

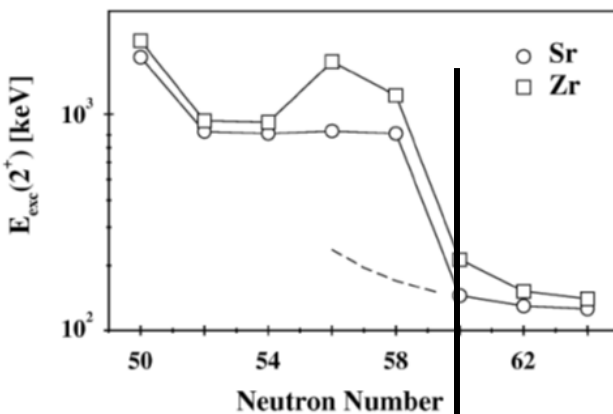
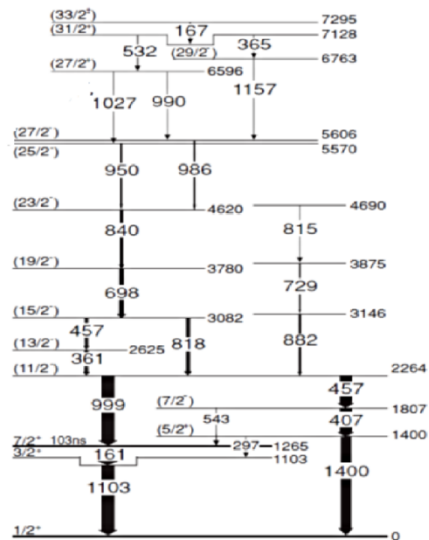
Spectroscopy of neutron-rich γ isotopes produced in fission induced by cold neutrons – onset and evolution of deformed structures

Ł. Iskra - *The Institute of Nuclear Physics, Krakow, Poland*

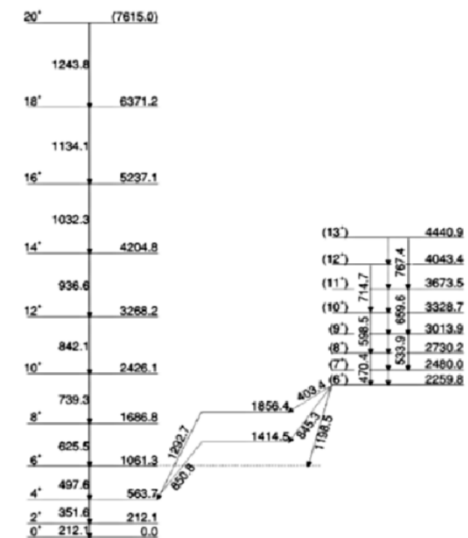
A decorative graphic consisting of several parallel white lines of varying thicknesses, slanted diagonally from the bottom right towards the top right, set against a solid blue background.

Scientific motivation

M. Matejska-Minda, B. Fornal et al., PRC 80, 017302(2009)



H. Hua et al., PRC 69, 014317 (2004)

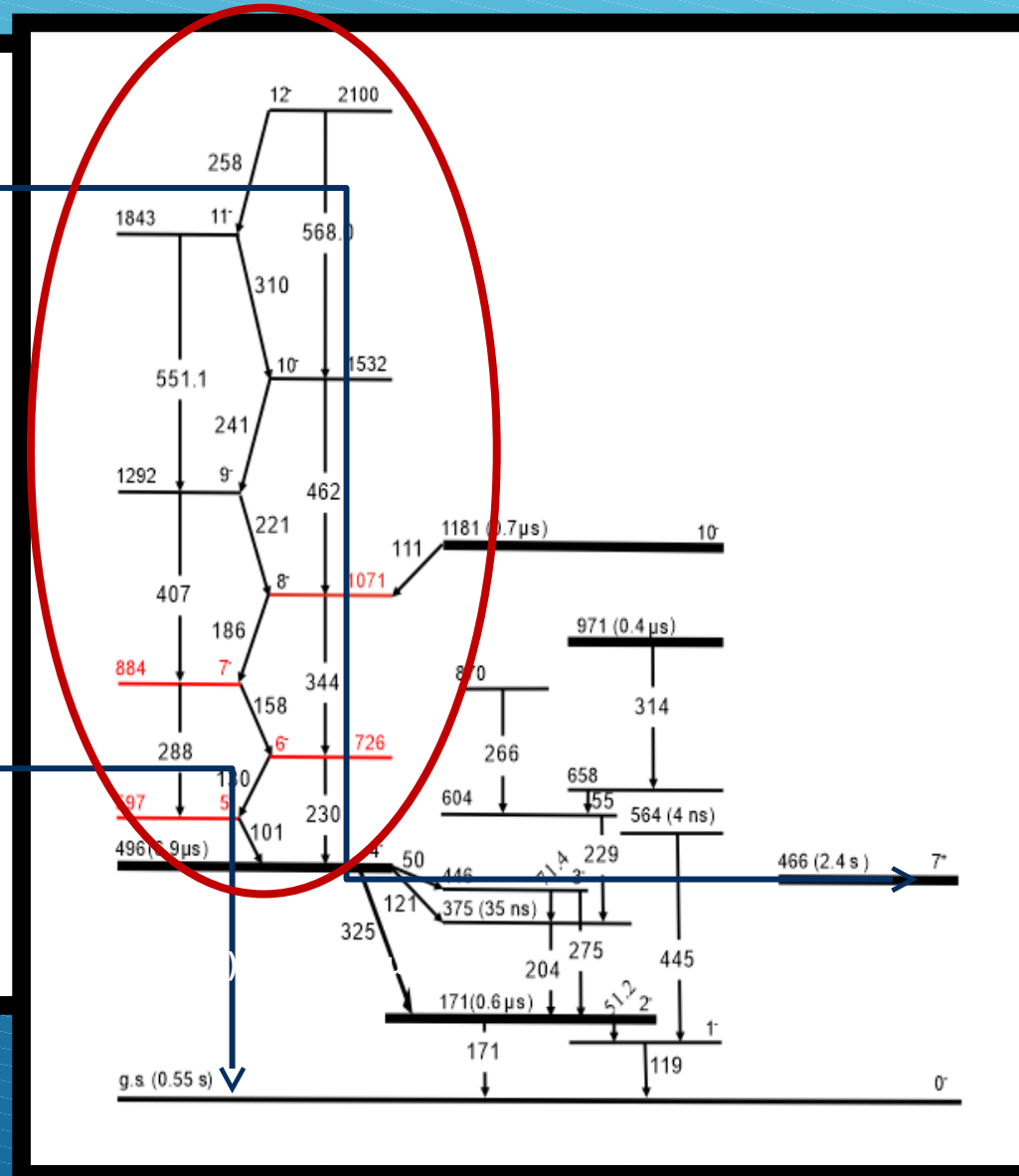
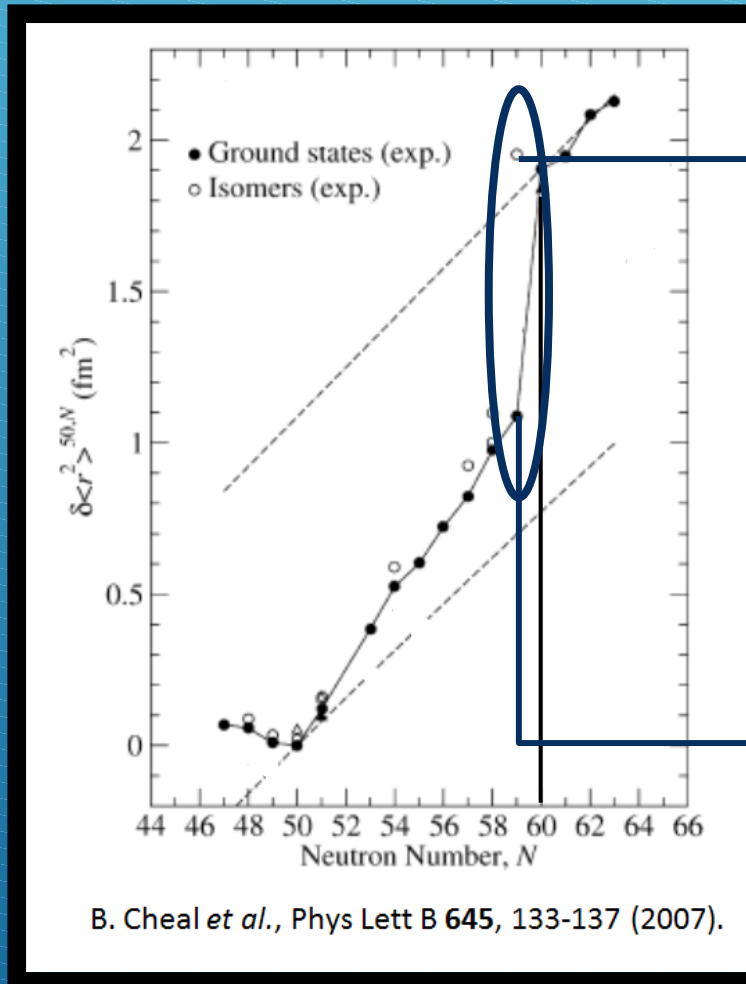


Z = 40

97Nb	98Nb	99Nb	100Nb	101Nb	102Nb	103Nb
96Zr	97Zr	98Zr	99Zr	100Zr	101Zr	102Zr
95Y	96Y	97Y	98Y	99Y	100Y	101Y
94Sr	95Sr	96Sr	97Sr	98Sr	99Sr	100Sr

N = 60

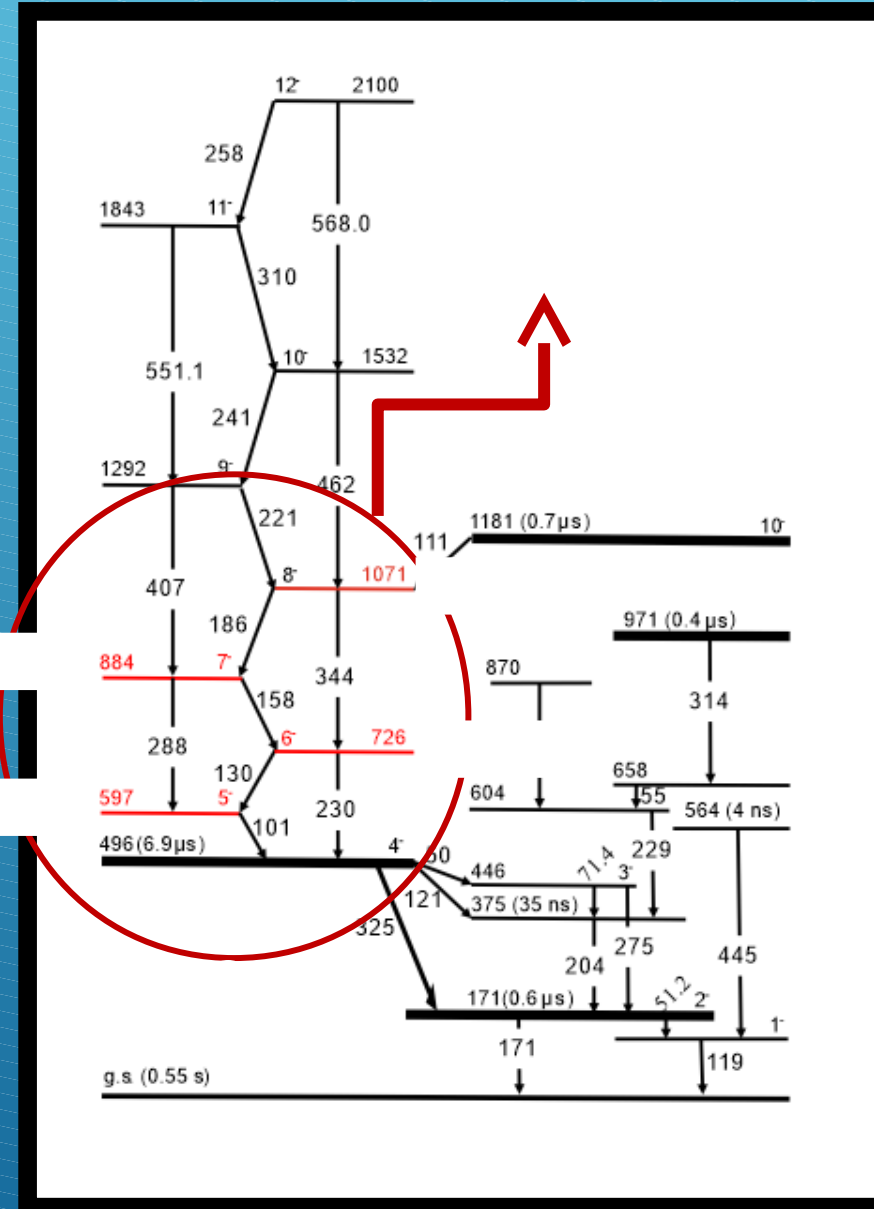
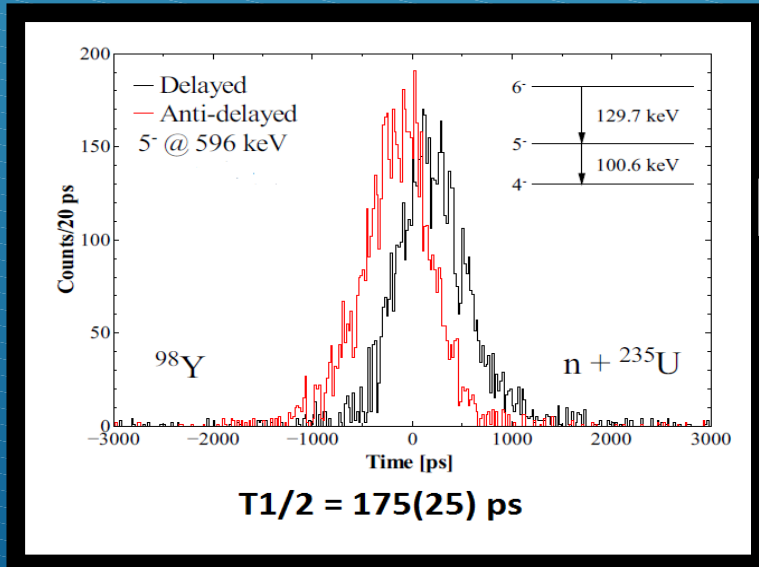
Scientific motivation

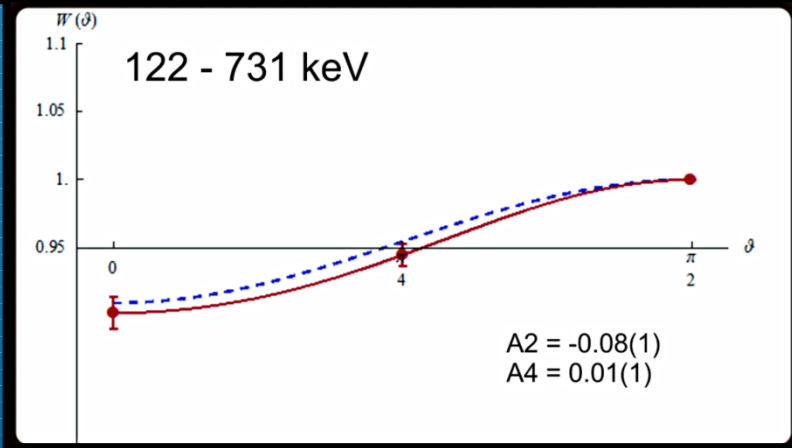
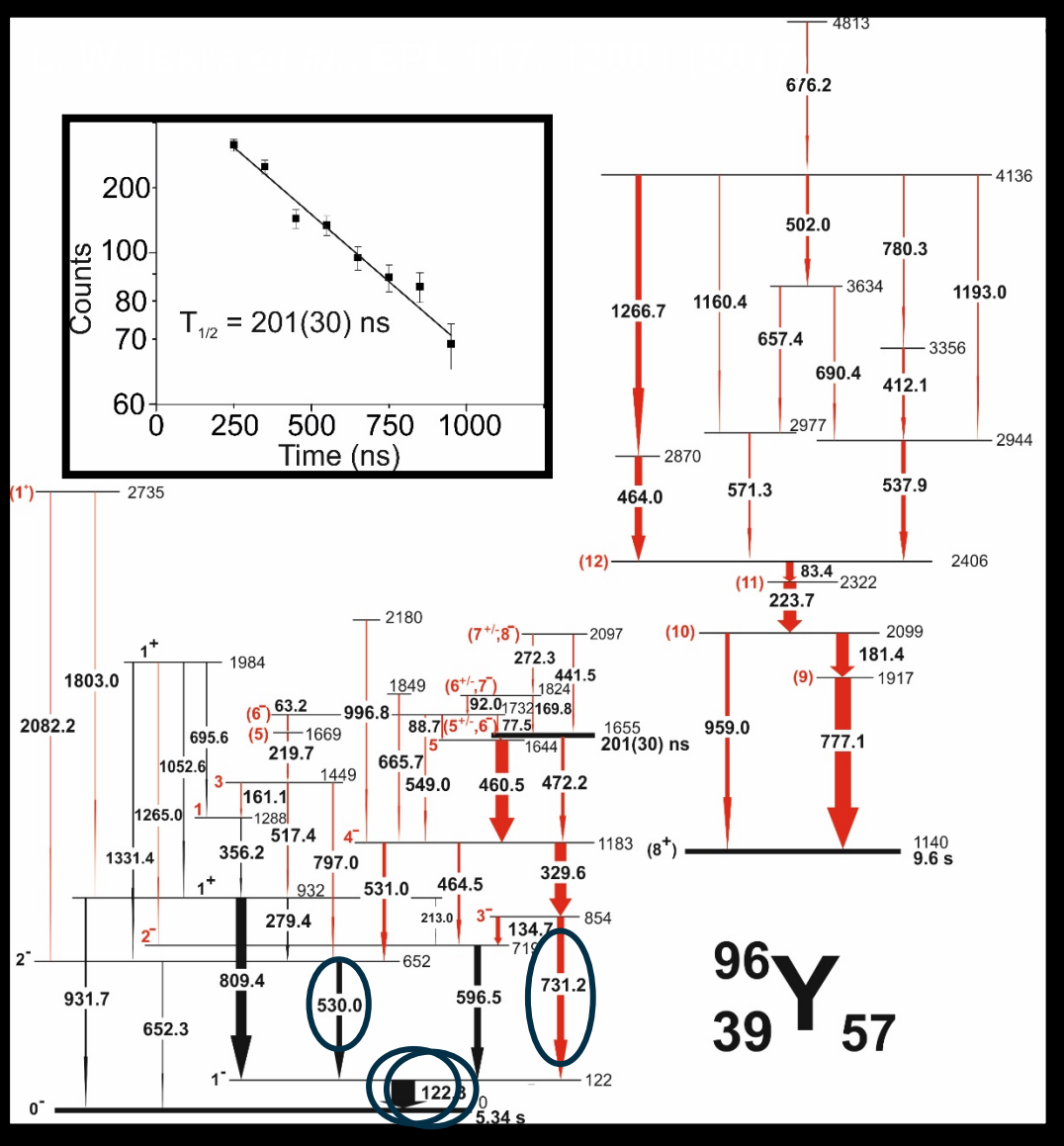
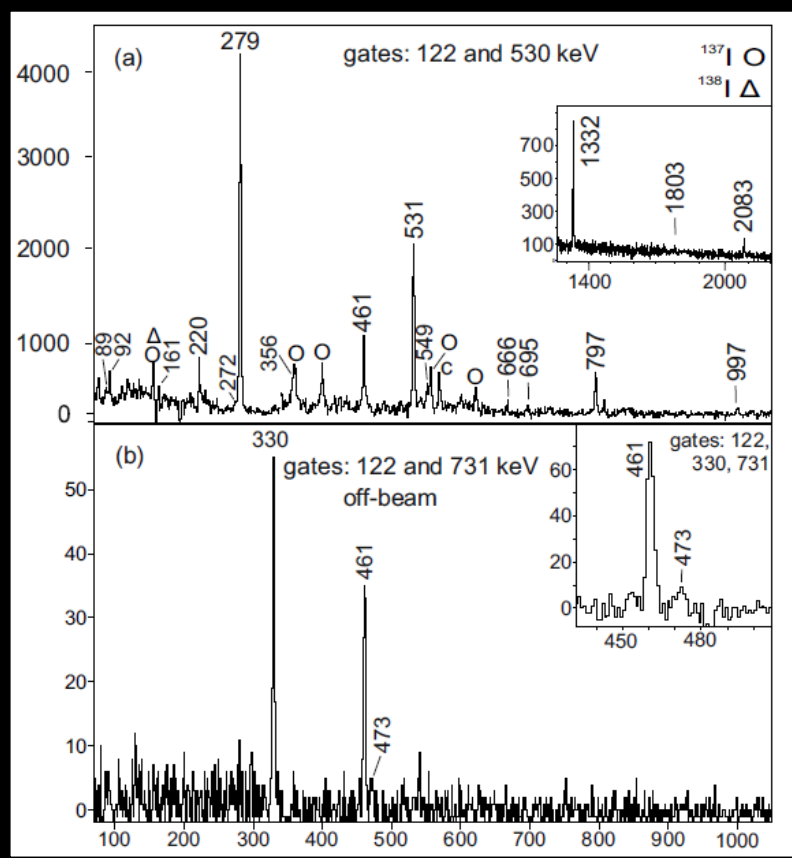


Experimental details

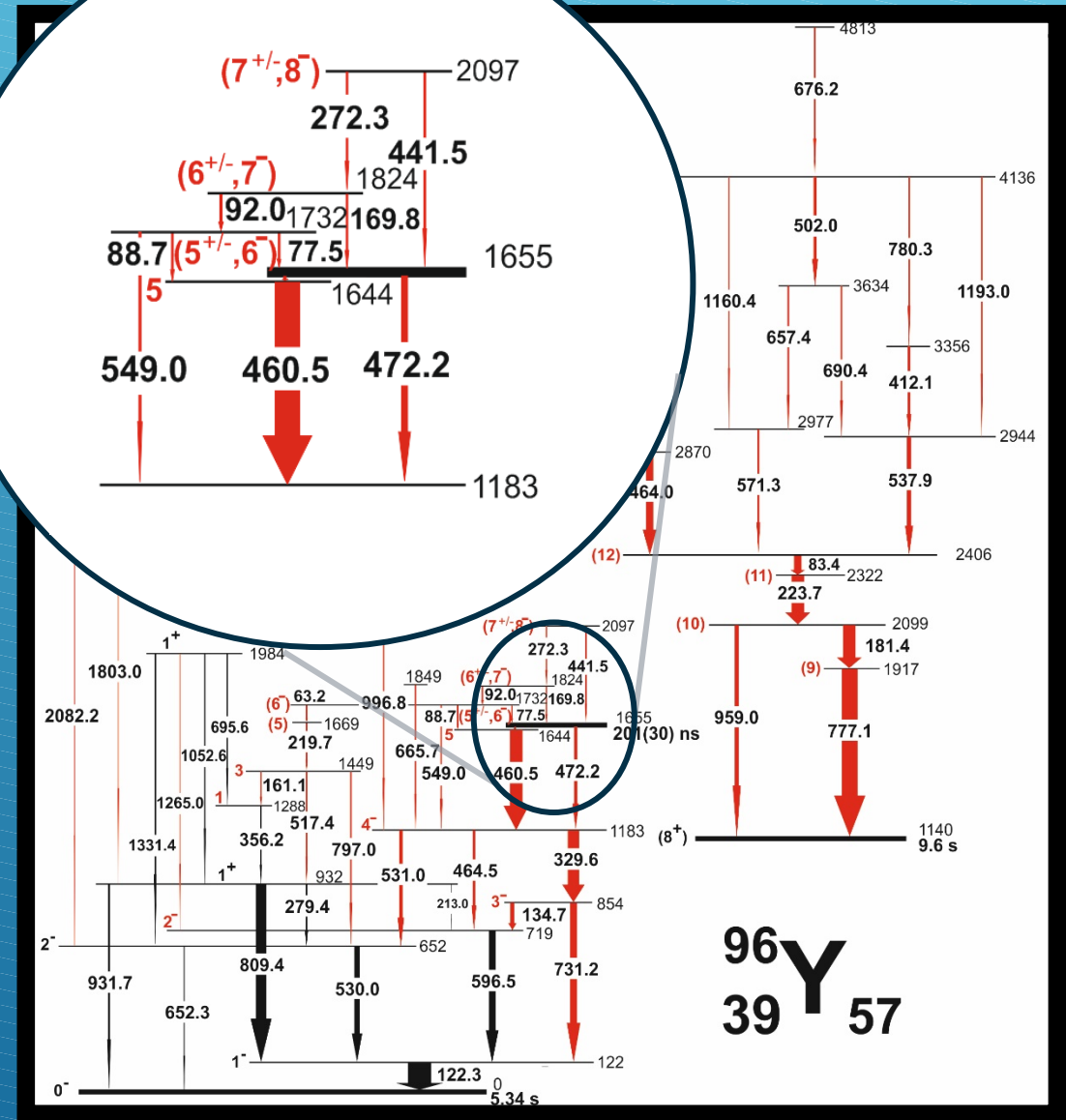
EXILL campaign – ILL (Grenoble)

- * Cold neutrons from ILL reactor induced fission of on ^{235}U and ^{241}Pu targets
- * 52 HPGe detectors (EXOGRAM + GASP) → gamma spectroscopy
- * HPGe + 16 LaBr₃ (FATIMA) → lifetime measurements

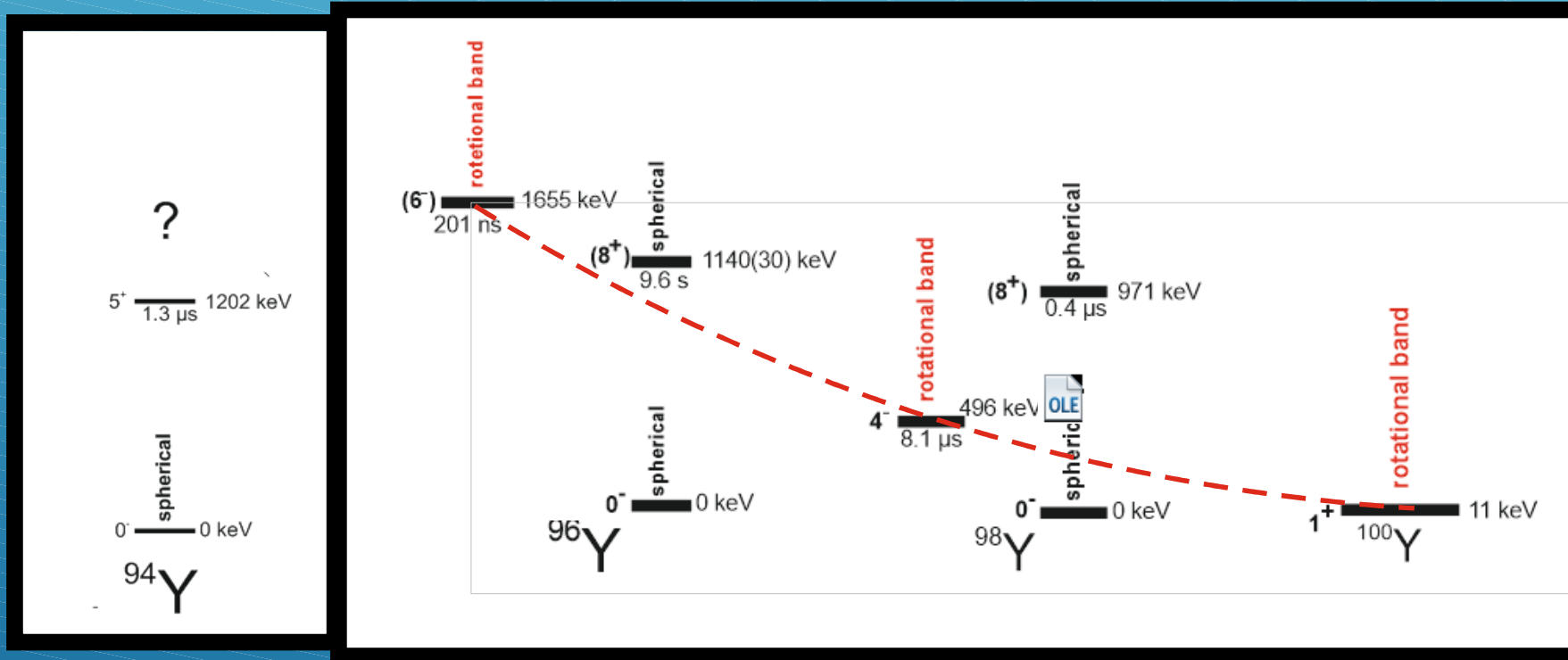




- * No connections with a spherical structure above 8+ isomer
- * Large retardation of the isomeric transition $\sim 10^{-4}$ W.u. - characteristic for the K or shape isomers
- * Theoretical calculation based on complex Excited (Vampir) model predicts the presence of a deformed 6- isomer as a bandhead of a rotational prolate structure
- * The structure above the isomer looks like a beginning of the rotational band

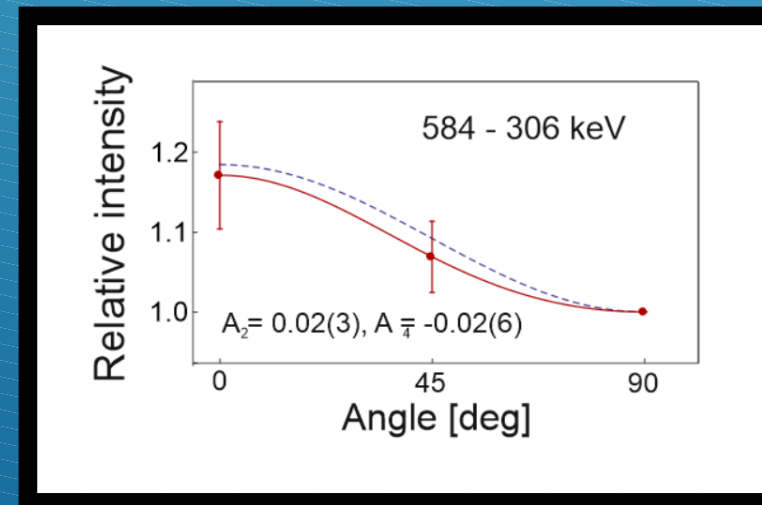
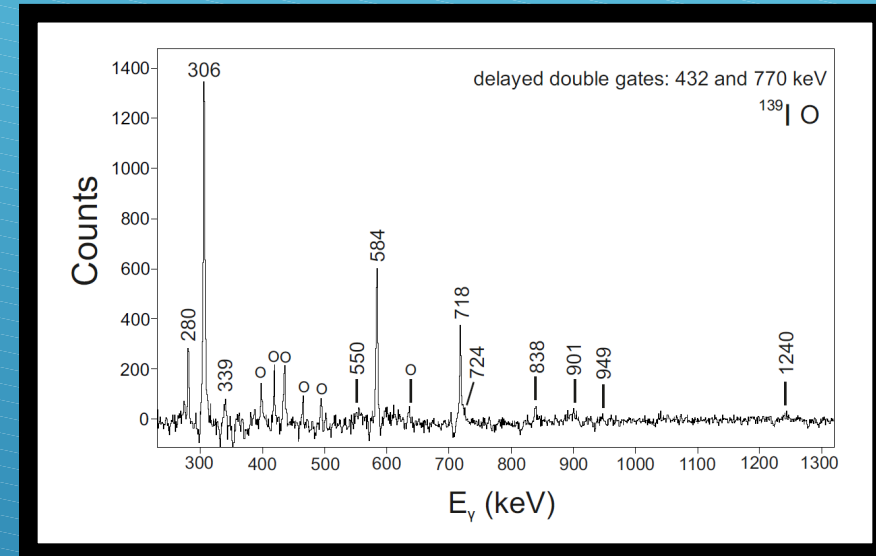
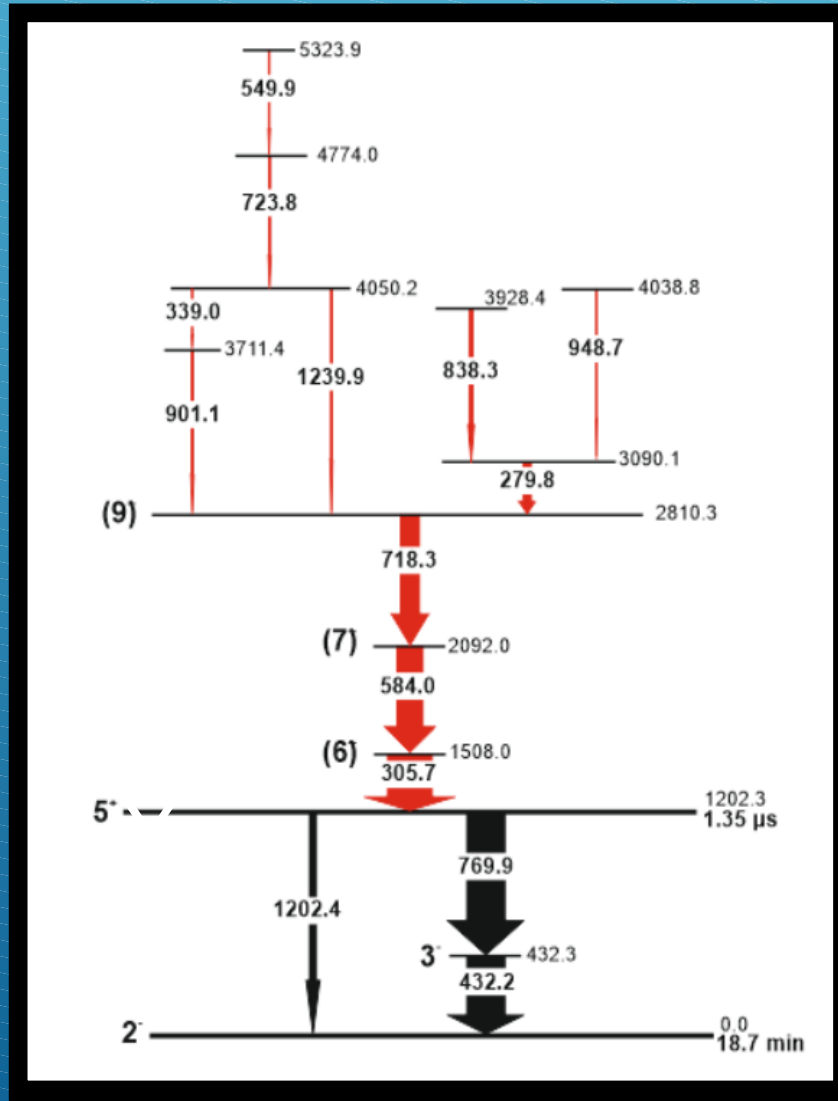


Shape evolution in the Y isotopic chain

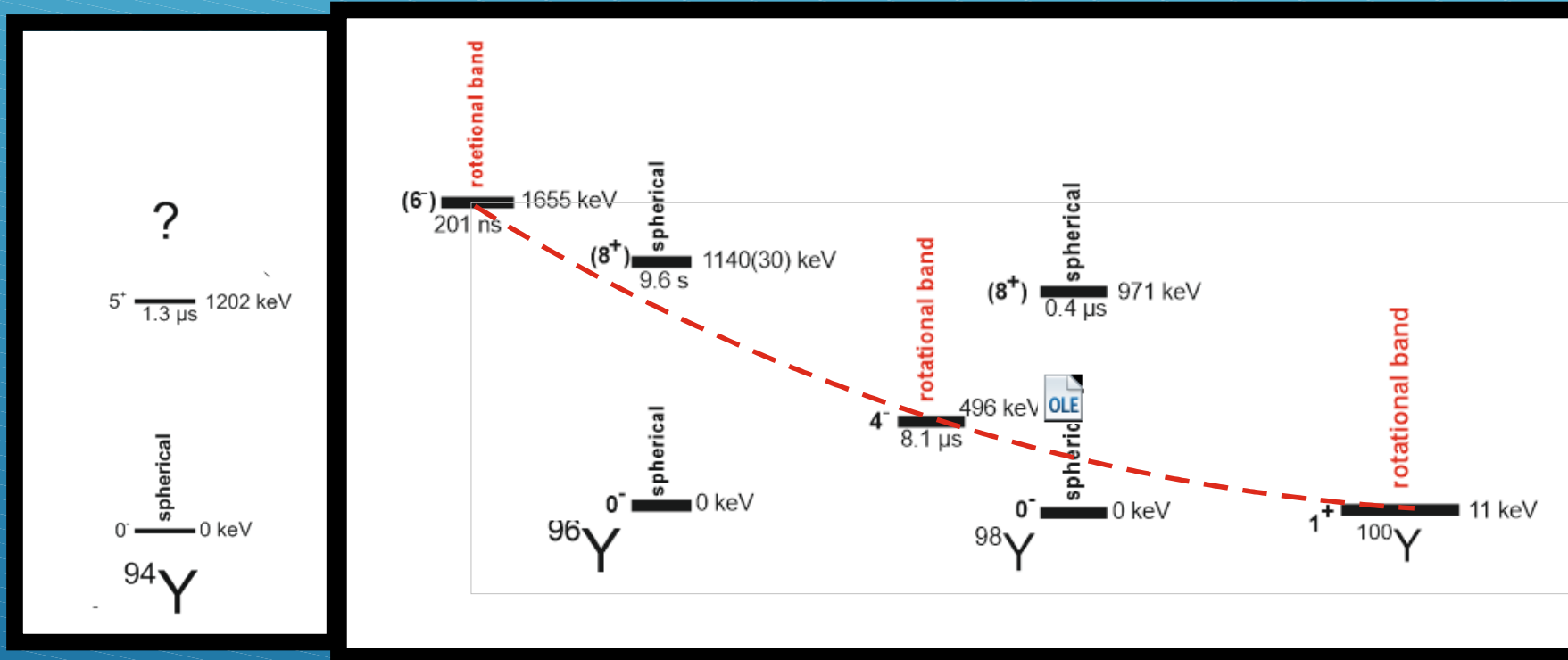


No sudden onset of deformation at $N = 60$ but gradually decrease in energy !?

Identification in the ^{94}Y isotope



Shape evolution in the Y isotopic chain



No sudden onset of deformation at $N = 60$ but gradually decrease in energy !?

Summary

Using the data from fission of ^{235}U and ^{241}Pu targets it was possible to identify over 50 new gamma transitions and 32 states in the $^{94,96}\text{Y}$ isotopes

Angular correlation analysis allowed to make spin-parity assignment for most of the identified levels

The analysis also revealed the presence of the new deformed isomeric state in the ^{96}Y as a bandhead of the possible rotational structure – first observation of the shape coexistence at $N = 57$

The recent results from the gamma spectroscopy study suggest that in the case of yttrium isotopic chain we observe smooth evolution of the deformation rather than sudden onset



Collaboration group

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(partial results)

Ł. W. Iskra *et al.*, EPL 117, 12001 (2017)

Ł. W. Iskra *et al.*, Acta Phys. Pol. B 48, 581 (2017)

Ł. W. Iskra *et al.*, Phys. Scripta, 92, 10 (2017)

**Thank you
for your attention**