

# Identification of High Spin States in $^{137,138}\text{Cs}$ and Shell Model Calculations

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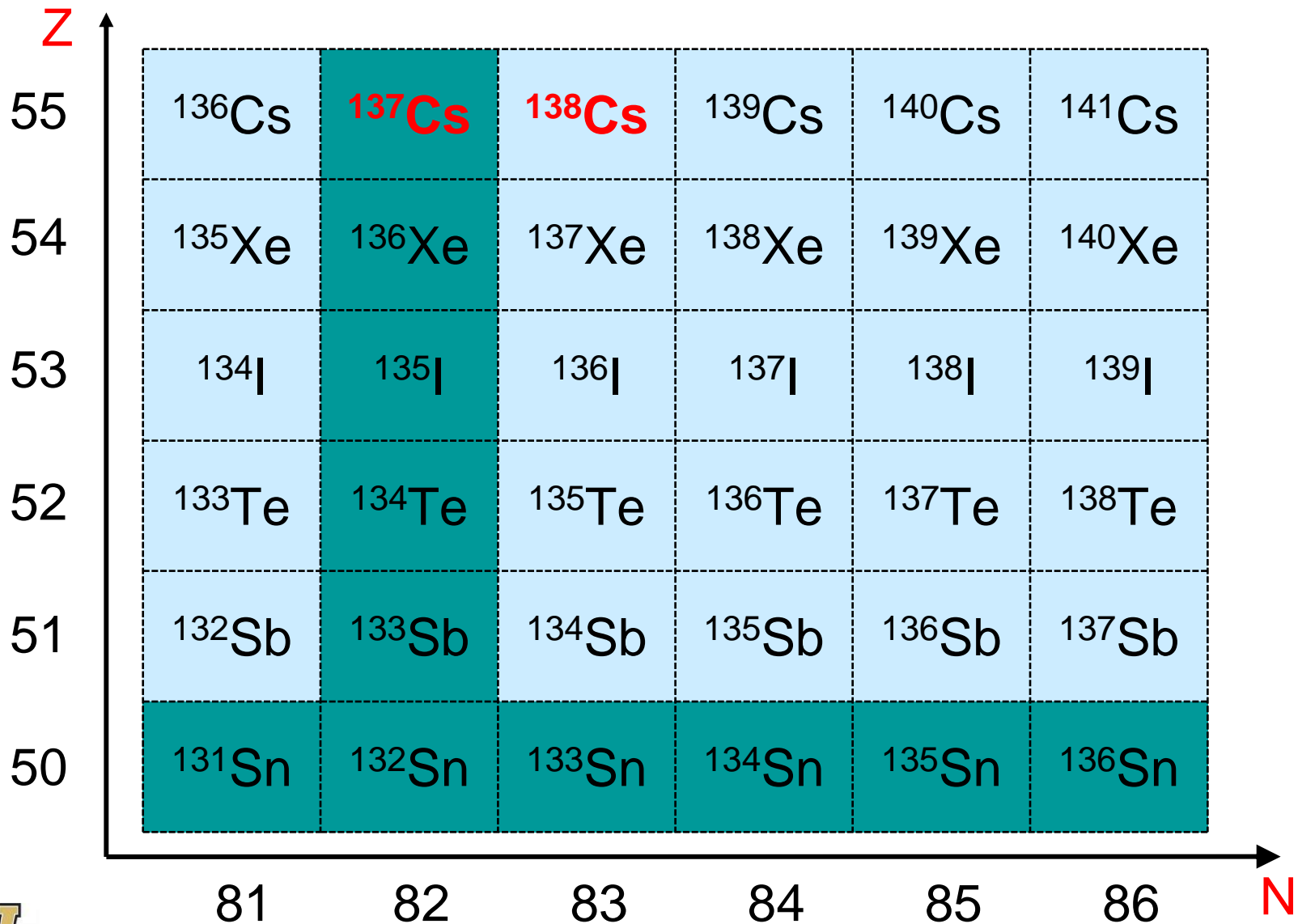
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# Introduction

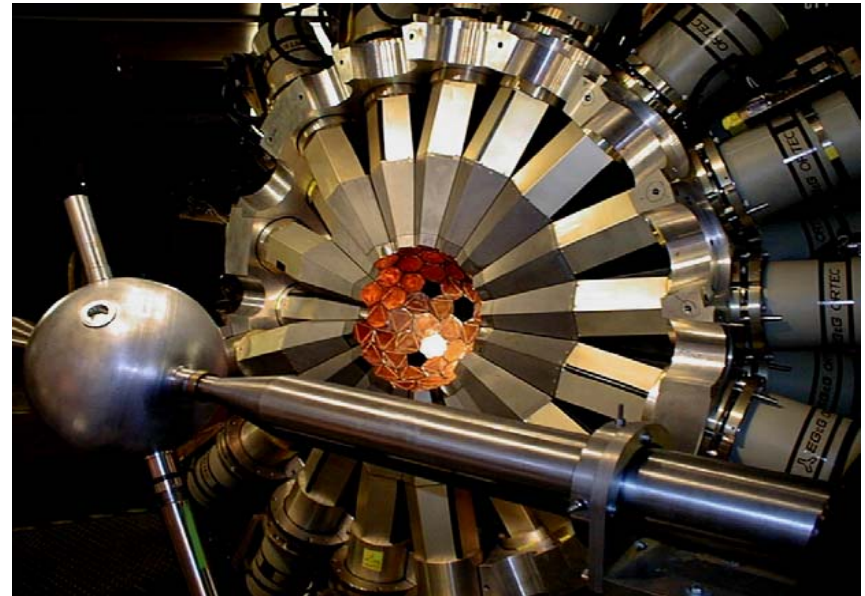
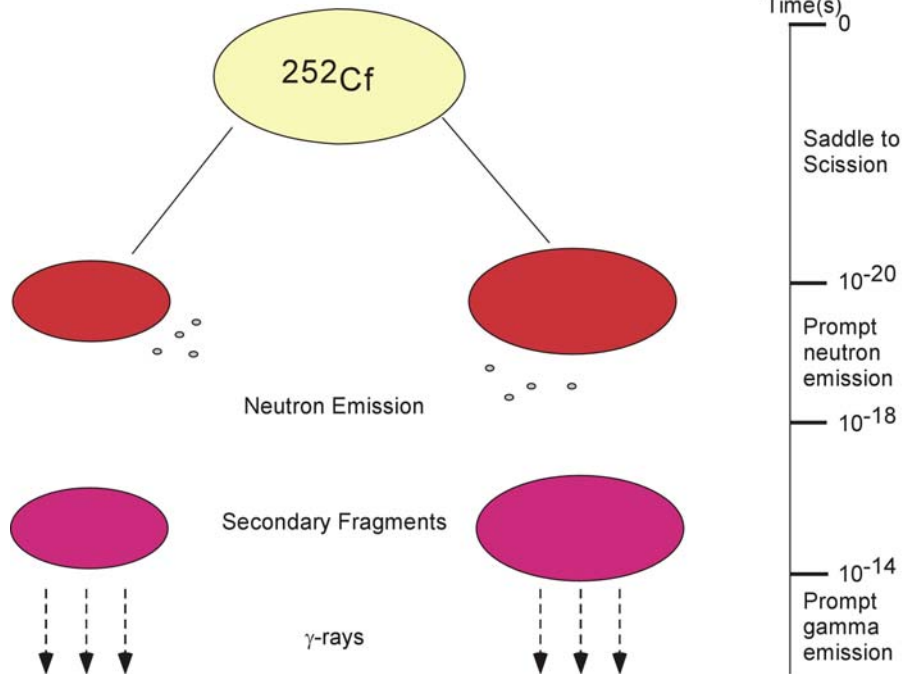


# Experimental Details

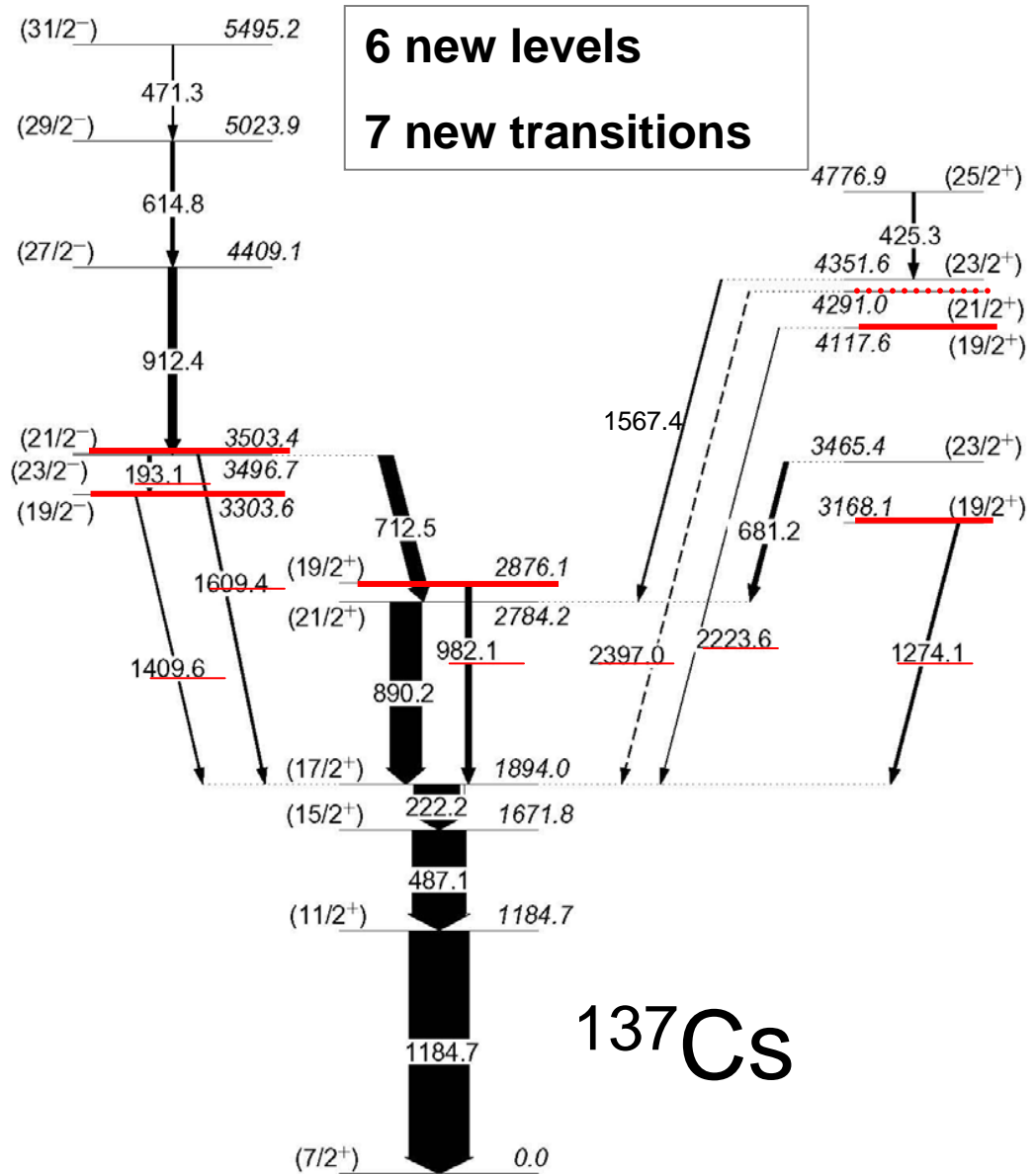
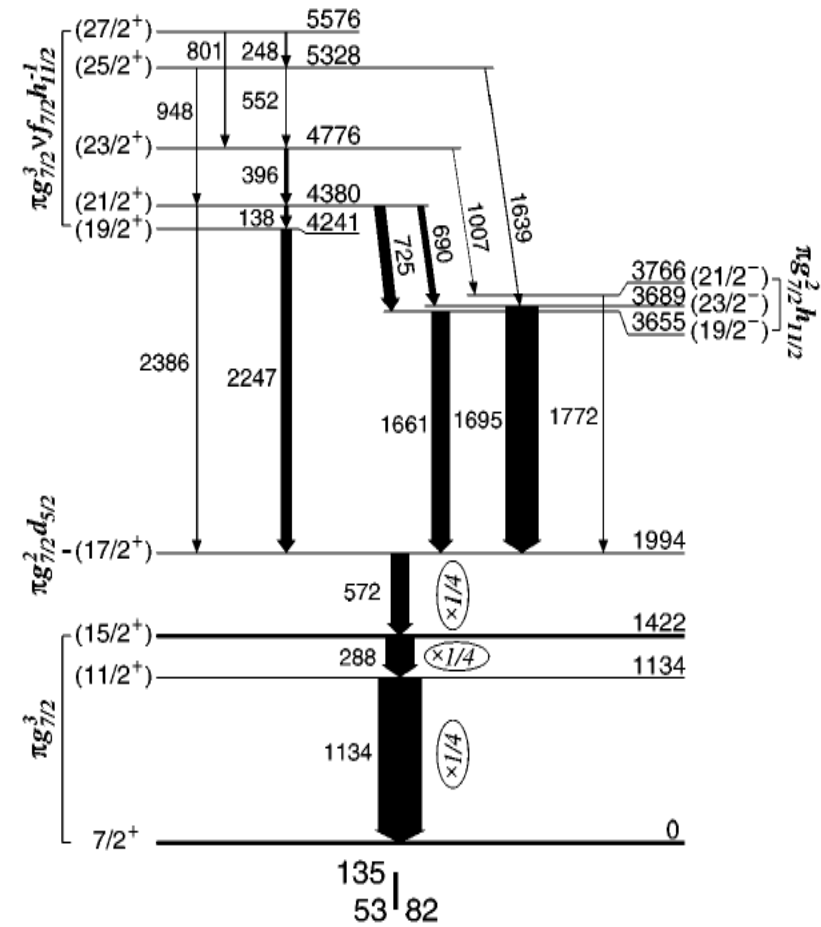
- $^{252}\text{Cf}$ , 62  $\mu\text{Ci}$  of  $\alpha$
- Sandwiched between two Fe foils of thickness 10 mg/cm<sup>2</sup>
- Gammasphere with 101 Compton-suppressed Ge detectors.
- $\sim 6 \times 10^{11}$  triple events



# SF of $^{252}\text{Cf}$ & GammaspHERE



# Results of $^{137}\text{Cs}$



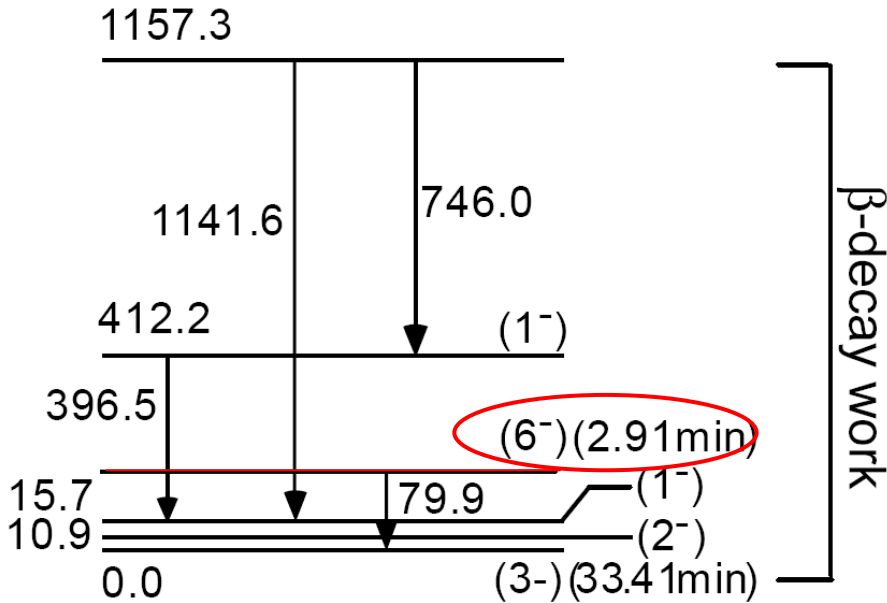
C.T. Zhang et al., PRL 77  
3743(1996)

Reported by R. Broda et al, PRC 59, 3071(1999).

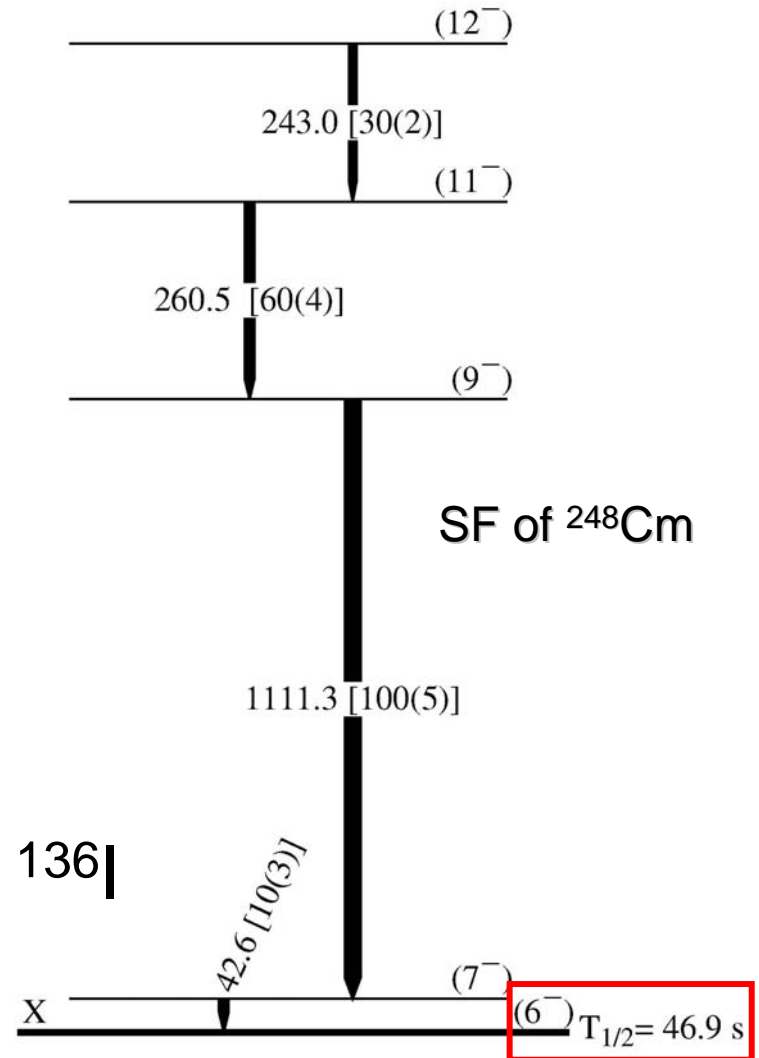


# Previous work on 138Cs

$\beta$ -decay of  $^{138}\text{Xe}$ :  $^{138}\text{Cs}$



G.H. Carlson *et al.*, Phys. Rev. C9 283(1974)

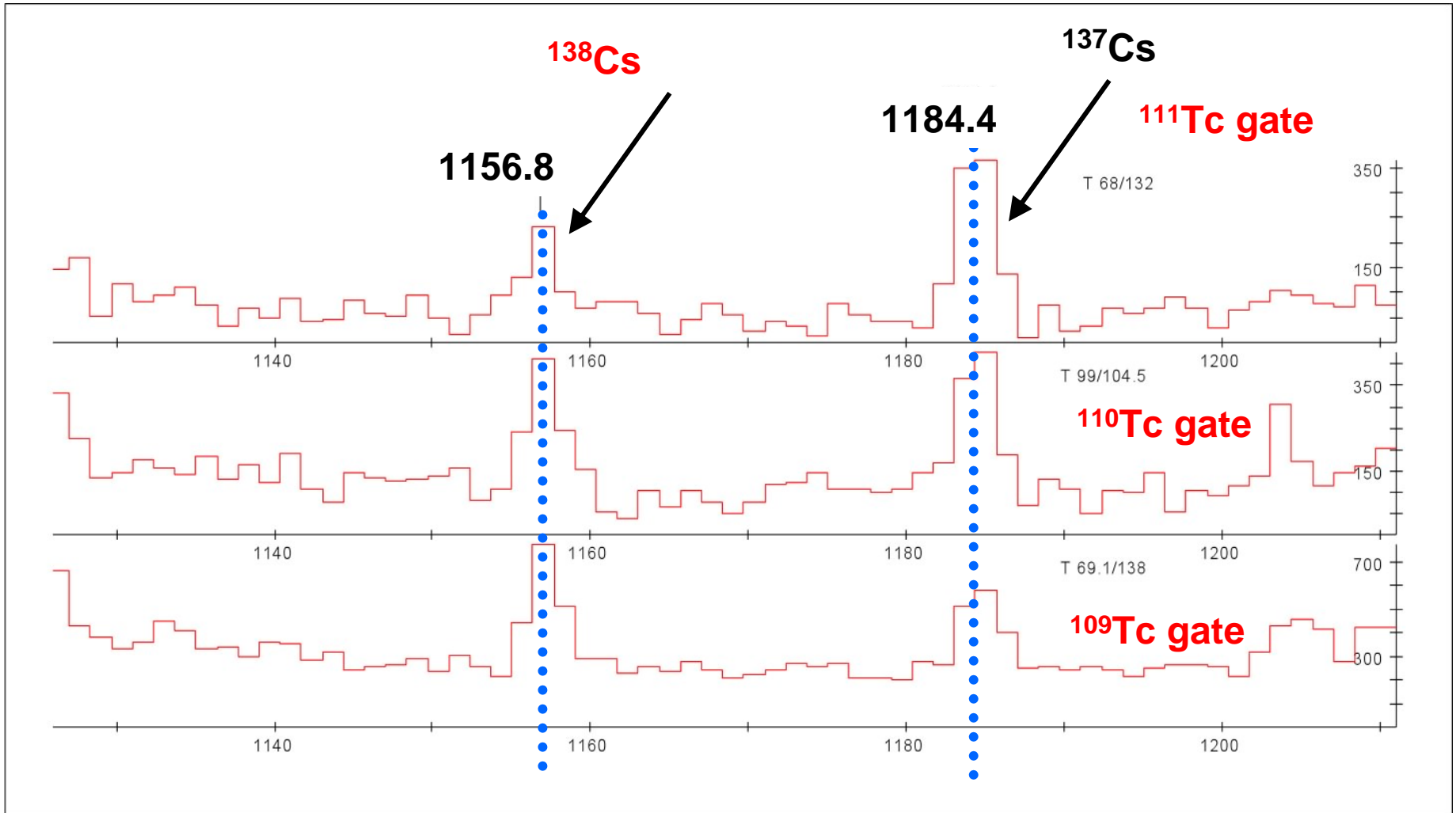


W. Urban *et al.*, EPJA 27, 257-262 (2006)

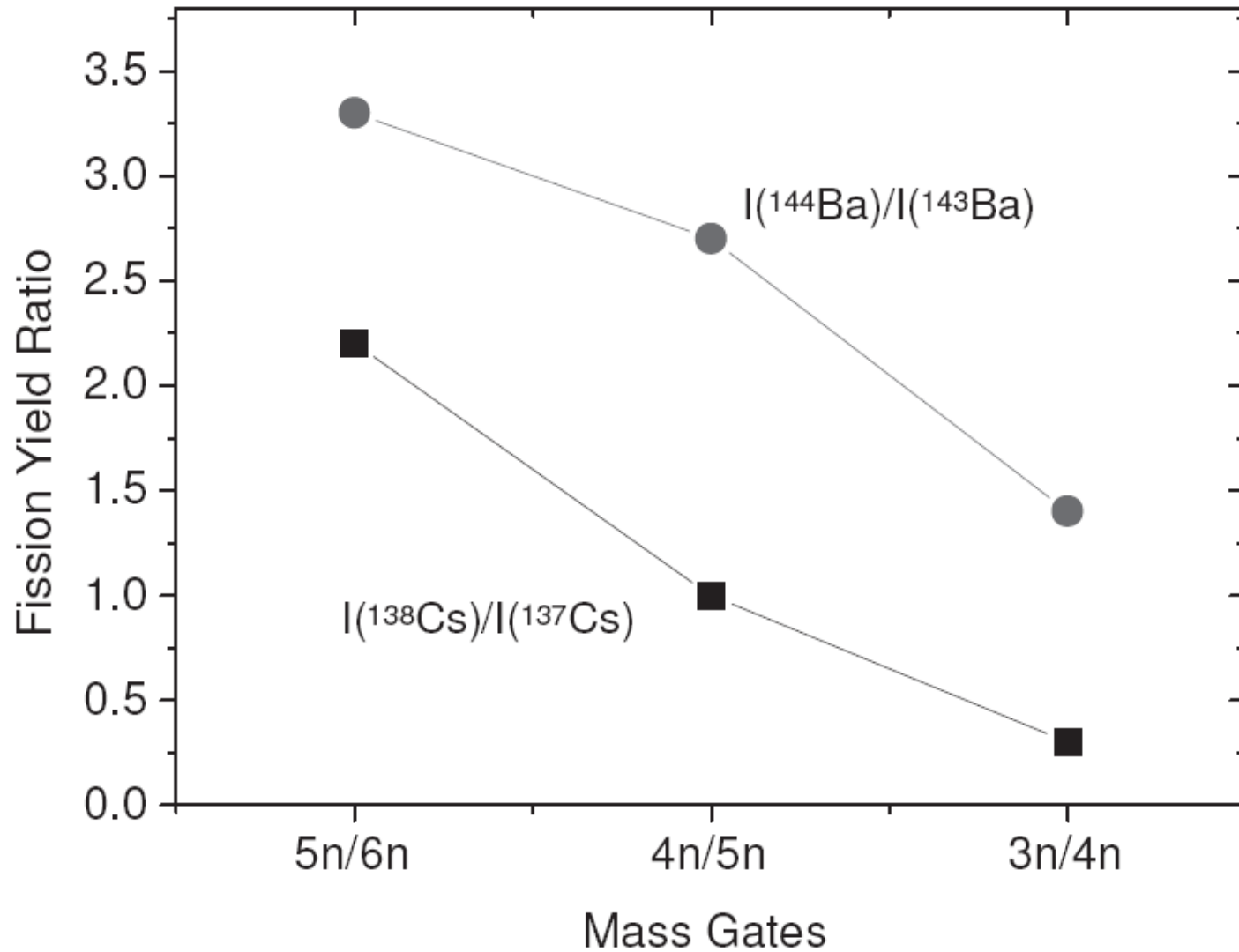
Sanibel Island, Nov. 2007

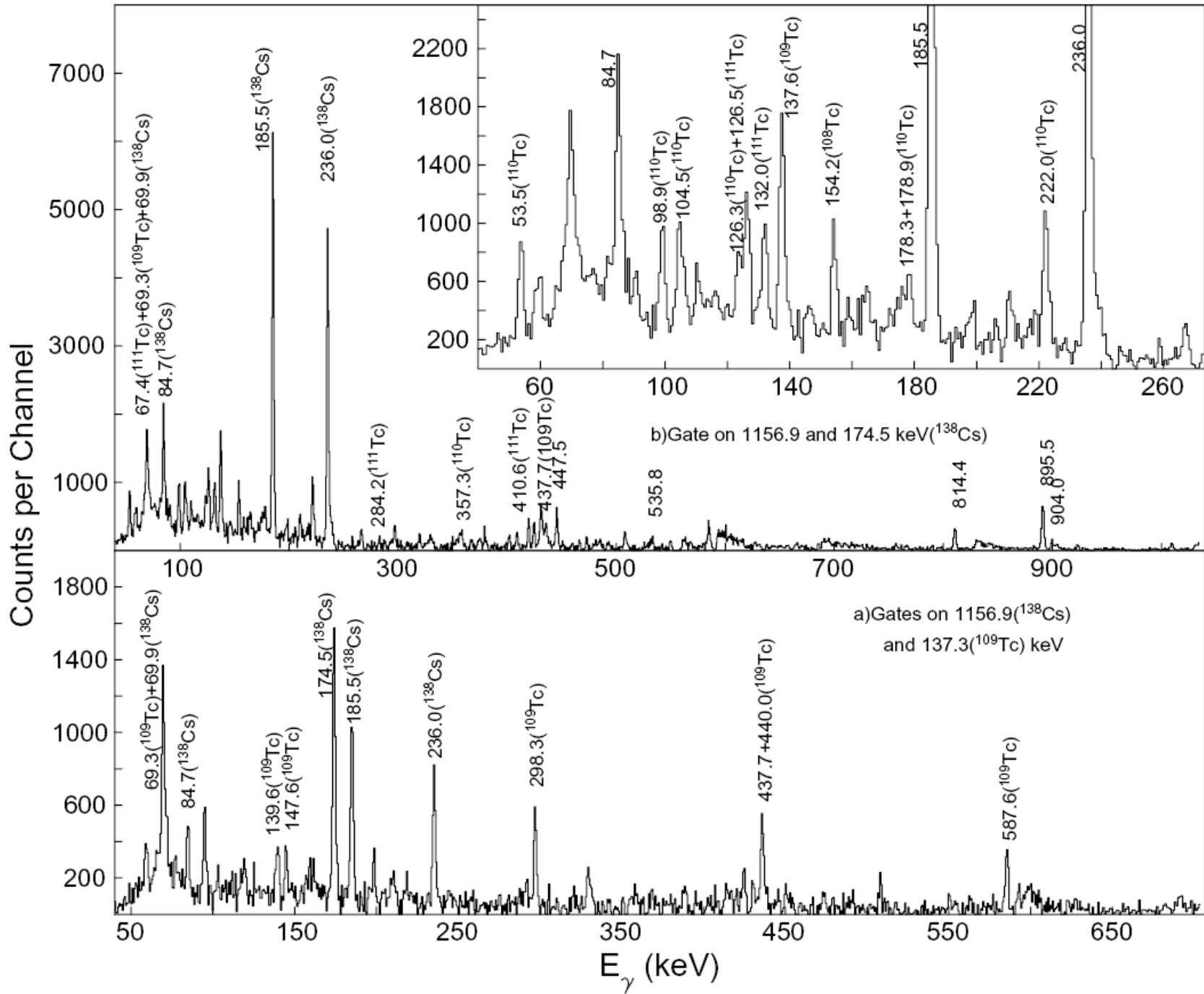


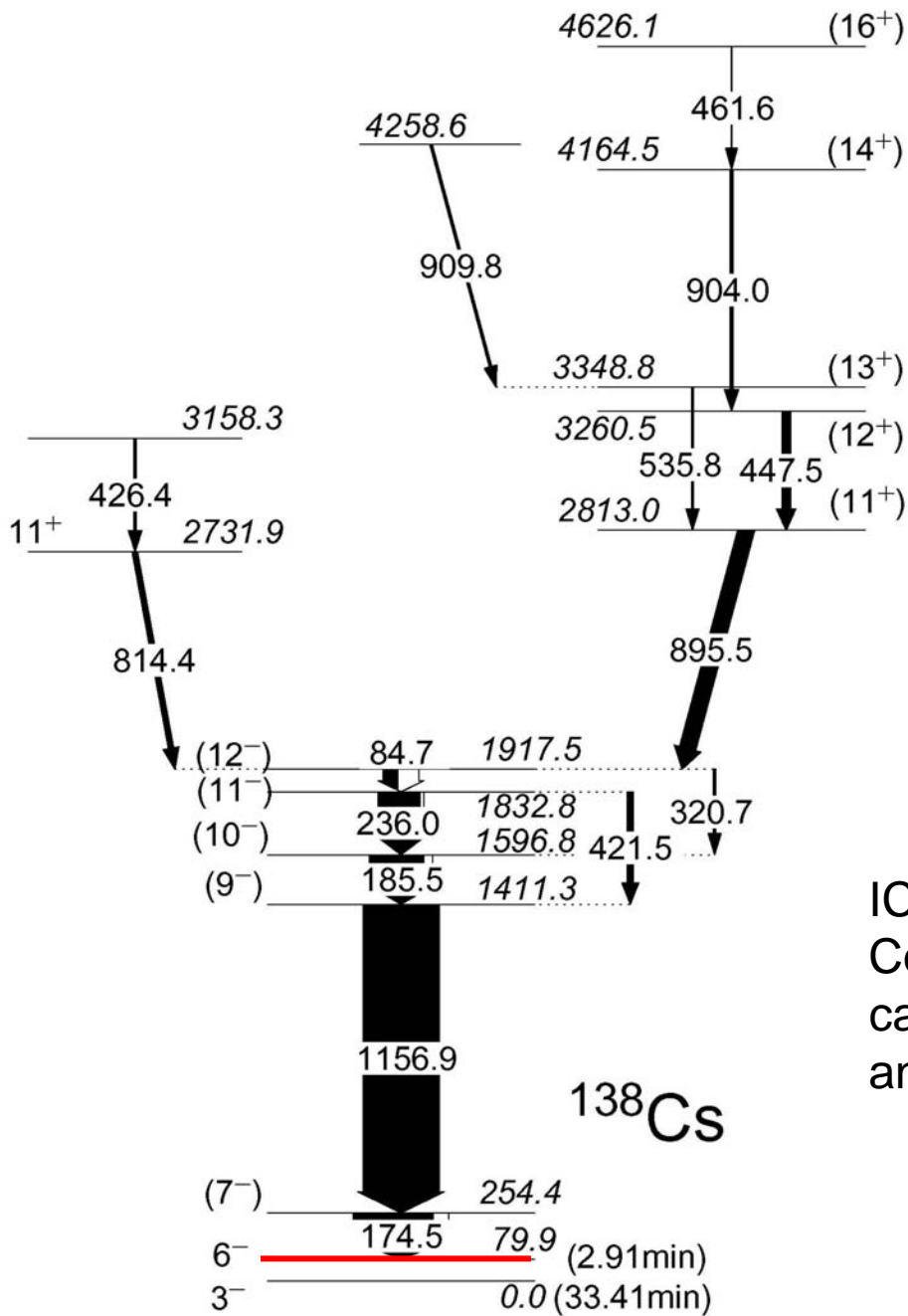
# Identification of $^{138}\text{Cs}$



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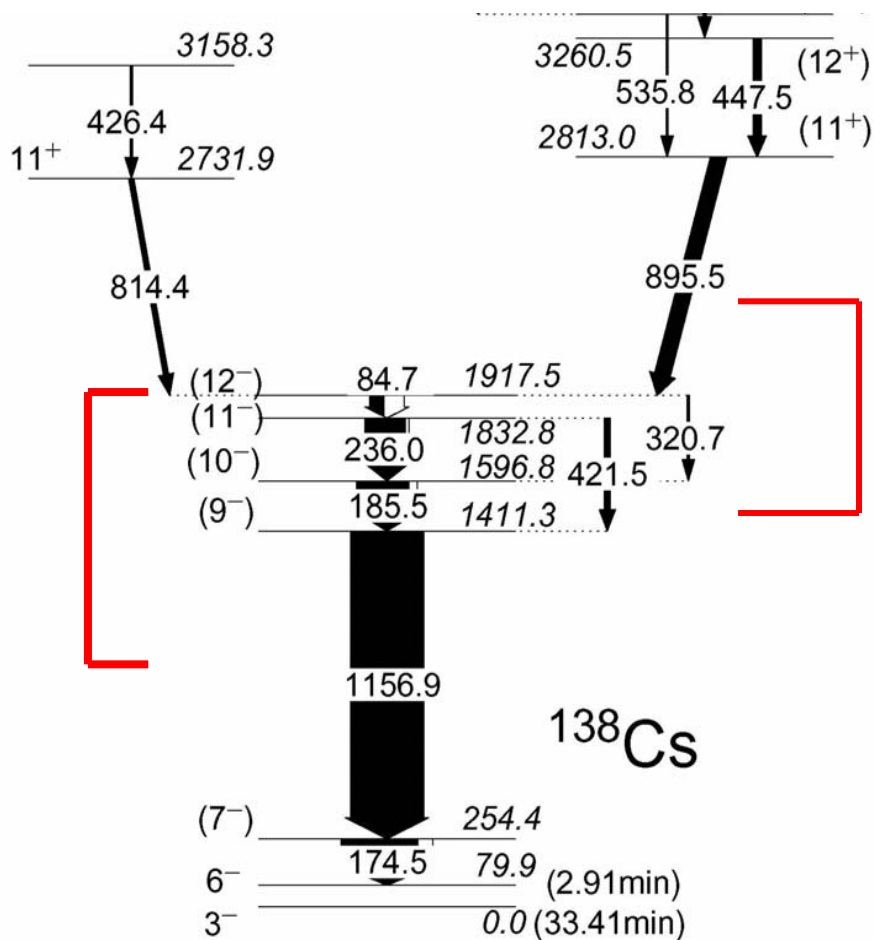
13 states

15 transitions

ICC measurements, Angular Correlations & Shell model calculations  $\rightarrow$  spins, parities and configurations

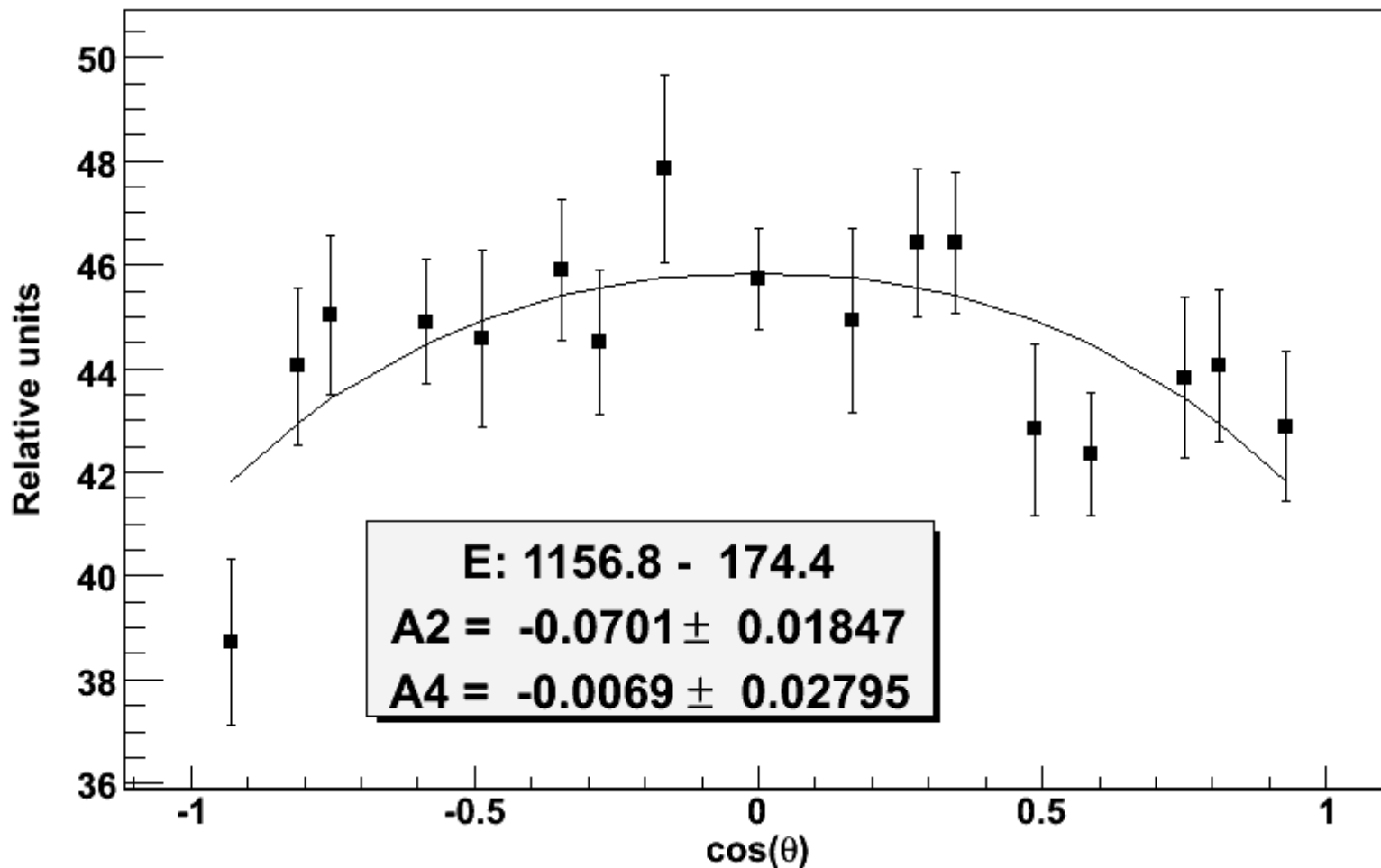


# Internal Conversion Coefficients



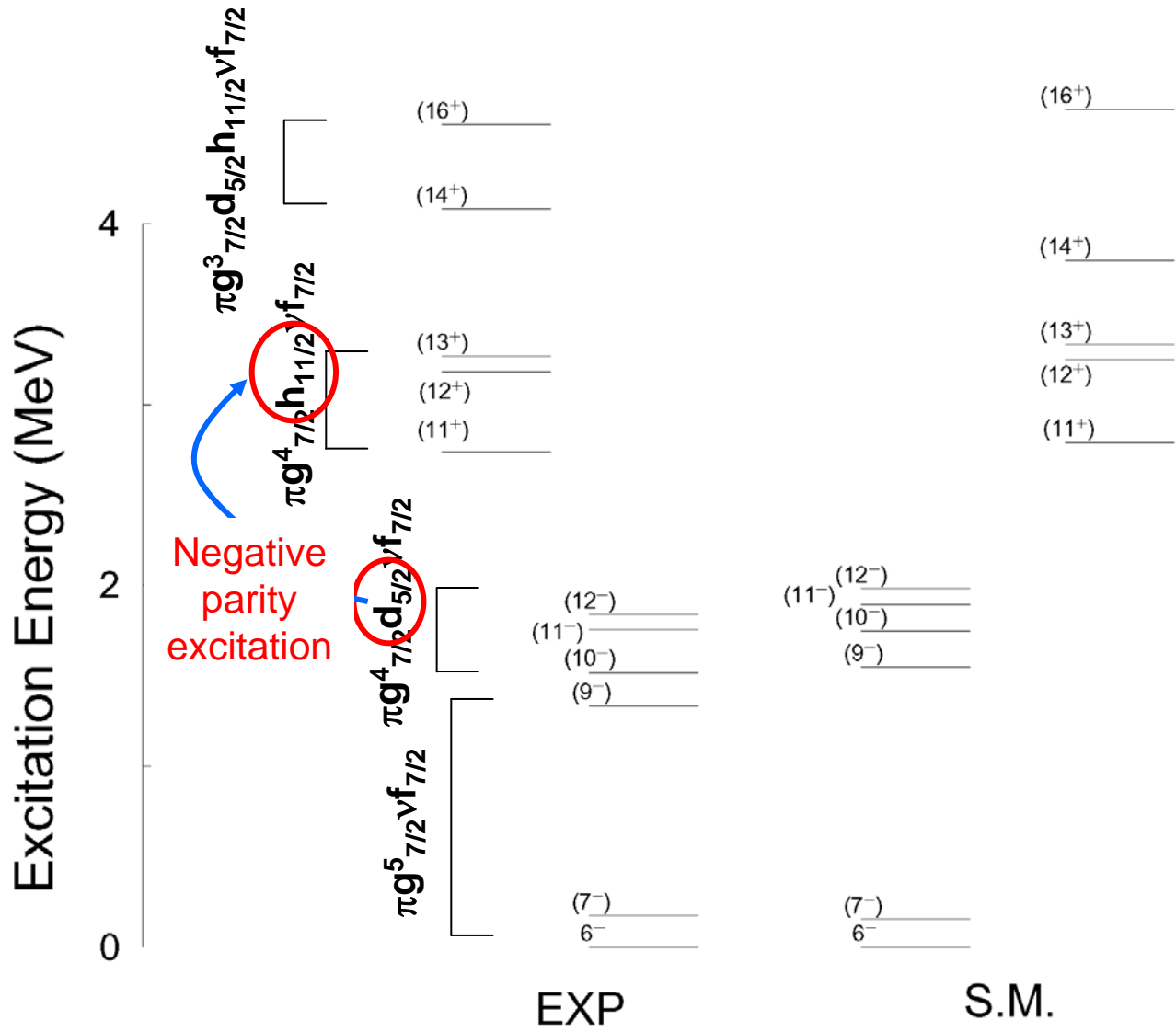
$E_\gamma$	ICC	Multipolarity
185.5	0.18	M1(E2)
84.7	1.39	M1

# Angular Correlation Measurements



# Shell-model Calculations

- We have assumed  $^{132}\text{Sn}$  to be a closed core and let the valence protons occupy the five single-particle (SP) orbits of the 50-82 shell, while for the neutrons the model space includes the six orbits of the 82-126 shell.
- We have employed a shell-model Hamiltonian with the SP particle energies taken from experiment and the two-body effective interaction derived from the CD-Bonn free nucleon-nucleon potential

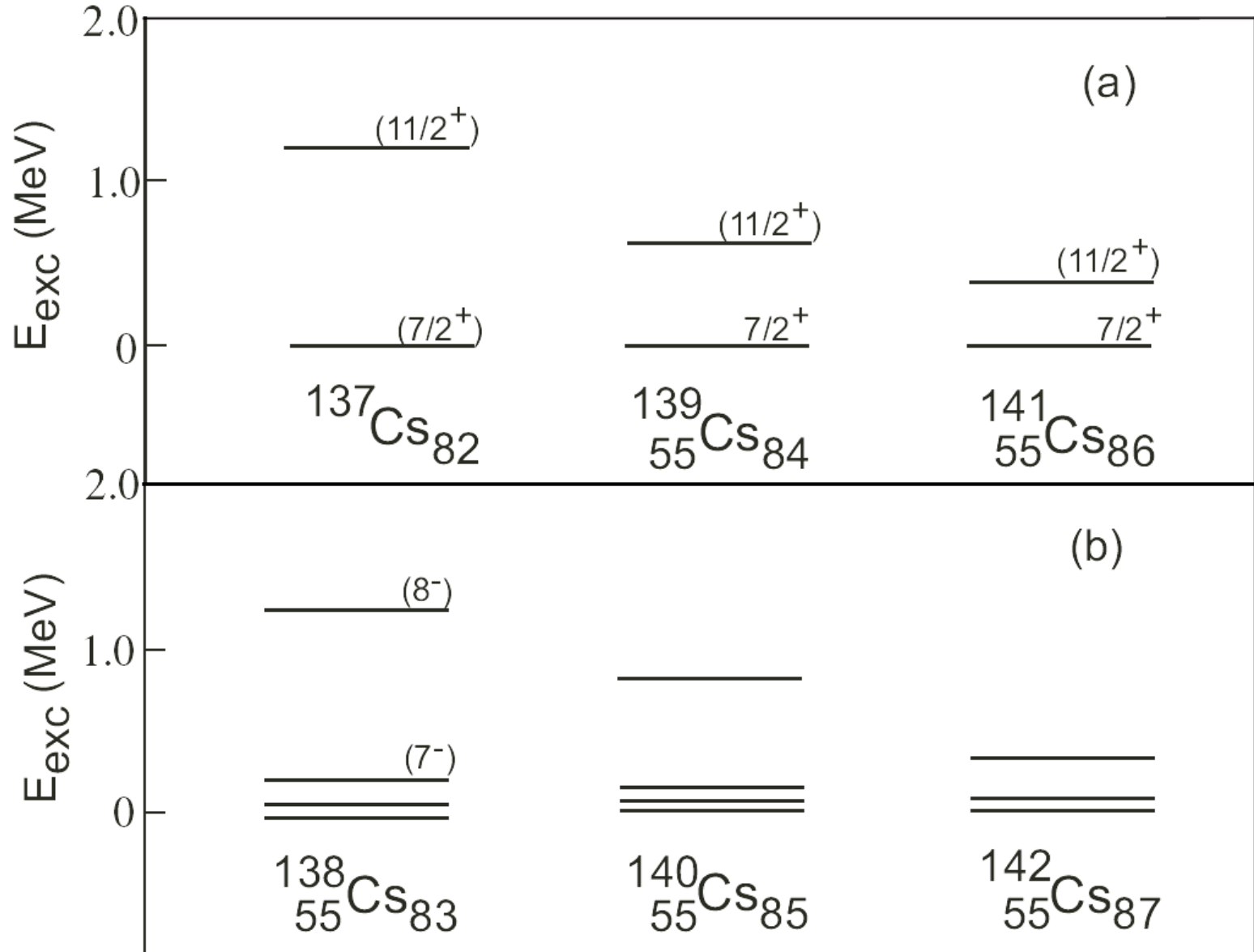


**$^{138}\text{Cs}$**

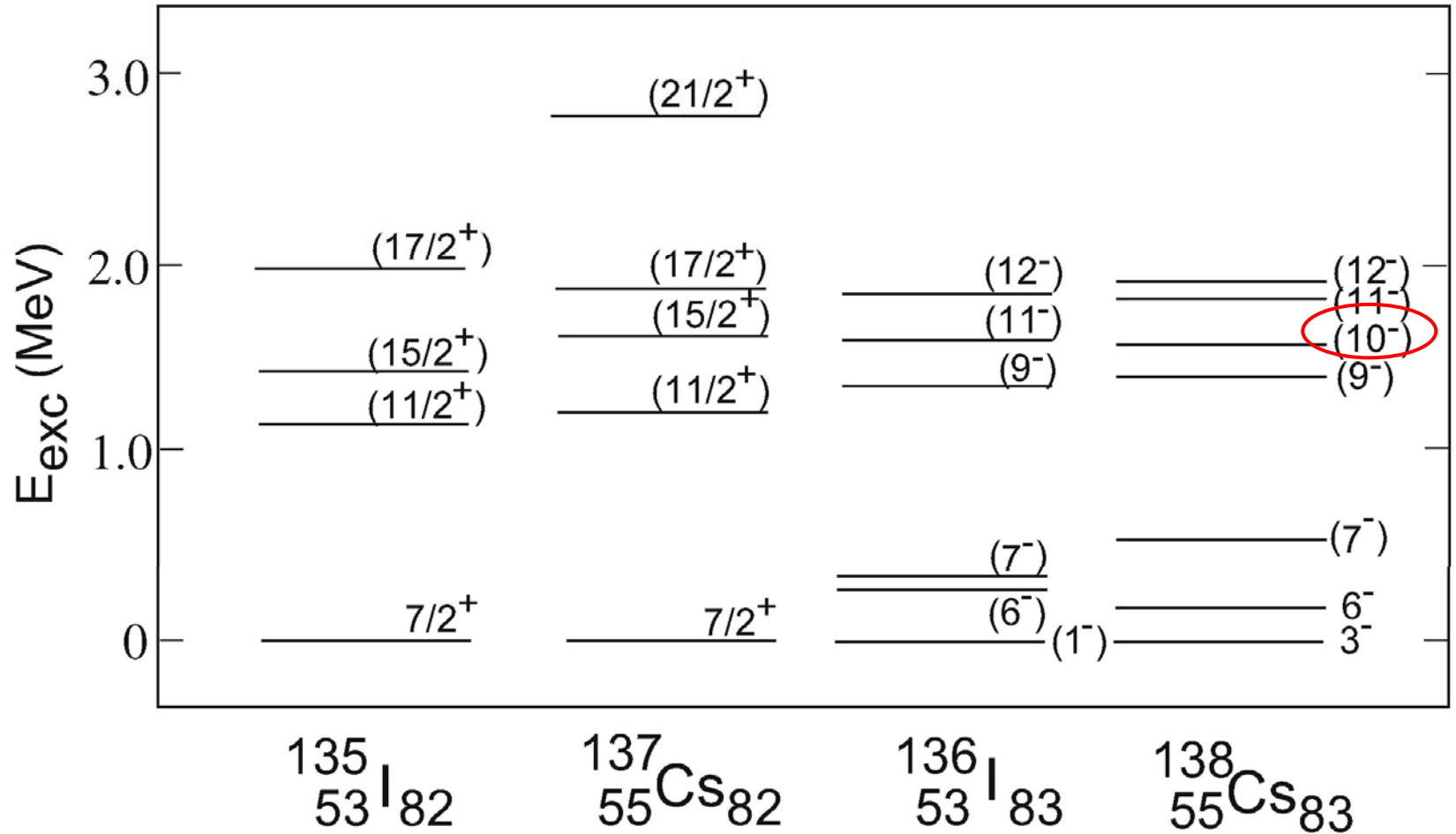




# Yrast energies of Cs isotopes



# Comparison of N=82, 83 isotones



# Conclusion

- High spin states in the N=83 neutron-rich isotope  $^{138}\text{Cs}$  has been observed for the first time and the level scheme of  $^{137}\text{Cs}$  expanded
- Spins, parities and configurations have been assigned based on ICC determinations and shell model calculations
- Similarities are observed in the N=82 isotones  $^{137}\text{Cs}$  and  $^{135}\text{I}$ .
- Differences are observed in the N=83 isotones  $^{138}\text{Cs}$  and  $^{136}\text{I}$

