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Probing nuclear structure emerging from the interplay of single-particle and collective regimes

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Keywords:

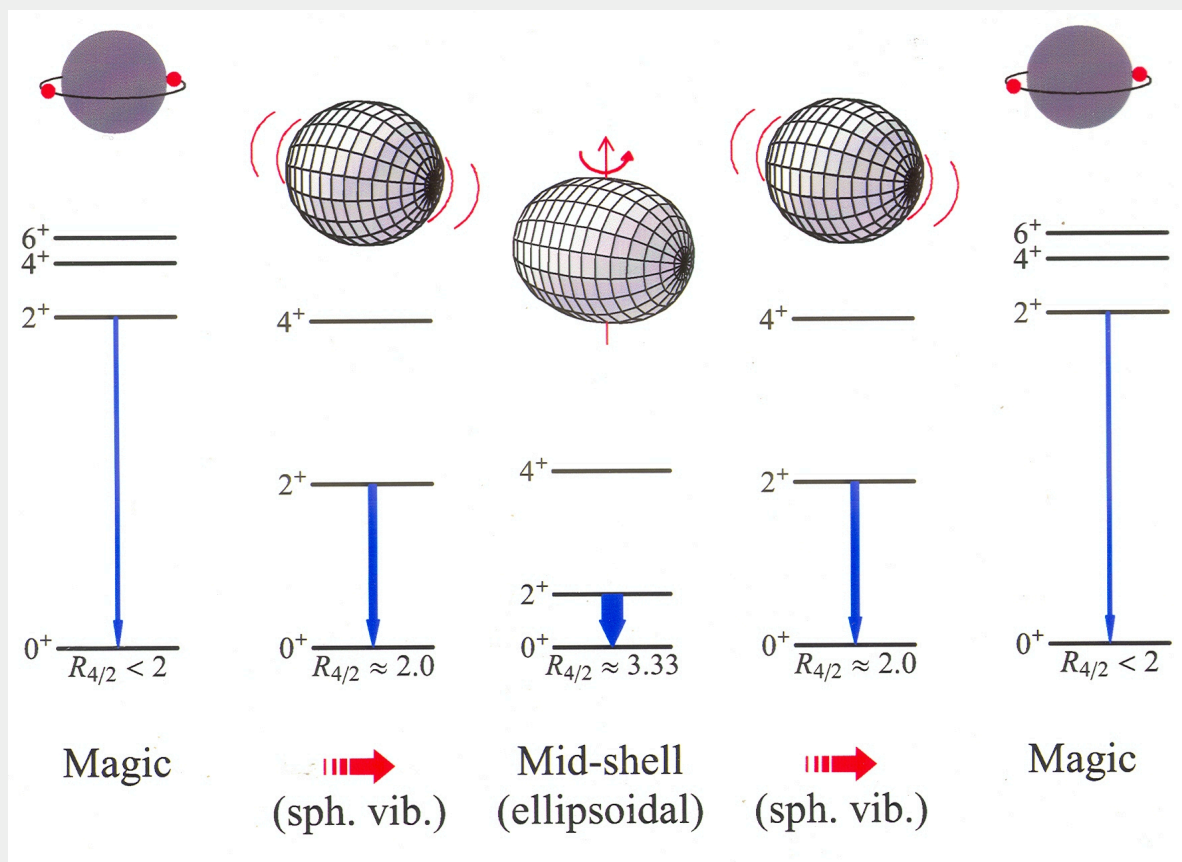
What: Transition probabilities in $^{166,168}\text{Os}$ and ^{166}W

Why: Collective vs. single-particle motion

How: RDDS lifetime measurements at
University of Jyväskylä

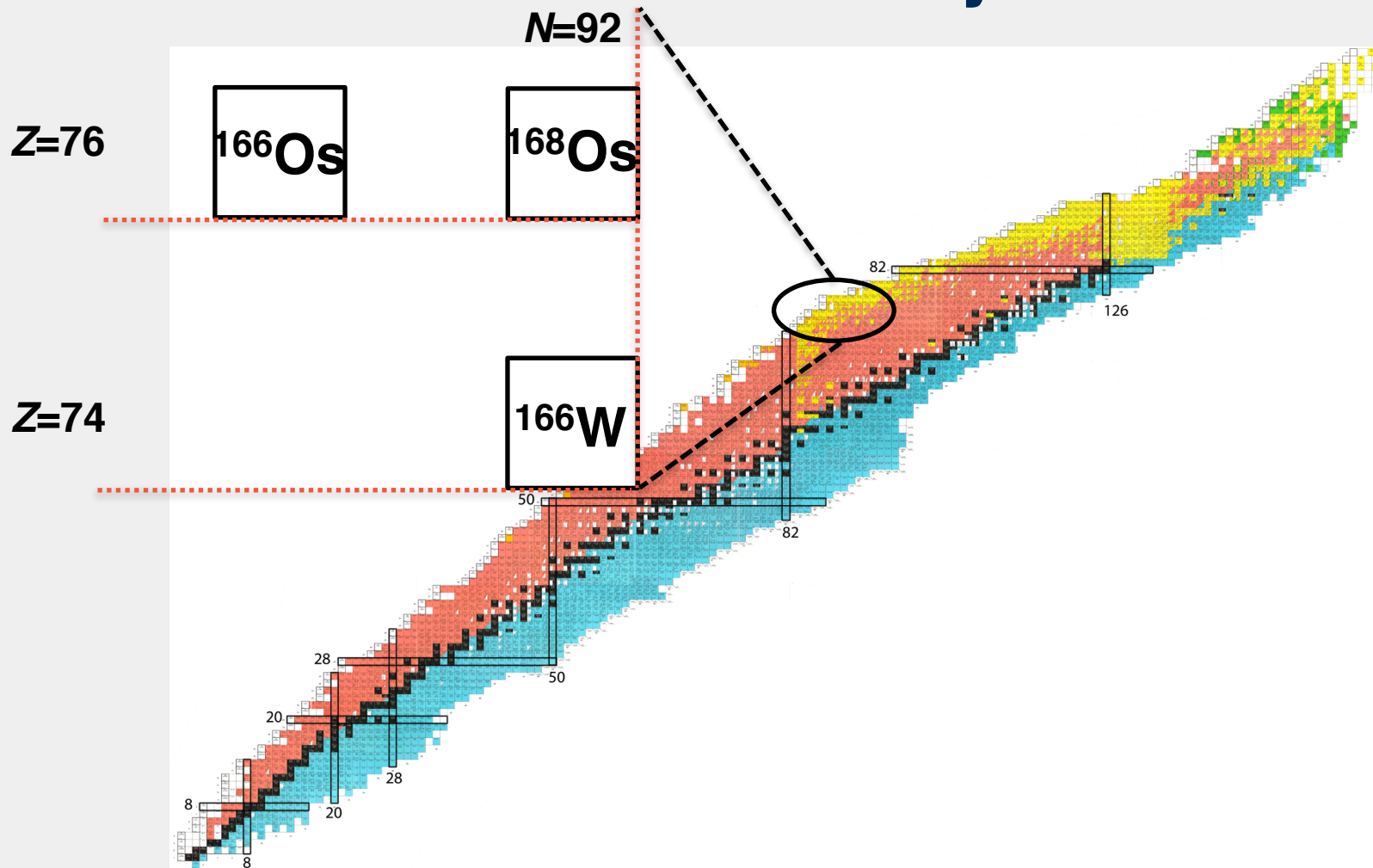


Collective vs. single-particle structures



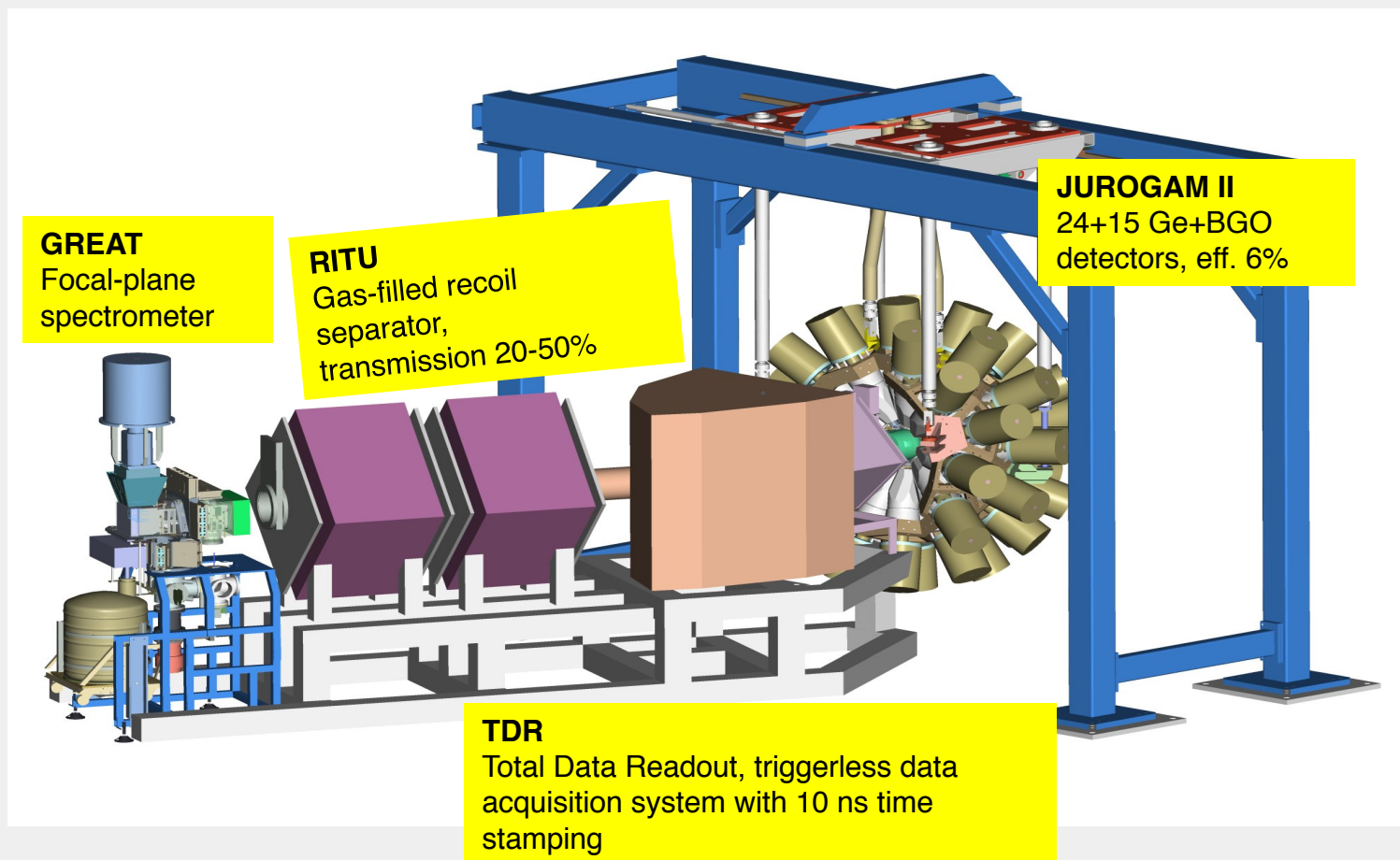


Neutron-deficient Os & W-far from shell closures and stability



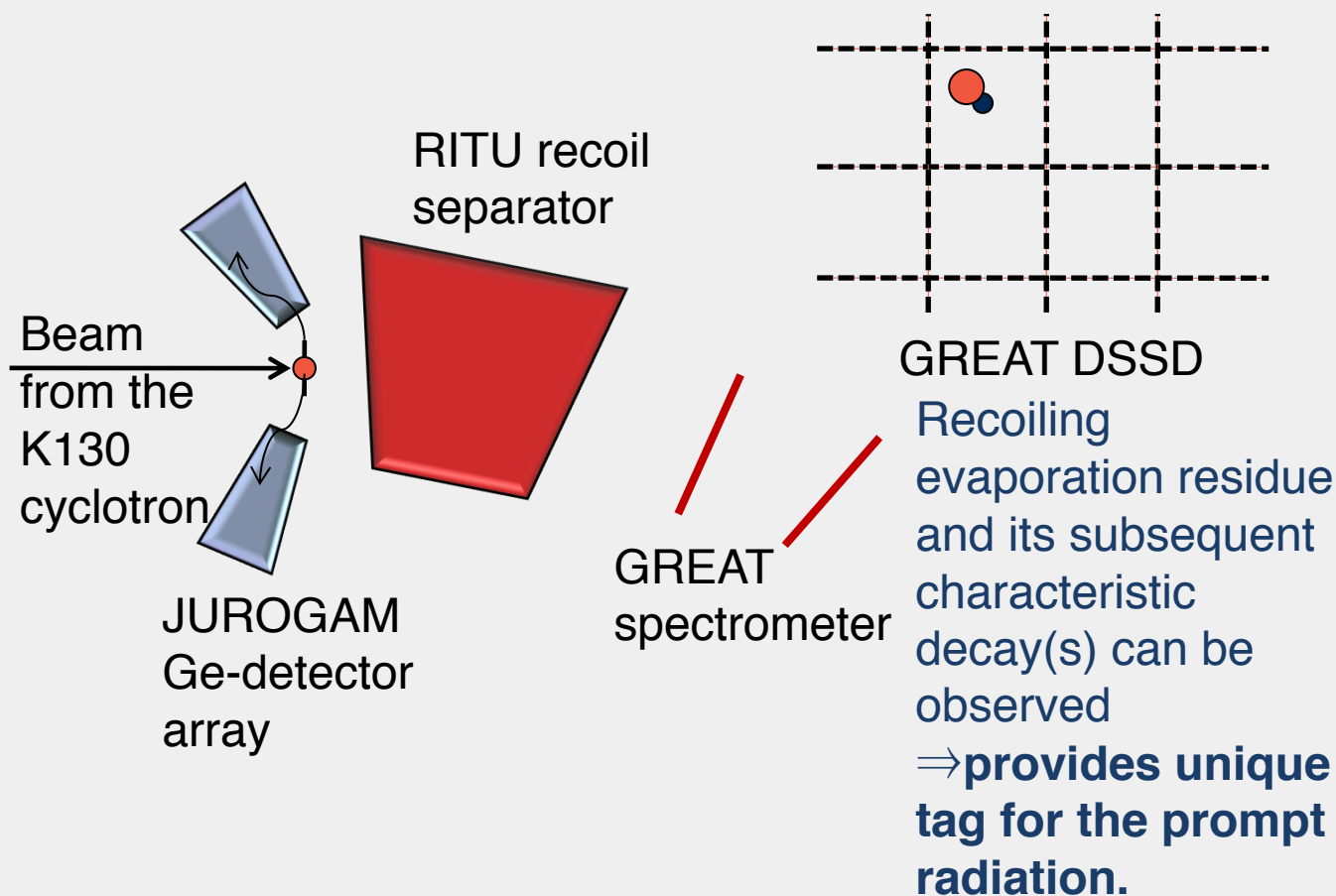


Tagging instrumentation at JYFL





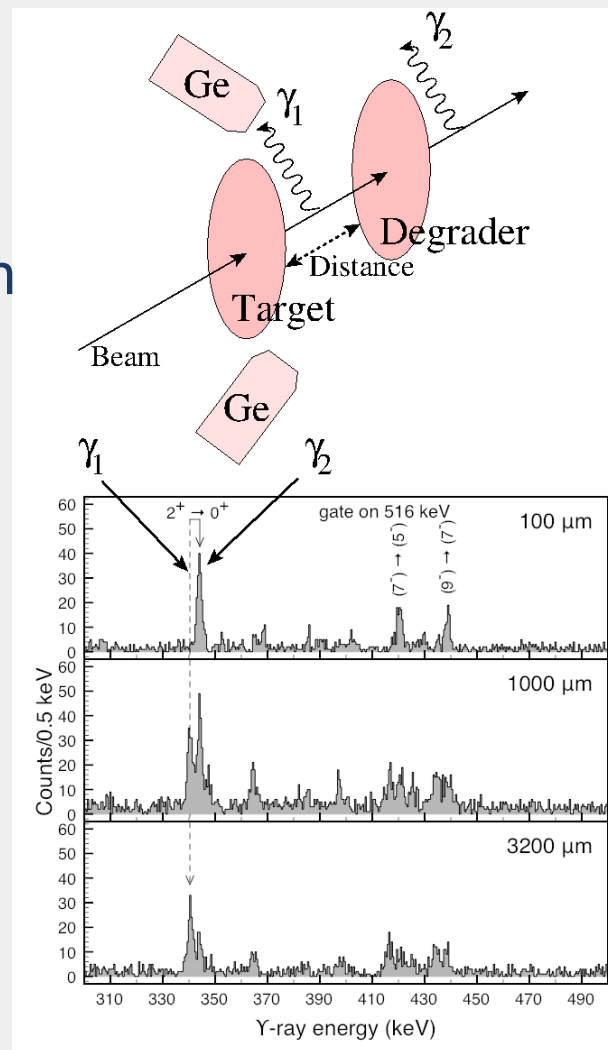
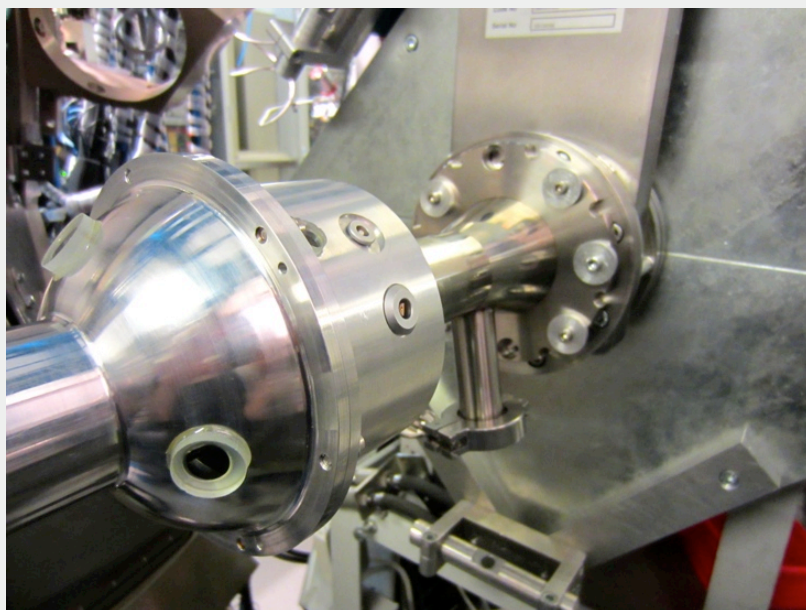
Recoil-Decay Tagging (RDT) method





RDDS lifetime measurements

Recoil distance Doppler-shift (RDDS) lifetime measurement (with the Köln and DPUNS plunger devices), combined with selective tagging techniques



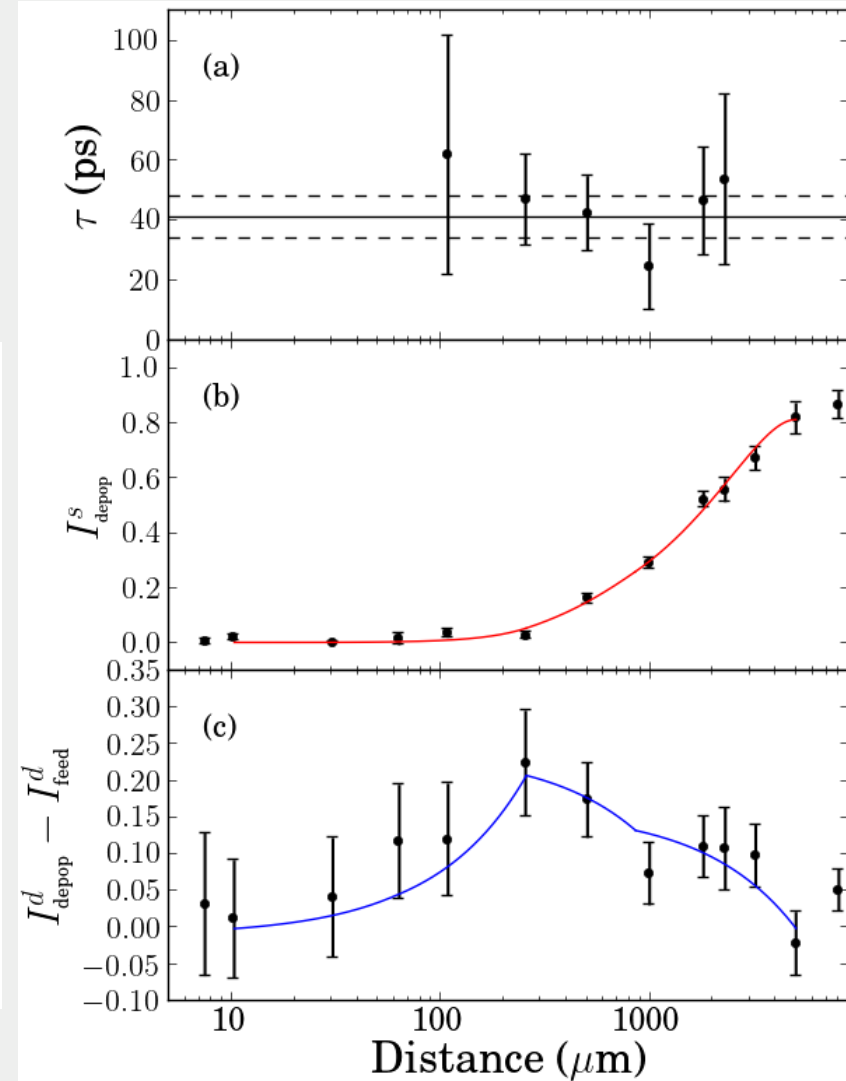
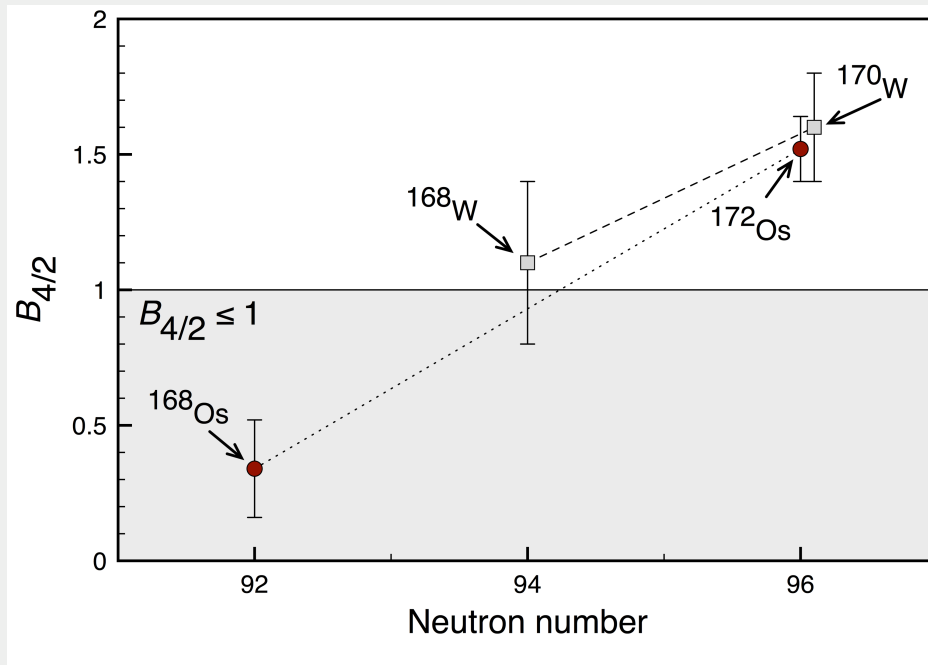


^{168}Os lifetimes

$\tau_{2^+} = 41(7)$ ps, $B(E2) = 74(13)$ W.u.

$\tau_{4^+} = 16(8)$ ps $B(E2) = 25(13)$ W.u.

$\Rightarrow B_{4/2} = 0.34(18)$



T. Grahn et al., Physical Review C 94, 044327 (2016)

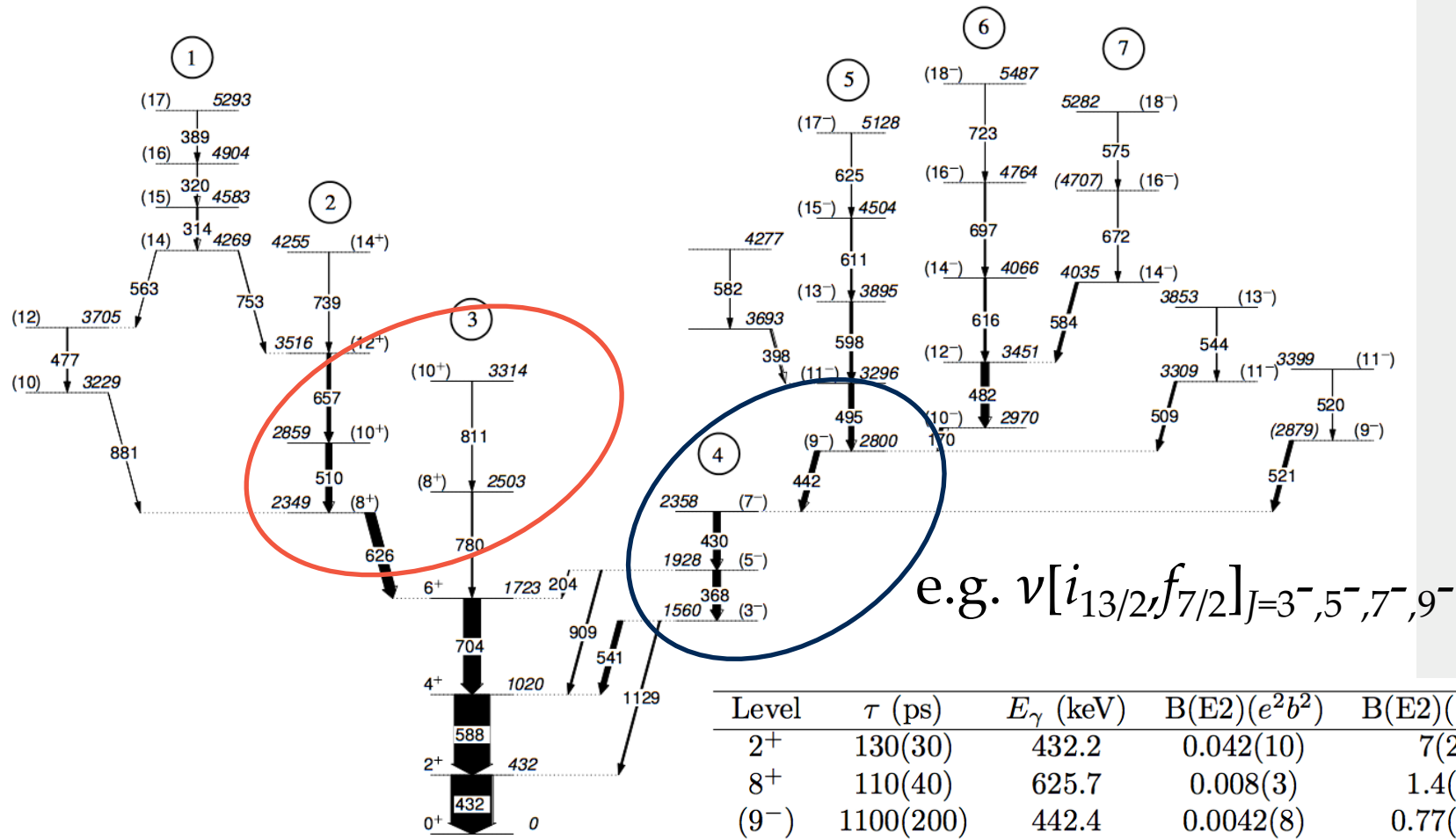


Spectroscopy and lifetime measurements of

$^{166,168}\text{Os}$

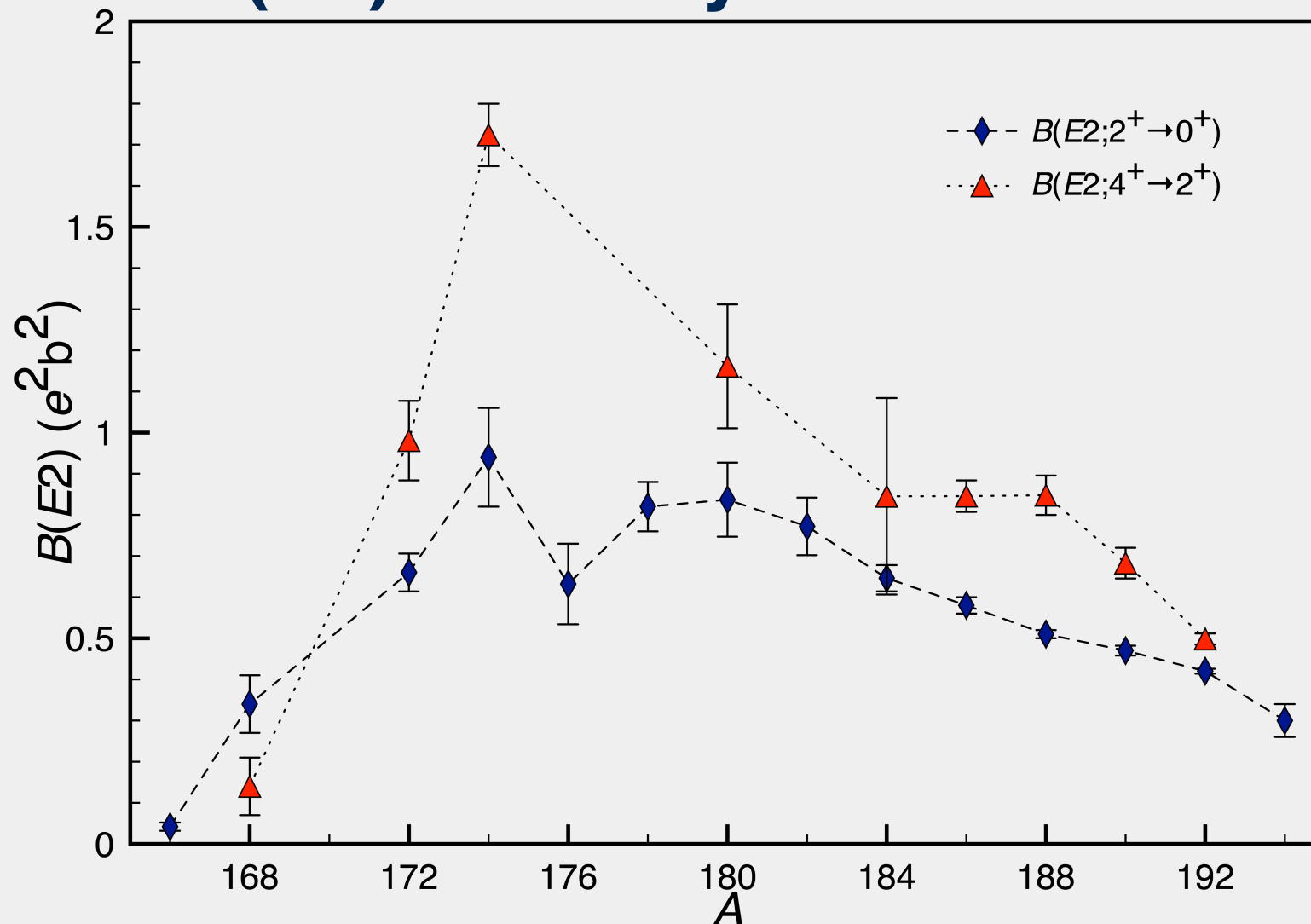
by

Sanna Stolze



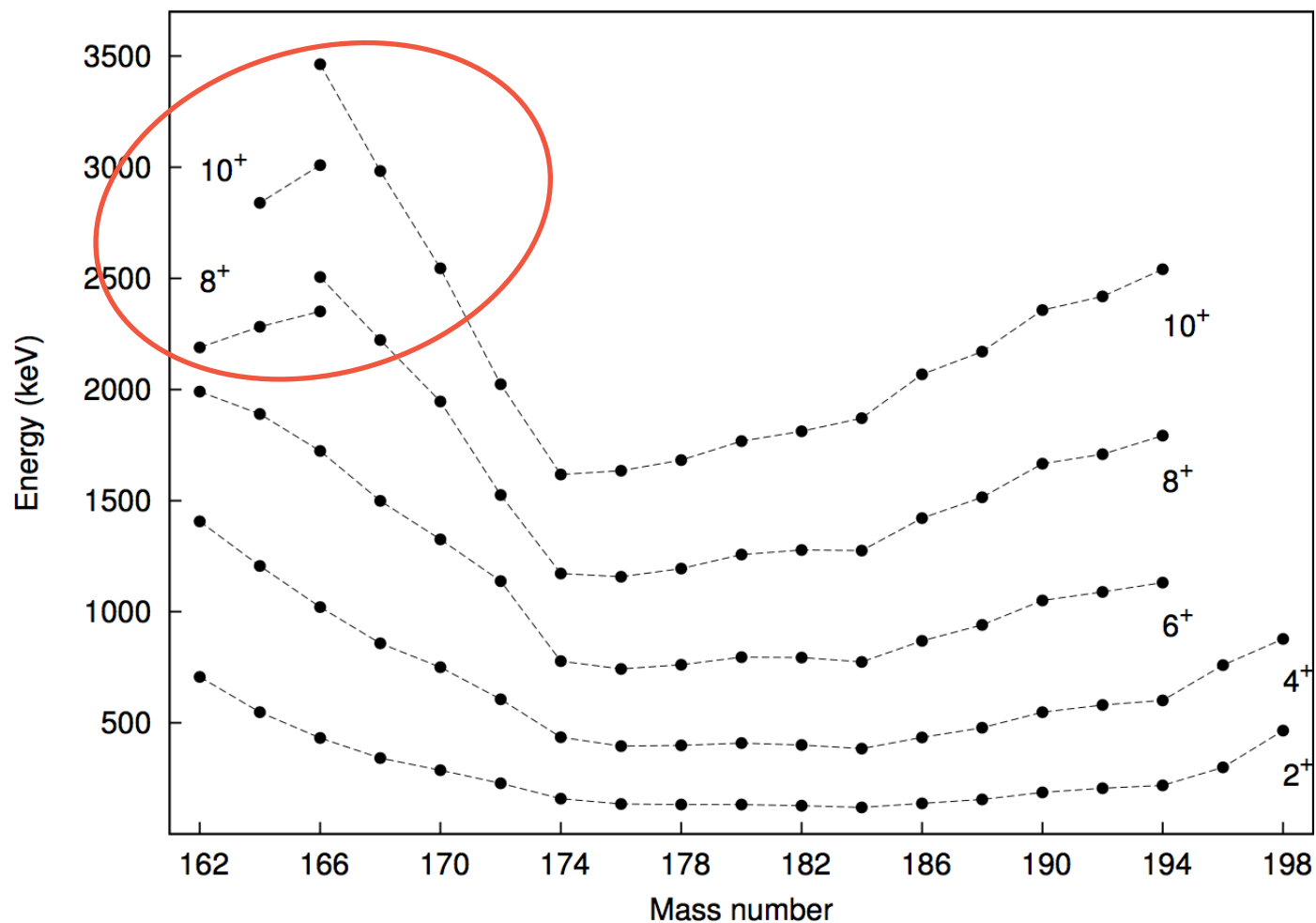


Os $B(E2)$ -value systematics



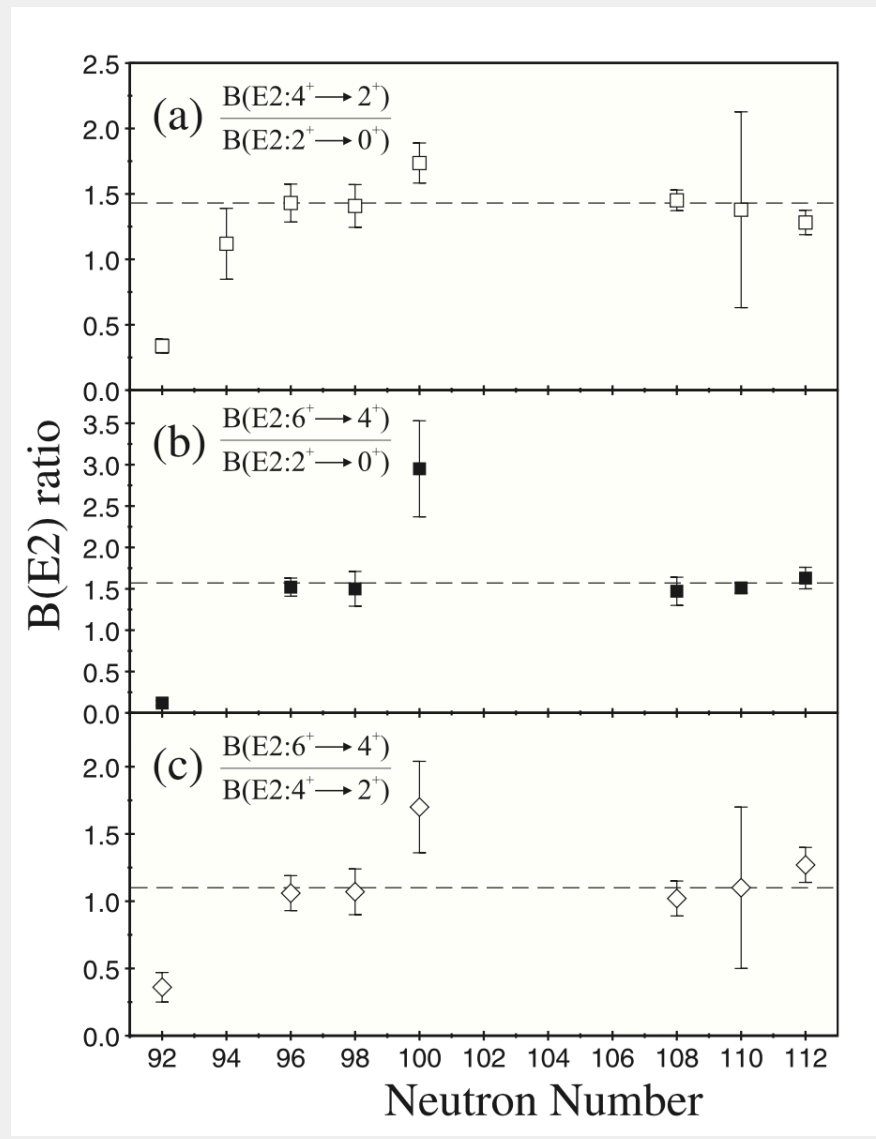
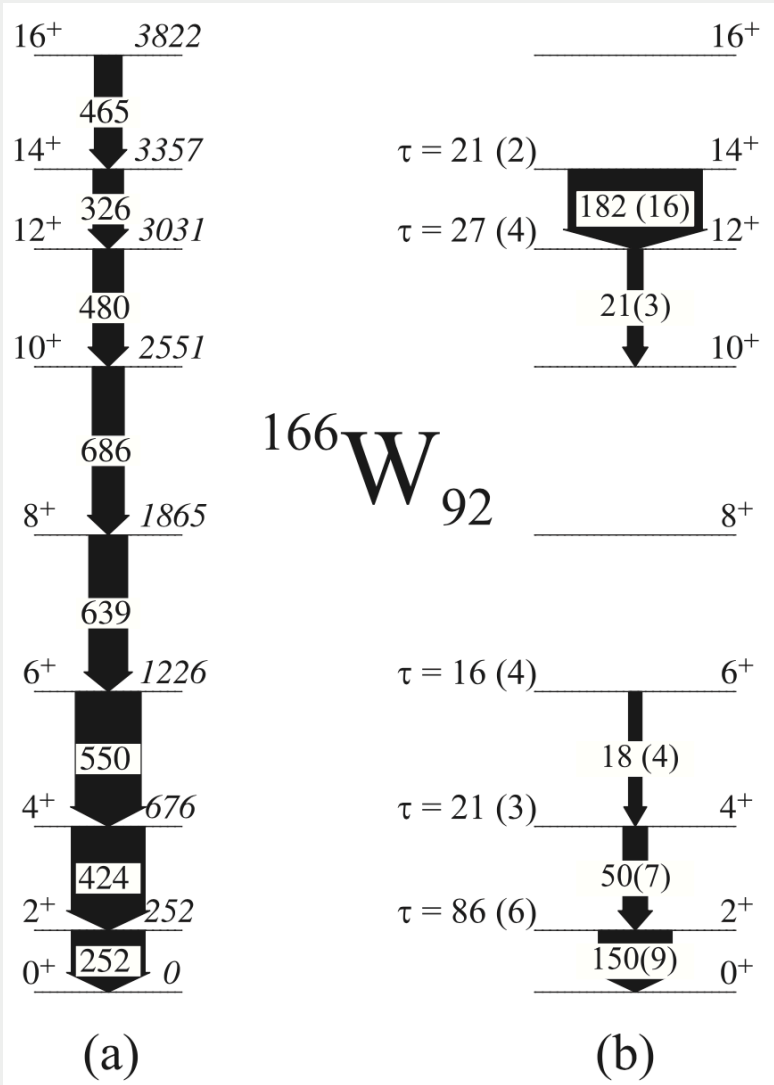


Os level-energy systematics





Lifetimes in ^{166}W

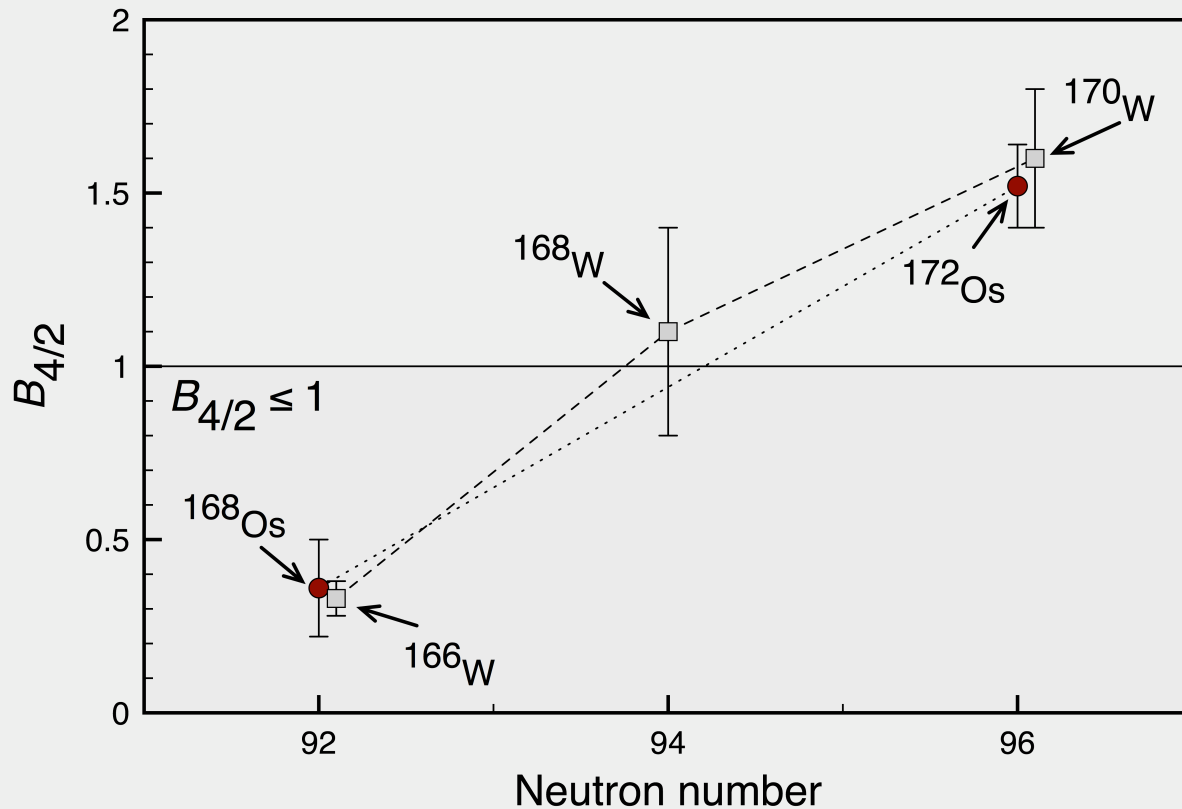


B. Saygi et al., Physical Review C **96**, 021301(R) (2017)

The data



$B(E2)$ (W.u.)	$^{168}_{76}\text{Os}_{92}$	$^{166}_{74}\text{W}_{92}$	$^{166}_{76}\text{Os}_{90}$
$2^+ \rightarrow 0^+$	74(13)	150(9)	7(2)
$4^+ \rightarrow 2^+$	25(13)	50(7)	
$6^+ \rightarrow 4^+$		18(4)	
$12^+ \rightarrow 10^+$	0.86(6)	21(3)	
$14^+ \rightarrow 12^+$	130(15)	182(16)	





Conclusions

Observations:

- $B_{4/2} < 1$ in ^{168}Os and ^{166}W
- $B(E2; 2^+ \rightarrow 0^+) = 7(2)$ W.u. in ^{166}Os , very low cf. systematics
- Signs of single-particle multiplet(s) in ^{166}Os

Problems:

- The nuclei are not at or very near closed shells \Rightarrow seniority structures seem unlikely
- Sub-shell gap?
- Shape coexistence also unlikely



Collaboration

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