

University of Sofia "St. Kliment Ohridski",
Sofia, Bulgaria

Joint ICTP-IAEA Workshop
on Nuclear Structure and Decay Data:
Theory and Evaluation,
Trieste, 2014



Fast-timing measurements with $\text{LaBr}_3:\text{Ce}$ detectors

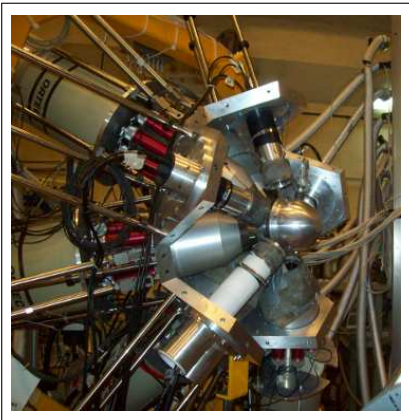
Stanimir Kisyov

27.03.2014

- 1 Experimental set-up for fast-timing measurements with LaBr₃:Ce
- 2 Measurements in ^{99,101,103}Ru

Experimental set-up for fast-timing measurements

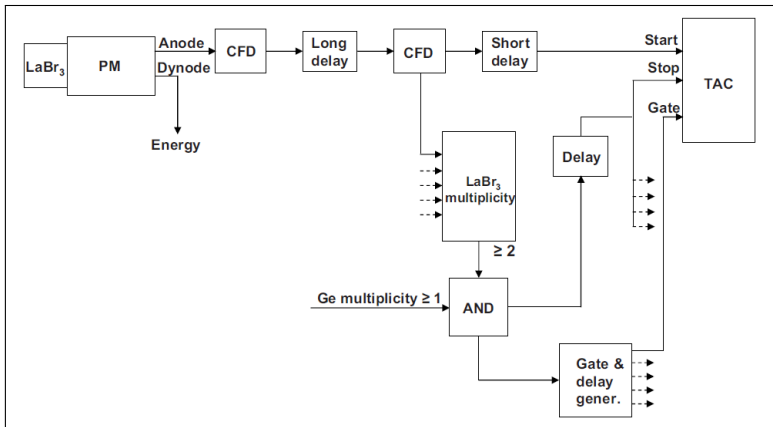
A mixed array of HPGe and $\text{LaBr}_3:\text{Ce}$ detectors was used for γ - spectroscopy (Bucharest, Romania).



RoSphere detector array

- 1 14 HPGe semiconductor detectors
- 2 11 $\text{LaBr}_3:\text{Ce}$ scintillation detectors

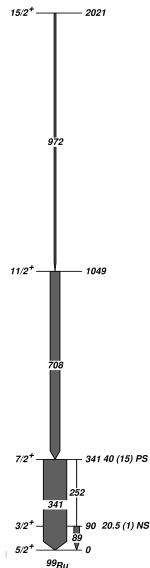
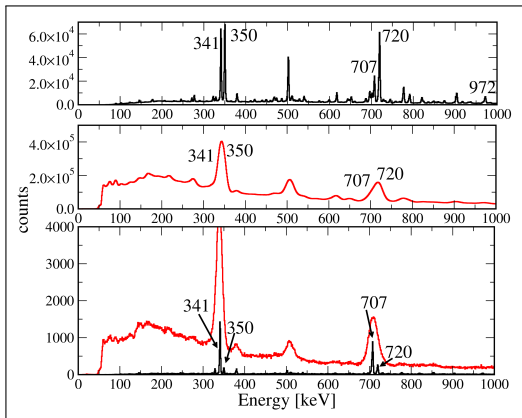
Experimental set-up for fast-timing measurements



N. Mărginean *et al.*, Eur. Phys. J. A 46, 329–336 (2010)

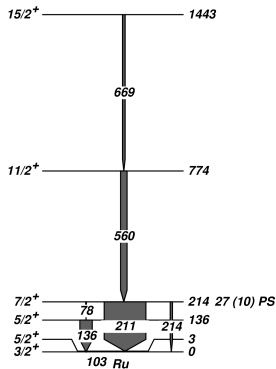
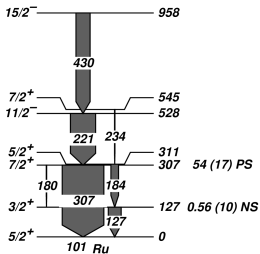
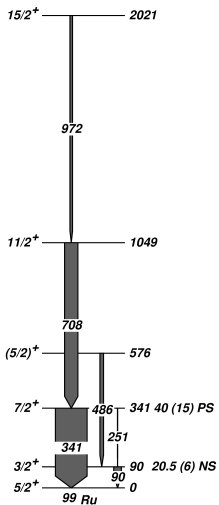
Energy spectra from ⁹⁶Mo(α , $n\gamma$)⁹⁹Ru

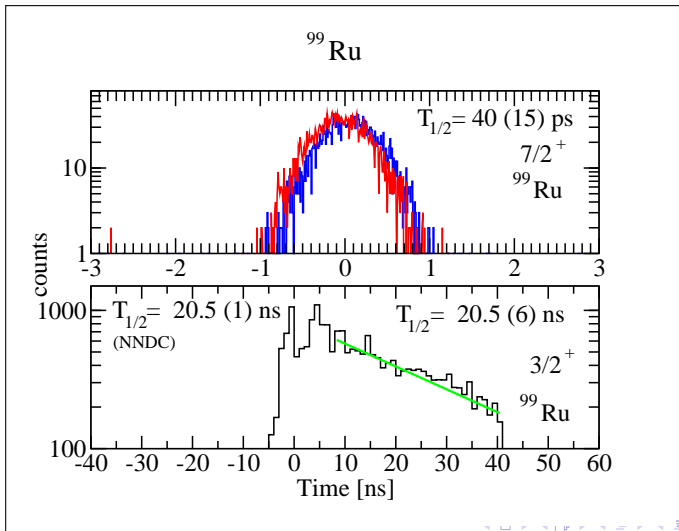
Applying an energy gate on HPGe detectors decreases the statistics in LaBr₃ spectra, but increases the peak-to-background ratio for the levels of interest.

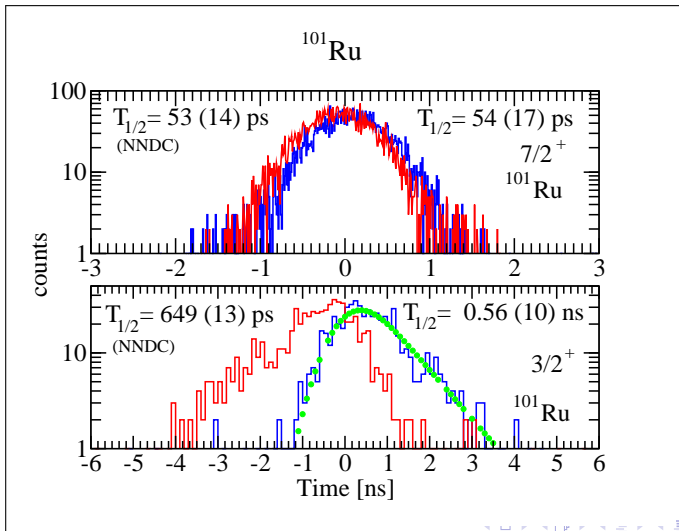


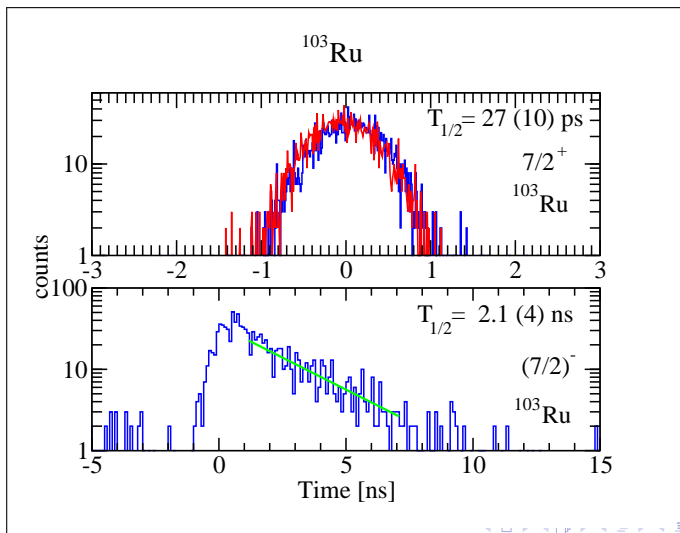
└ Measurements in ^{99,101,103}Ru

Low-lying states in ^{99,101,103}Ru



Half-lives of 7/2⁺ and 3/2⁺ in ⁹⁹Ru

Half-lives of 7/2⁺ and 3/2⁺ in ¹⁰¹Ru

Half-lives of $7/2^+$ and $(7/2)^-$ in ¹⁰³Ru

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Transition probabilities

B(M1) and B(E2) values for $7/2^+ \rightarrow 5/2^+$ transitions in $^{99,101,103}\text{Ru}$

Isotope	E_{level} [keV]	E_γ [keV]	$T_{1/2}$ [ps]	B(M1) [W.u.]	B(E2) [W.u.]
^{99}Ru	341	341	40 (15)	0.014 (6)	0.04 (3)
^{101}Ru	307	307	54 (17)	0.014 (5)	1.4 (14)
^{103}Ru	214	211	27 (10)

B(M1) and B(E2) values for $3/2^+ \rightarrow 5/2^+$ transitions in $^{99,101}\text{Ru}$

Isotope	E_{level} [keV]	E_γ [keV]	$T_{1/2}$ [ns]	B(M1) [W.u.]	B(E2) [W.u.]
^{99}Ru	90	90	20.5 (6)	0.000180 (12)	52 (4)
^{101}Ru	127	127	0.56 (10)	0.019 (4)	23 (5)