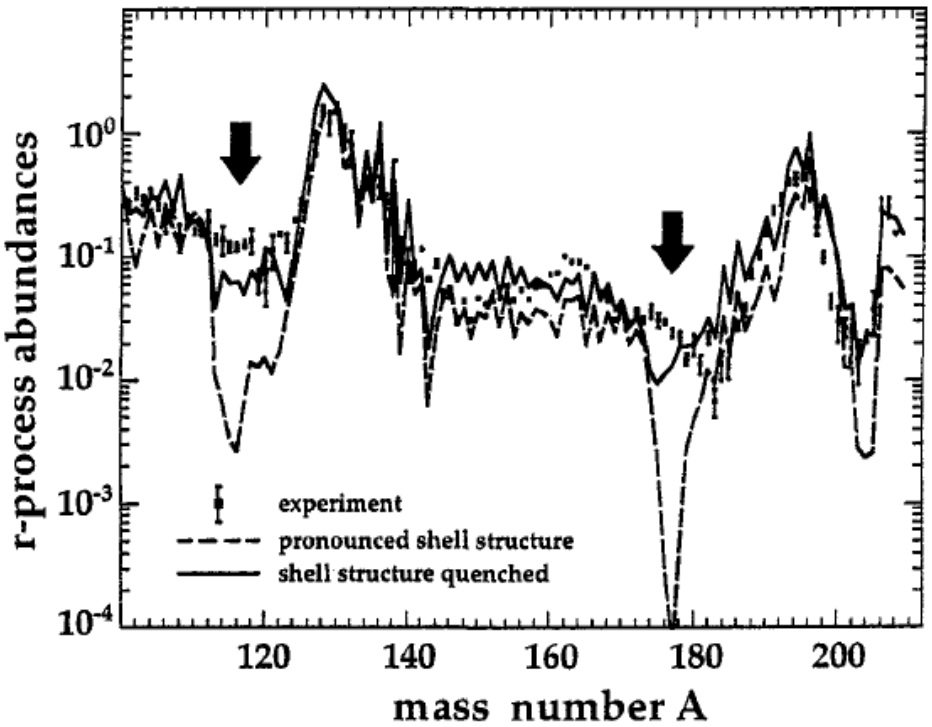
Search for long-lived isomeric activities "below" ^{132}Sn

S. Lalkovski

EURICA Workshop,
12 September 2011

r-process overabundance in $A \approx 120$ region



K.-L.Kratz, *et al.*,Hyp.Int.**129** (2000) 185

Nuclear physics input:

- nuclear masses: Q_β, S_n
- β-decay half lives: $T_{1/2}$
- neutron emission probabilities: P_n
- neutron capture cross-sections: $\sigma_{n,\gamma}$
- ground state J^π

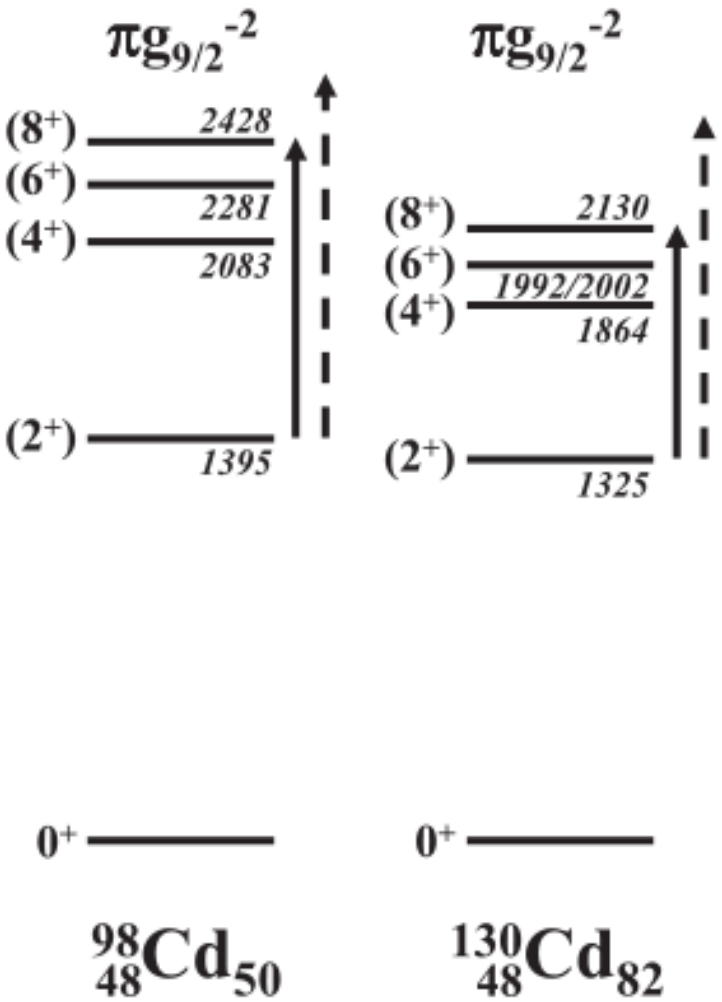
Observed overabundance in the $A \approx 120$ region.
Structural evolution towards N-rich nuclei

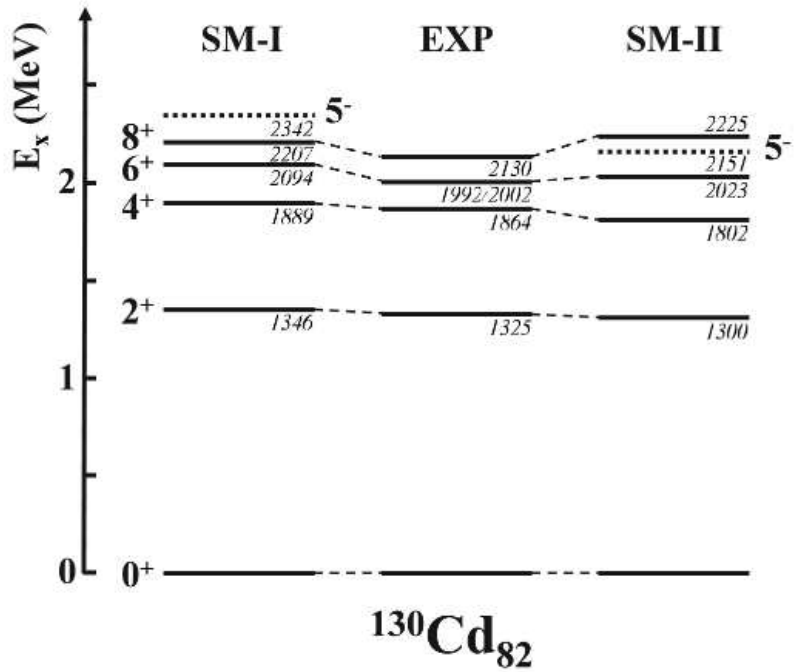
- Shell-quenching
- Shape co-existence
- Long β-decaying half-lives

Cegré chart

Z	74	75	76	77	78	79	80	81	N
	124Sn STABLE 5.79%	125Sn 9.64 D β-: 100.00%	126Sn 2.30E+5 Y β-: 100.00%	127Sn 2.10 H β-: 100.00%	128Sn 59.07 M β-: 100.00%	129Sn 2.23 M β-: 100.00%	130Sn 3.72 M β-: 100.00%	131Sn 56.0 S β-: 100.00%	132Sn 39.7 S β-: 100.00%
49	123In 6.17 S β-: 100.00%	124In 3.12 S β-: 100.00%	125In 2.36 S β-: 100.00%	126In 1.53 S β-: 100.00%	127In 1.09 S β-: 100.00% β-n≤ 0.03%	128In 0.84 S β-: 100.00% β-n < 0.05%	129In 0.61 S β-: 100.00% β-n: 0.25%	130In 0.29 S β-: 100.00% β-n: 0.93%	131In 0.28 S β-: 100.00% β-n≤ 2.00%
48	122Cd 5.24 S β-: 100.00%	123Cd 2.10 S β-: 100.00%	124Cd 1.25 S β-: 100.00%	125Cd 0.65 S β-: 100.00%	126Cd 0.515 S β-: 100.00%	127Cd 0.37 S β-: 100.00%	128Cd 0.28 S β-: 100.00%	129Cd 0.27 S β-	130Cd 162 MS β-: 100.00% β-n: 3.50%
47	121Ag 0.79 S β-: 100.00% β-n: 0.08%	122Ag 0.529 S β-: 99.80% β-n: 0.19%	123Ag 0.300 S β-: 100.00% β-n: 0.55%	124Ag 0.172 S β-: 100.00% β-n: 1.30%	125Ag 166 MS β-: 100.00% β-n	126Ag 107 MS β-: 100.00% β-n	127Ag 79 MS β-: 100.00%	128Ag 58 MS β-: 100.00% β-n	129Ag 46 MS β-: 100.00% β-n
46	120Pd 0.5 S β-: 100.00%	121Pd >150 NS β-	122Pd 175 MS β-≥ 97.50% β-n≤ 2.50%	123Pd >150 NS β-	124Pd 38 MS β-: 100.00%				

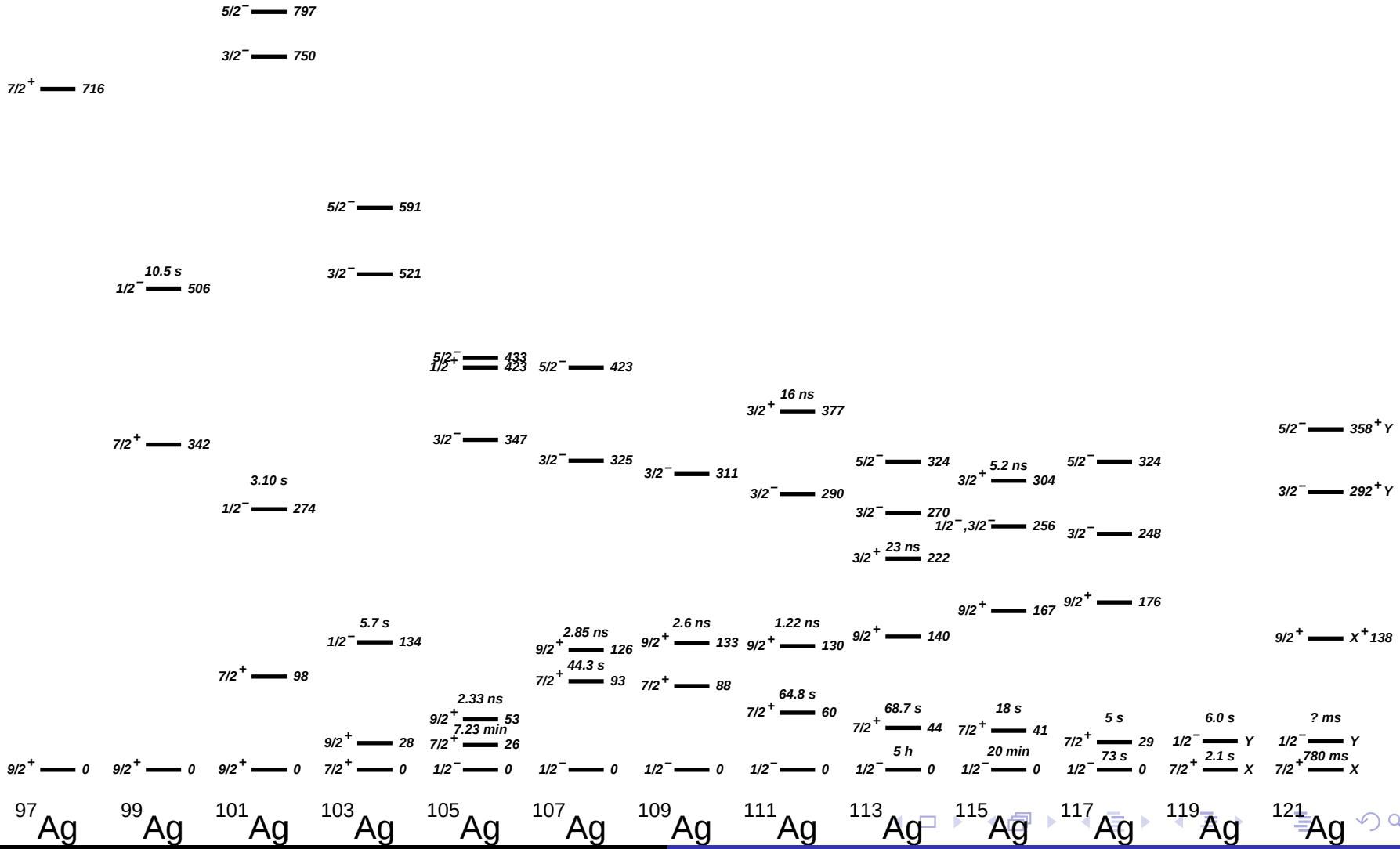
Search for shell-quenching effects



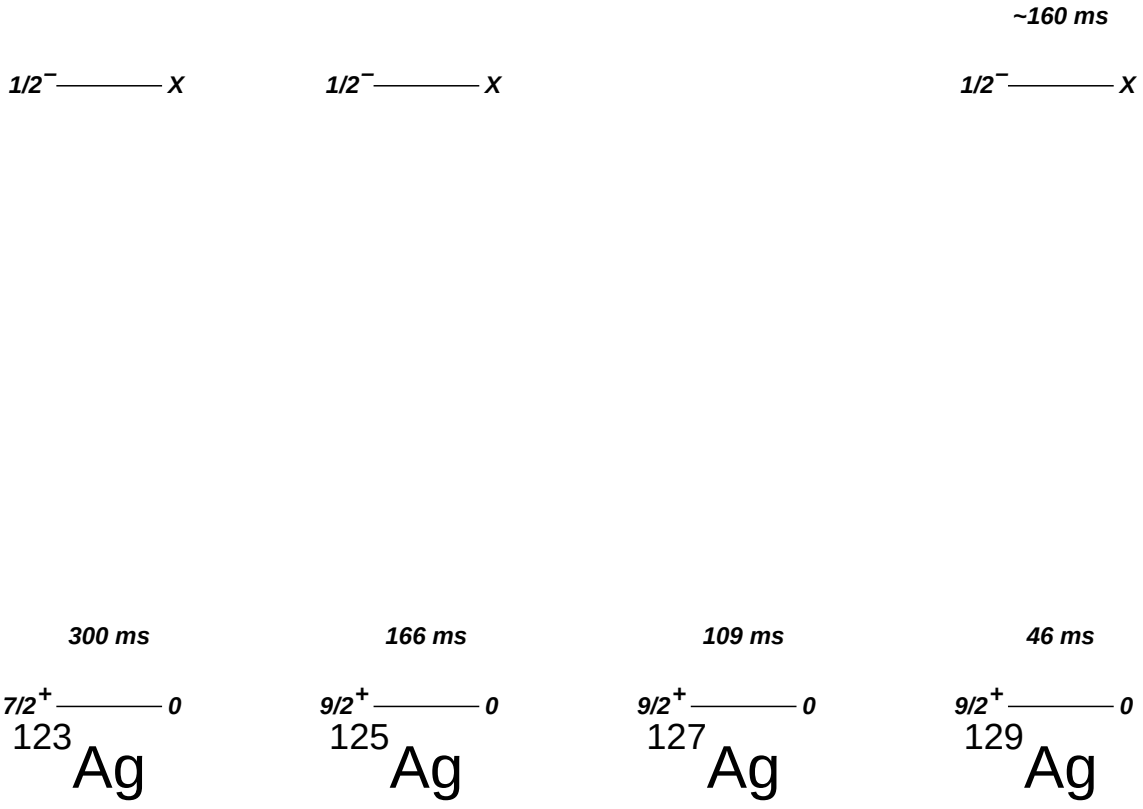


A.Jungclaus *et al.*, Phys.Rev.Lett.**99** (2007) 132501

Systematics of the odd-A Ag nuclei



Low-lying isomeric states at the N-rich odd-A Ag nuclei

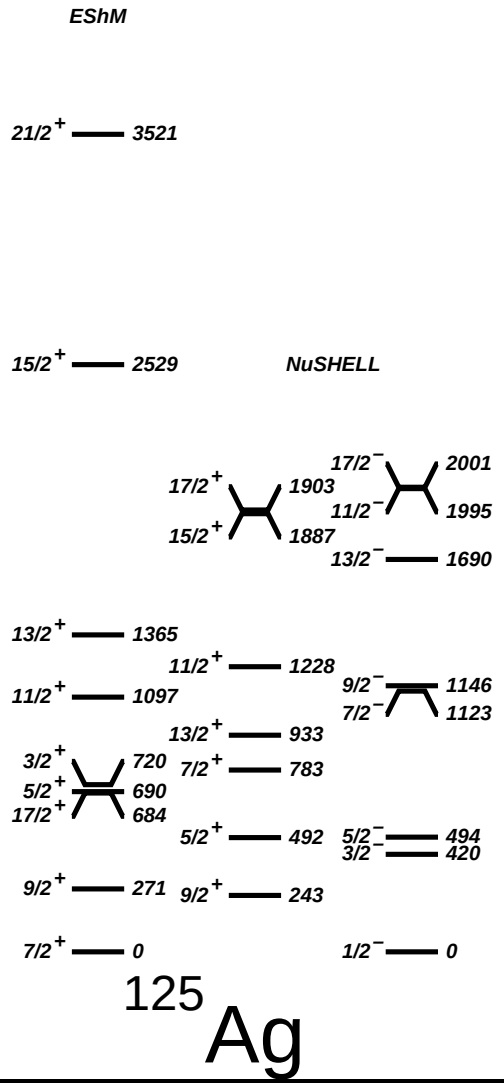


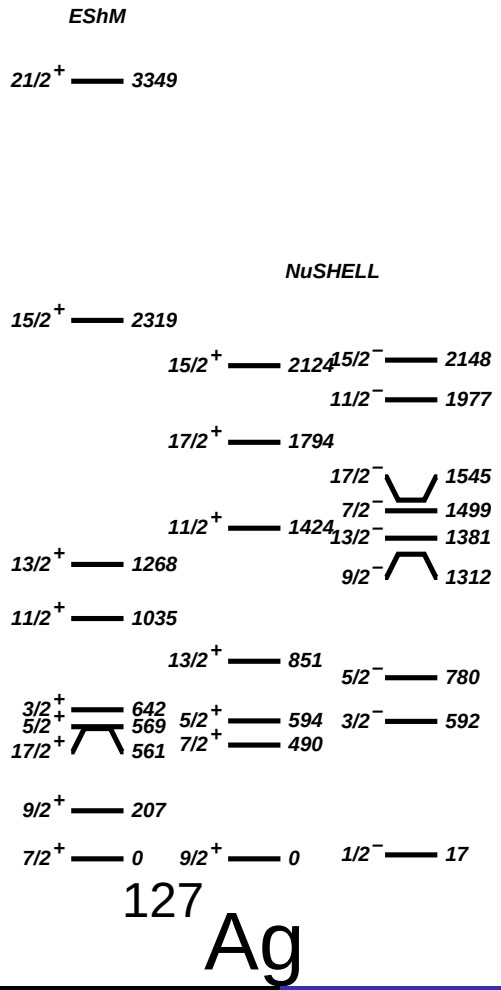
^{123,125}Ag: S.Lalkovski *et al.*, Rutherford Centennial Conference, Manchester, August 2011 J.Phys.CS(2011)

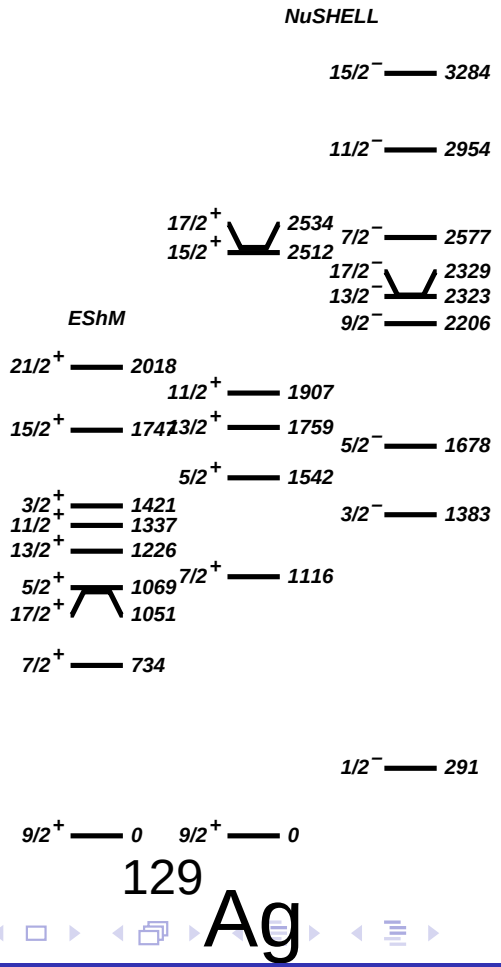
^{129}Ag: K.-L.Kratz *et al.*, Hyp.Int. **129** (2000) 185
Stellar $T_{1/2} \approx 80$ms
Unknown:

- $E(X)$
- $T_{1/2}(X)$
- J^{π}

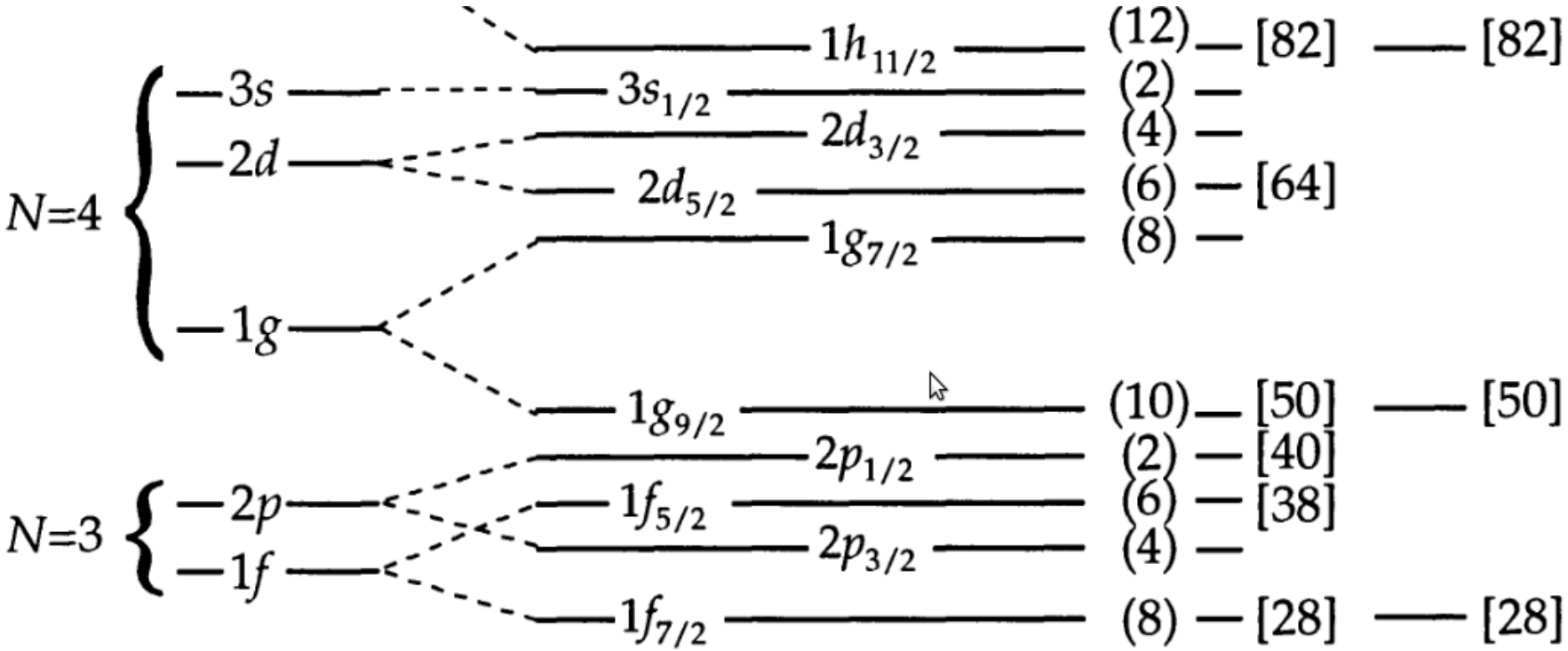
Shell model calculat



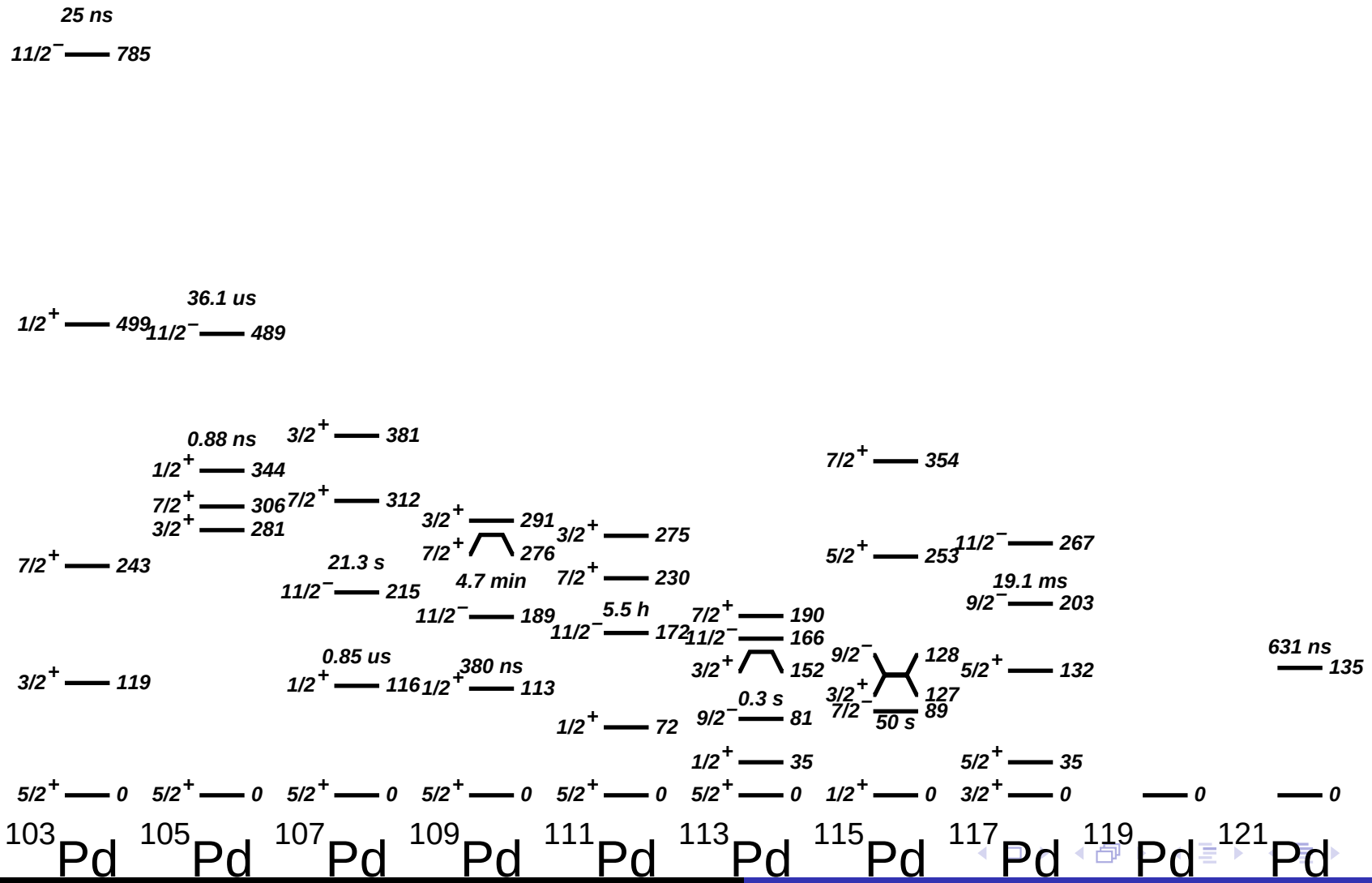




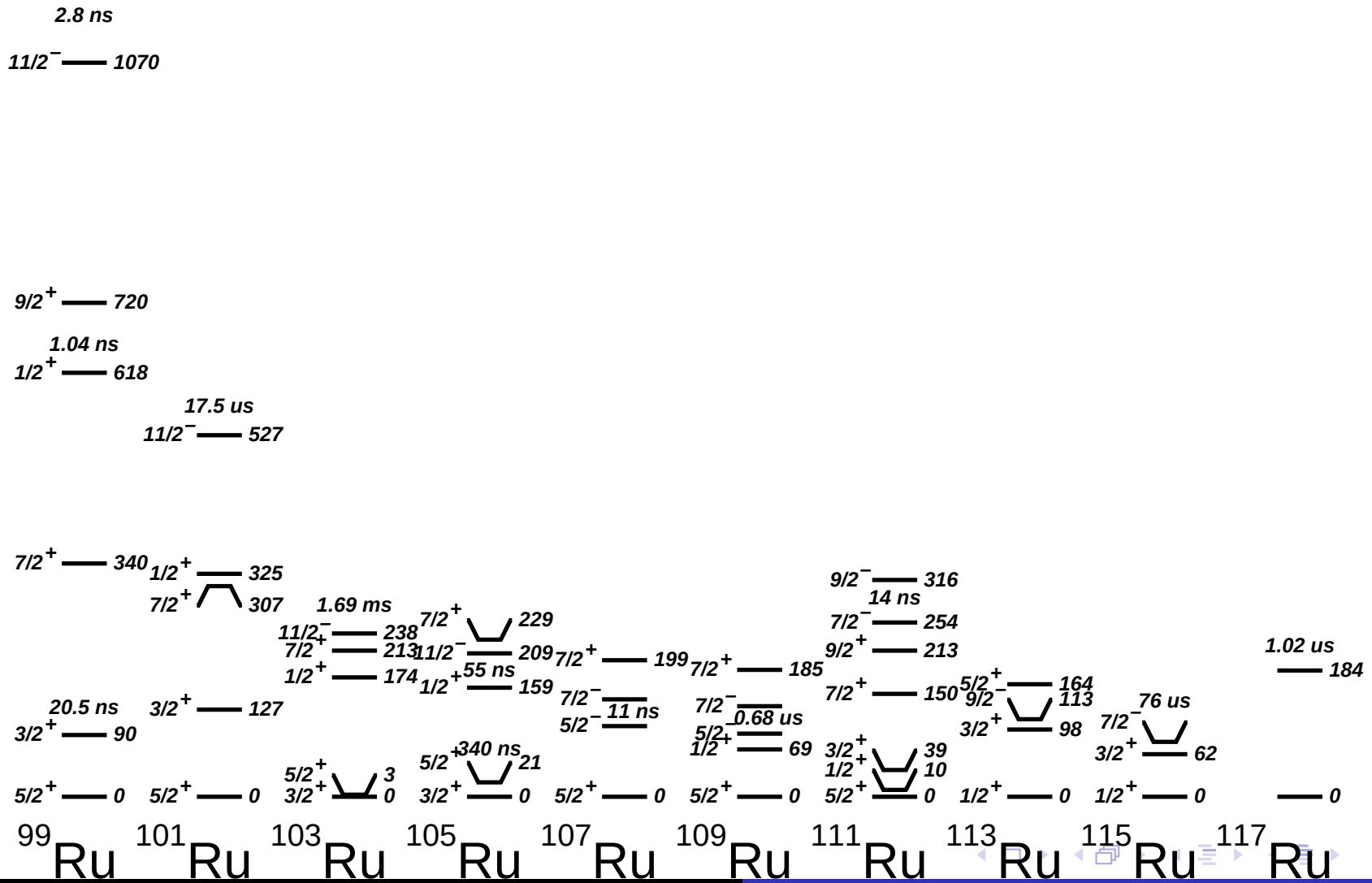
$N = 3$ and $N = 4$ oscillator shells



Neutron-rich odd-A palladium isotopes



Shell model calculations



Conclusion

Aim:

- To allocate the long lived isomers in the extremely N-rich odd-A Ag, Pd, Rh and Ru nuclei

Collaboration

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Dr. Zsolt Podolyak
Dr. Filip Kondev
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