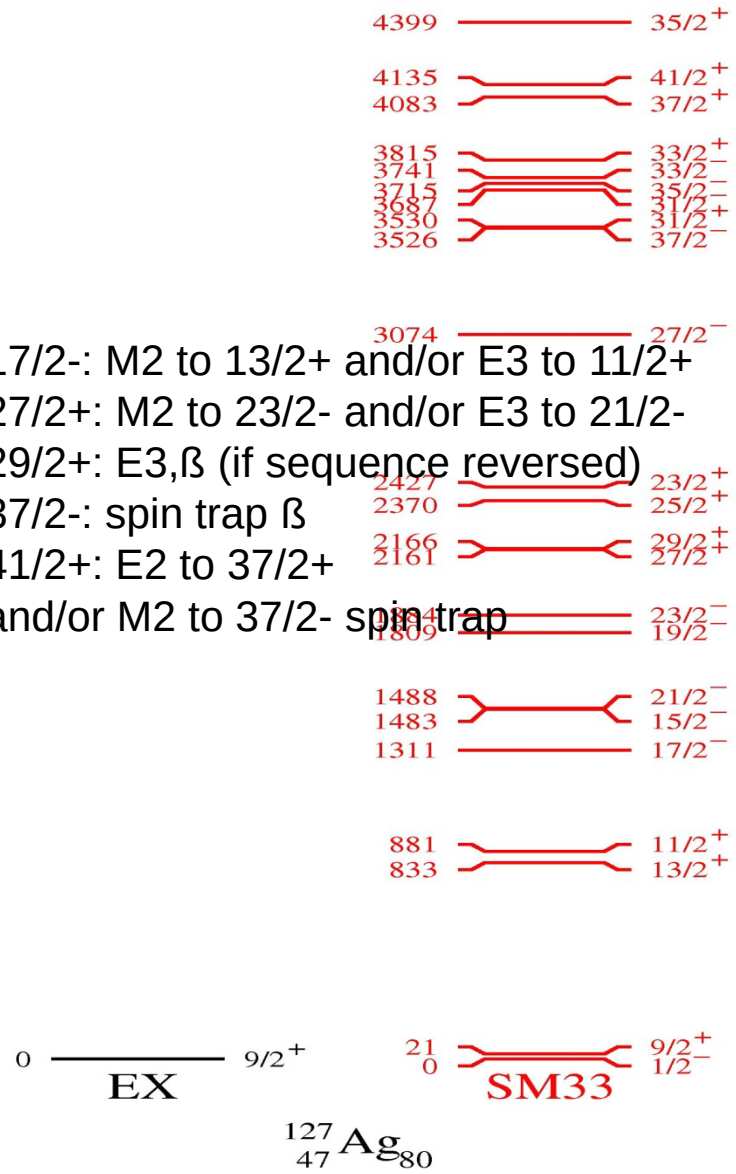


N=80 odd mass chain

Nothing new expected

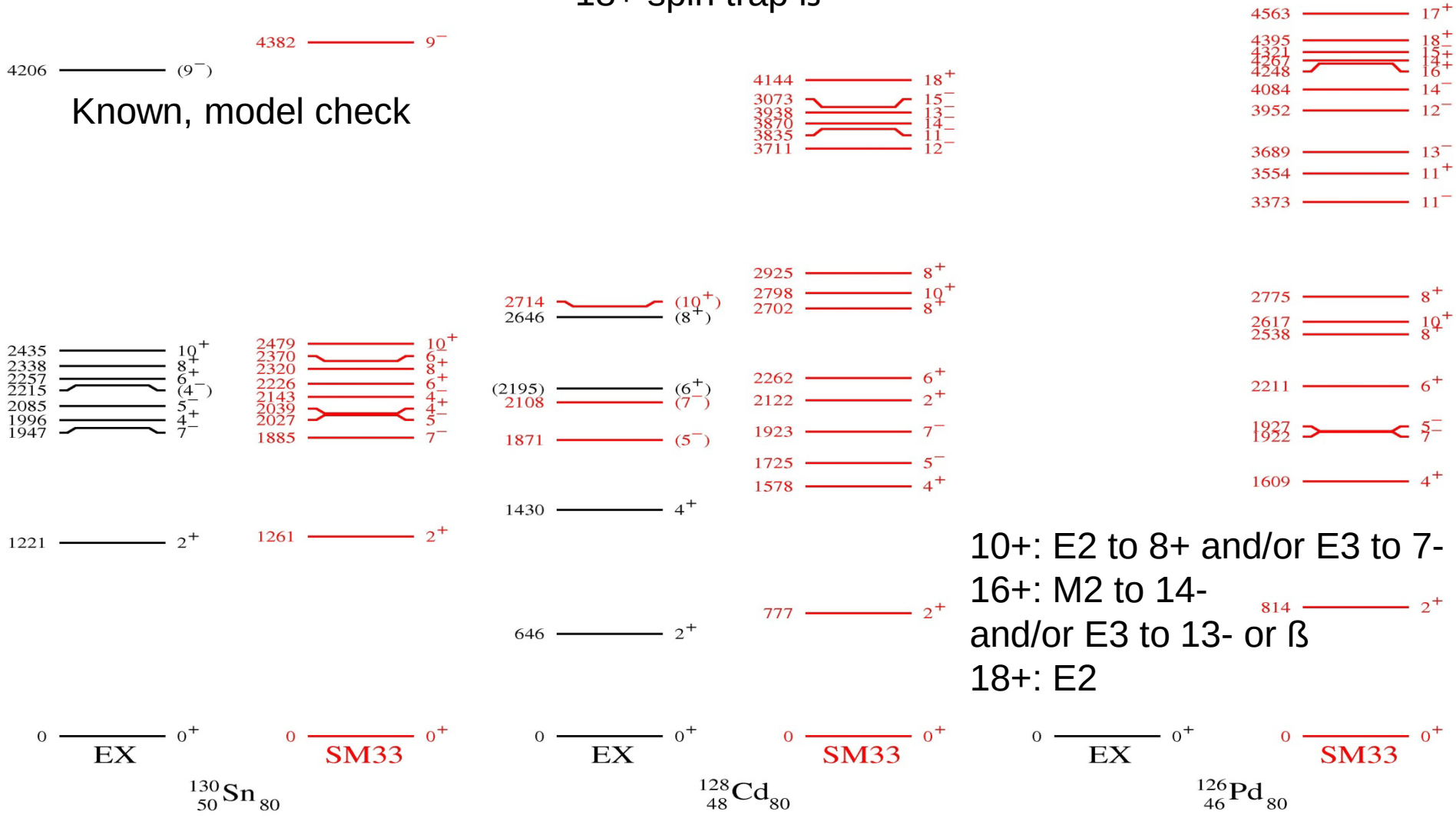


17/2-: M2 to 13/2+ and/or E3 to 11/2+
27/2+: M2 to 23/2- and/or E3 to 21/2-
29/2+: E3,ß (if sequence reversed)
37/2-: spin trap ß
41/2+: E2 to 37/2+
and/or M2 to 37/2- spin trap



N = 80 even mass chain

18+ spin trap ß



Conclusions

- new seniority isomers (not many)
- many spin trap isomers
- many new ß decaying isomers
- core excited isomers (see ^{131}In) less safely predictable

- Spectroscopy data on these will serve to understand shell evolution towards ^{122}Zr