Fast TIMING

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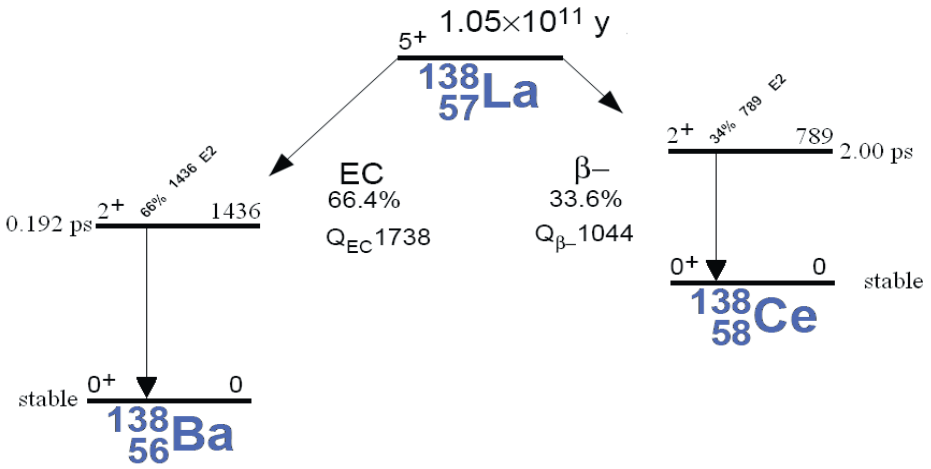
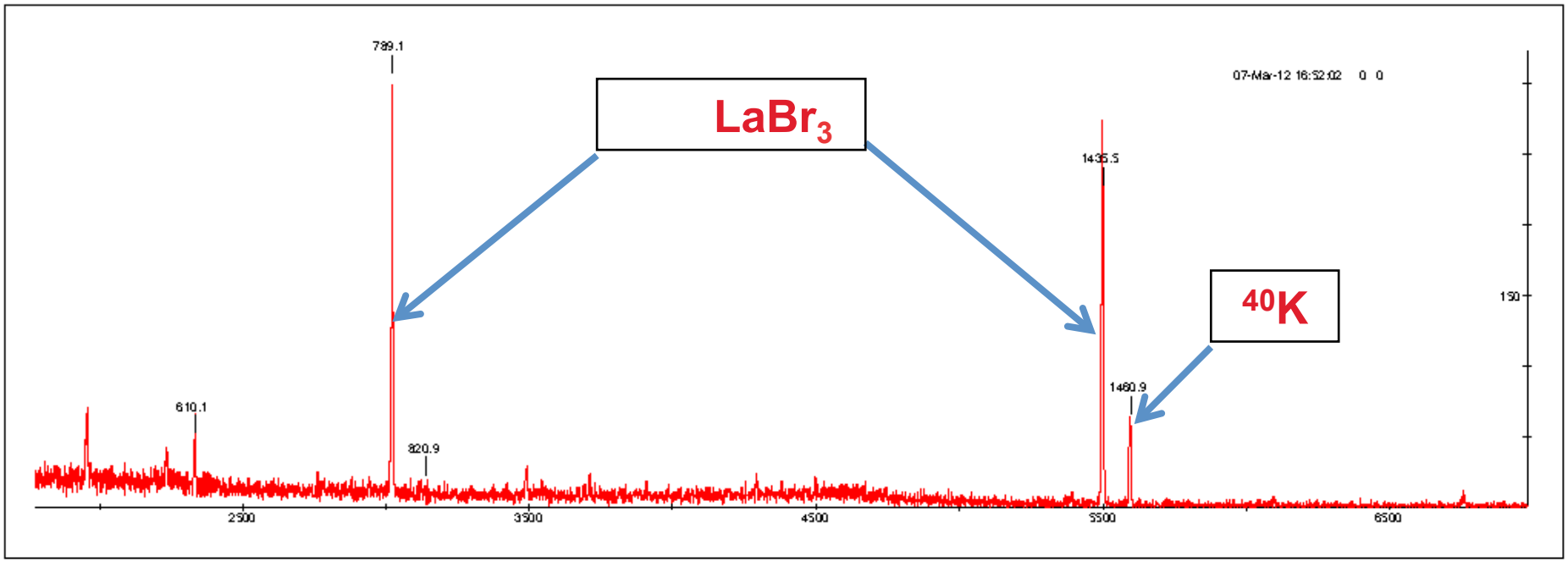
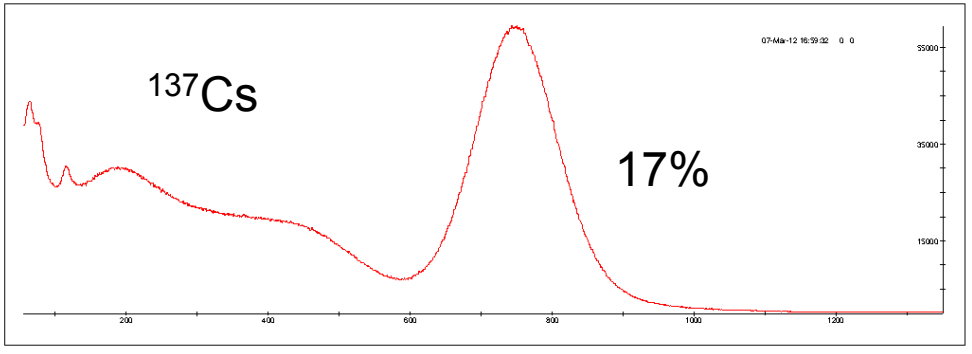
$LaBr_3$ DETECTOR – Saint Gobain Crystals – BrilLanCe 380

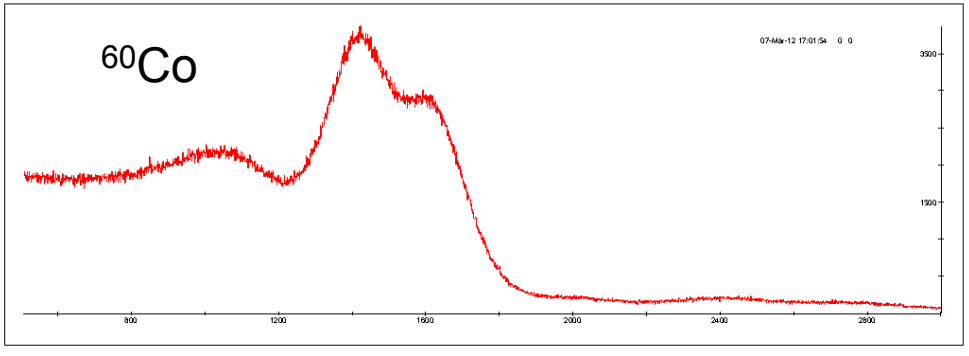




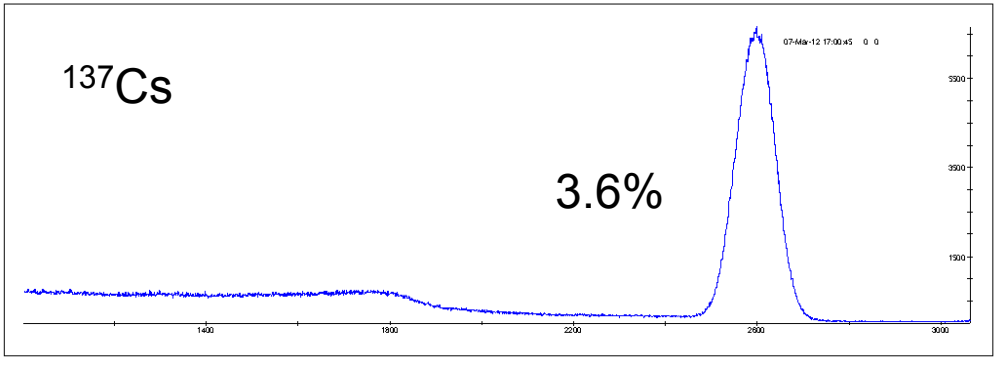
COMPARISON BETWEEN TWO DIFFERENT SCINTILATORS

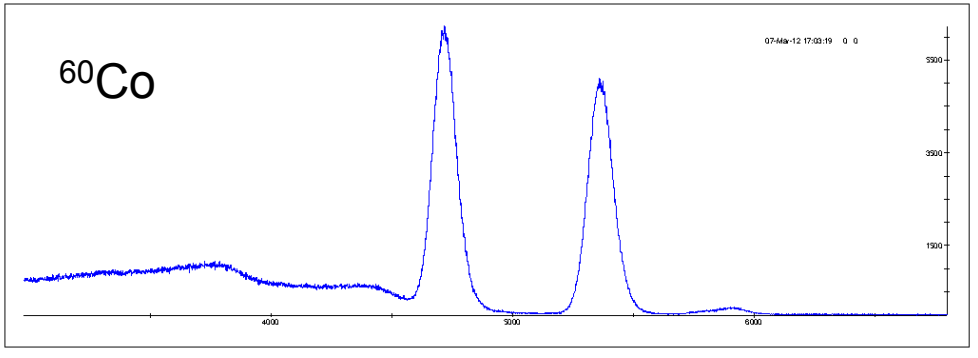
BaF_2





$LaBr_3$





SCHEDULE

PREPARING THE EXPERIMENTAL SETUP CALIBRATE THE ENERGY

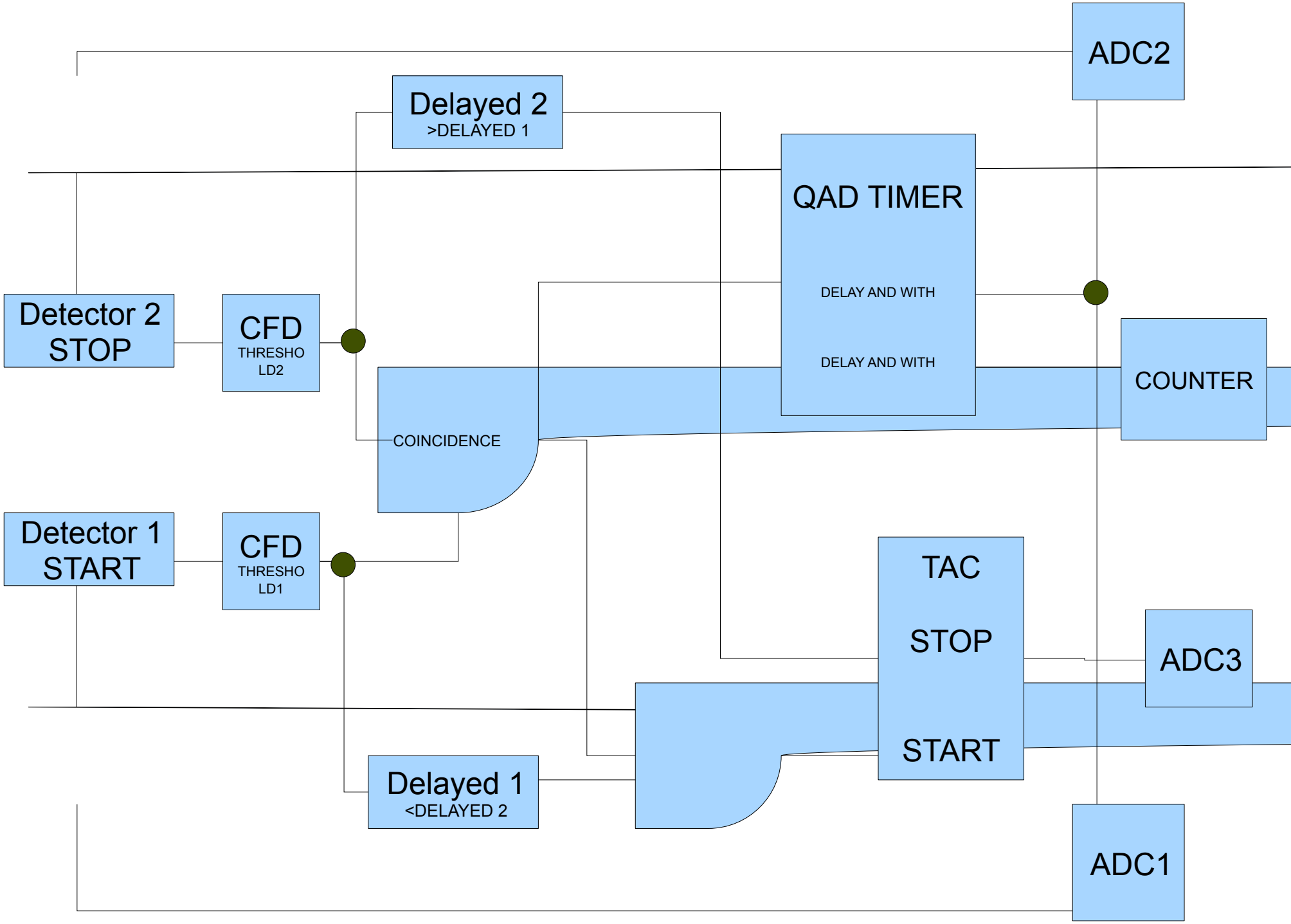
- Use ^{60}Co
- Use ^{152}Eu

TESTING THE TIME RESOLUTION

- Use ^{60}Co, instantaneus signal

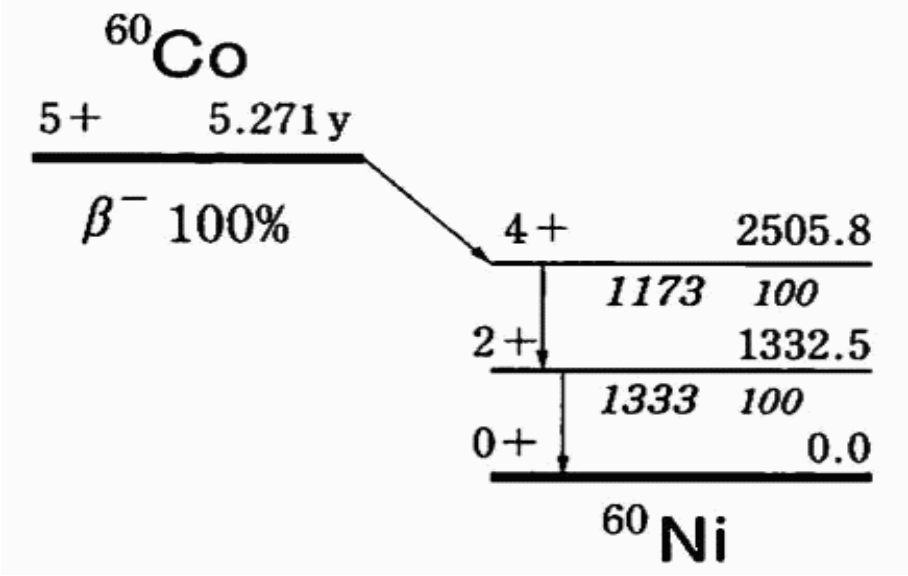
MAKE TIME MEASUREMENTS USING ^{152}Eu

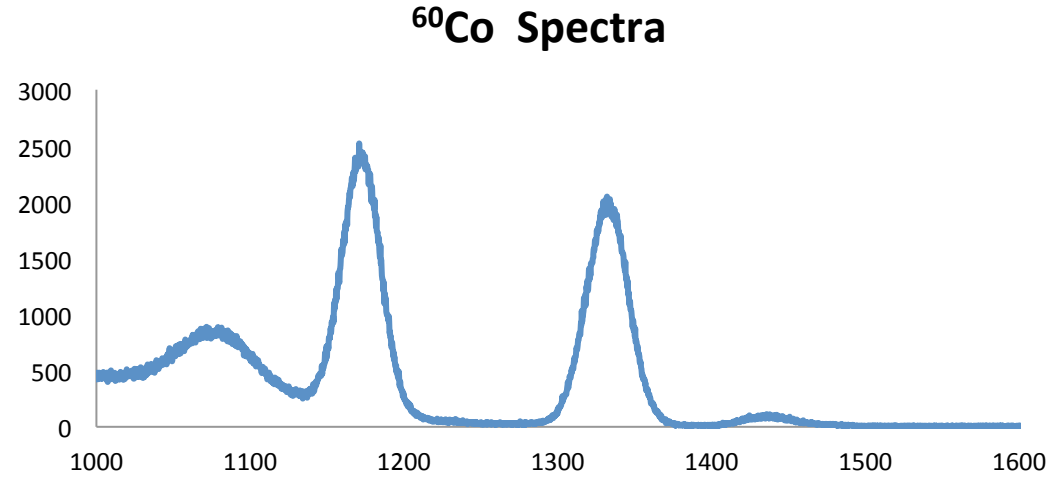
- First Start Signal
- Second Start Signal


ADC2
Delayed 2
>DELAYED 1
QAD TIMER
DELAY AND WITH
DELAY AND WITH
Detector 2
STOP
CFD
THRESHO
LD2
COINCIDENCE
COUNTER
Detector 1
START
CFD
THRESHO
LD1
TAC
STOP
START
ADC3
Delayed 1
<DELAYED 2
ADC1

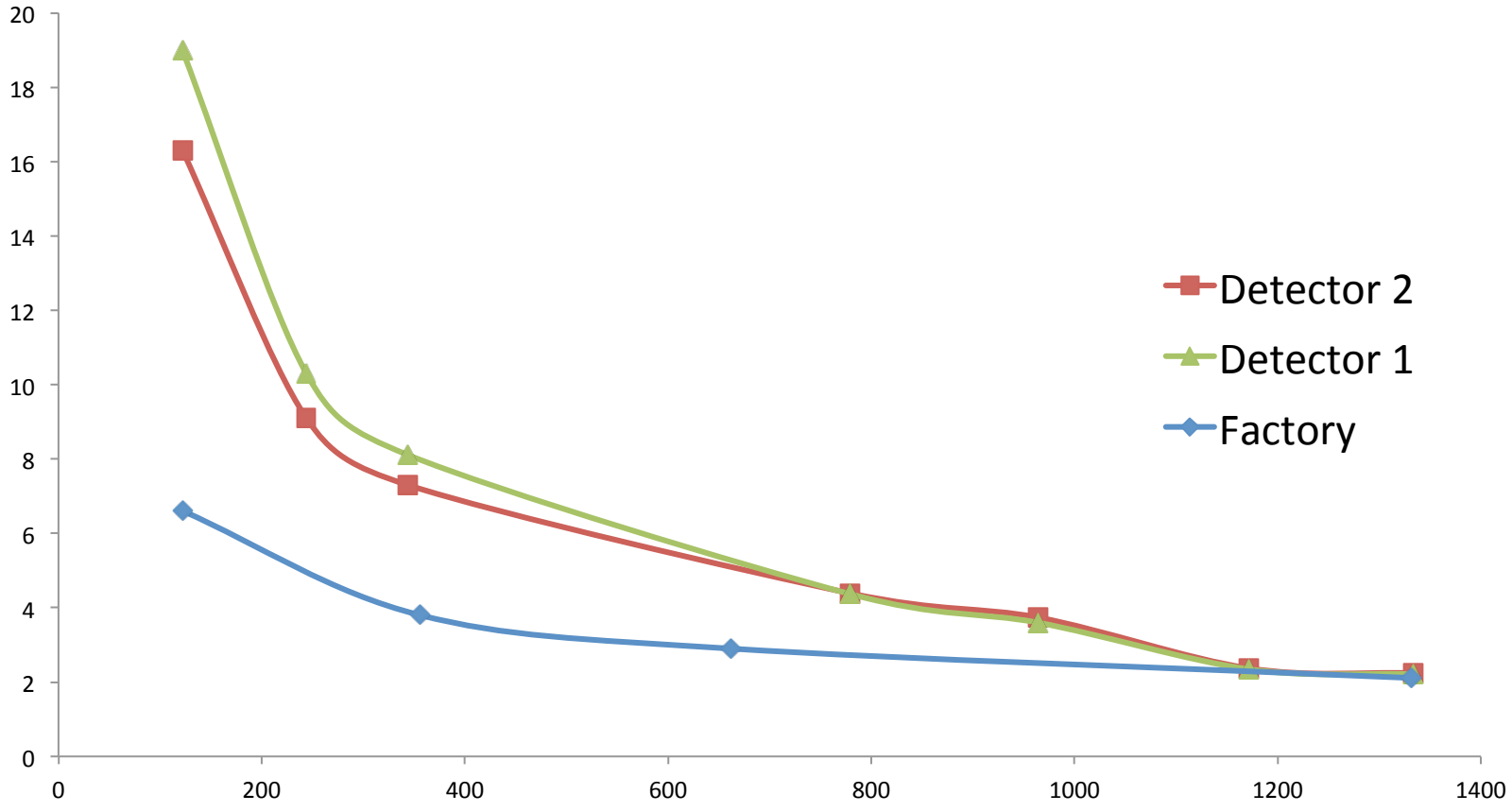
ENERGY CALIBRATION

^{60}Co



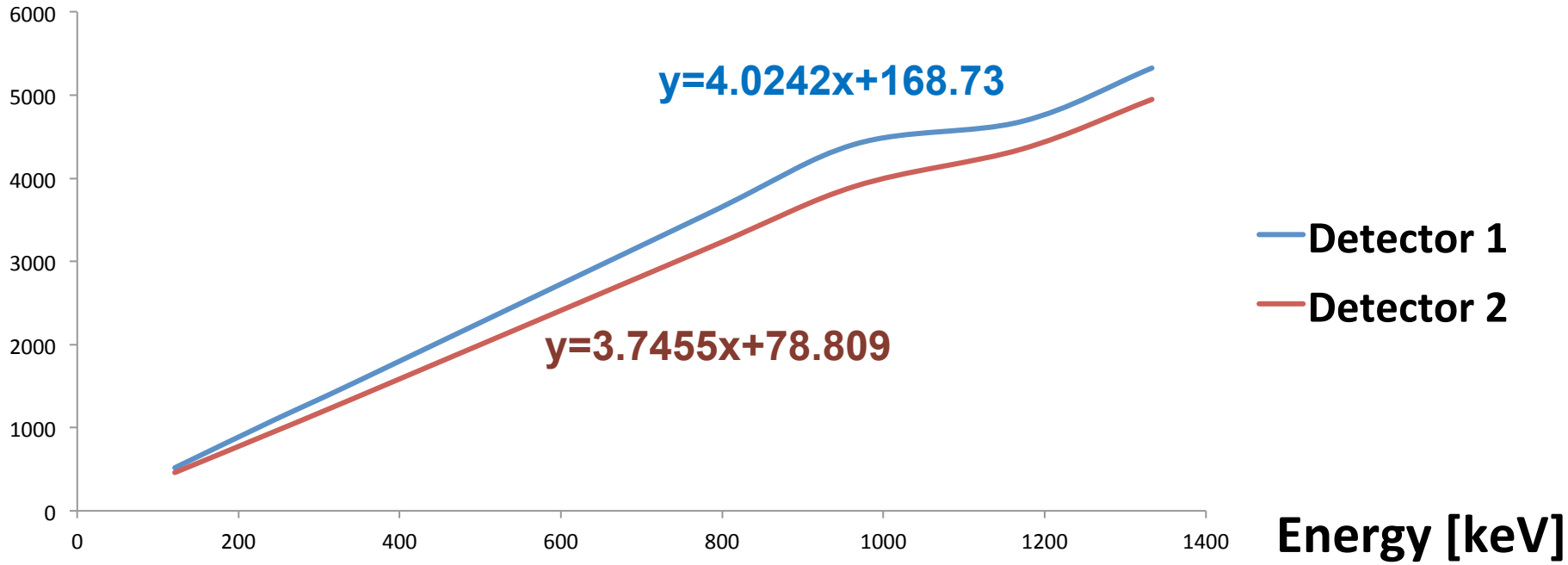


ENERGY RESOLUTION USING ^{60}Co and ^{152}Eu

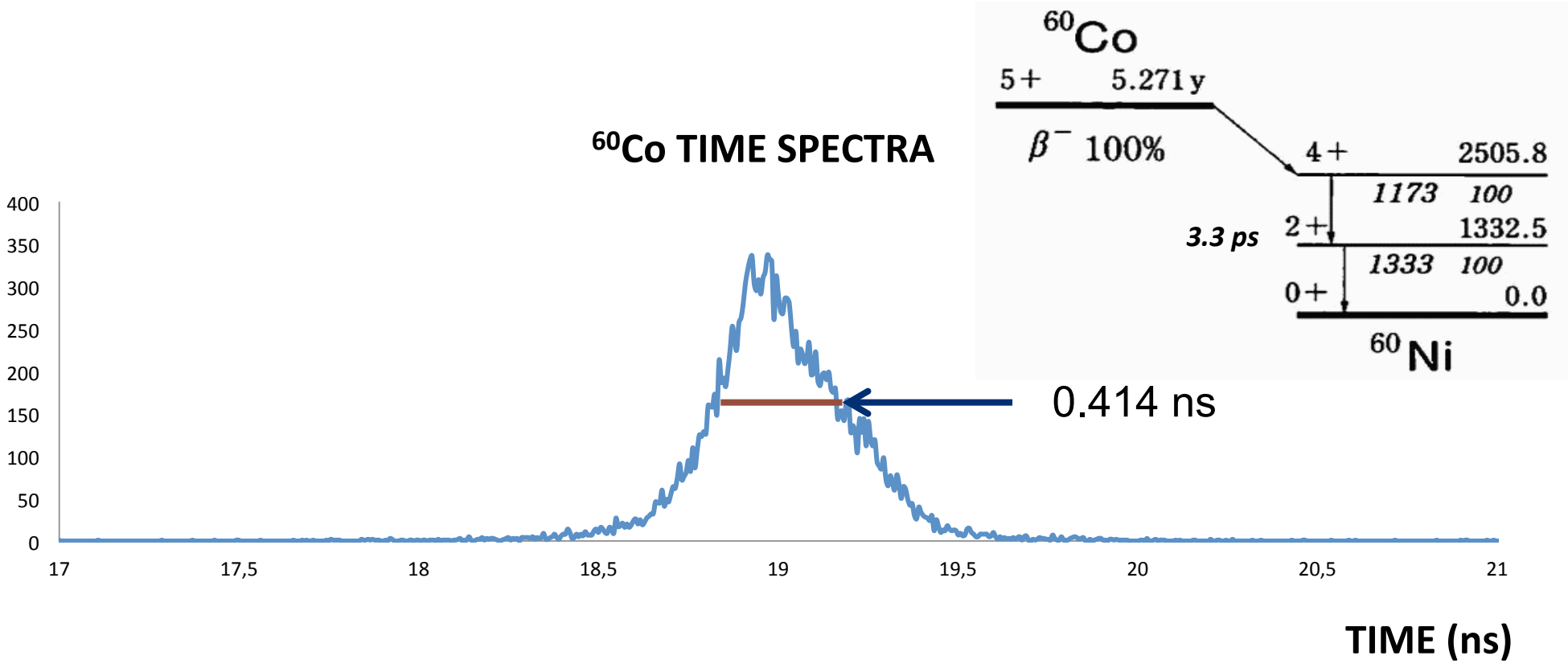


ENERGY CALIBRATION AND LINEARITY

^{60}Co and ^{152}Eu



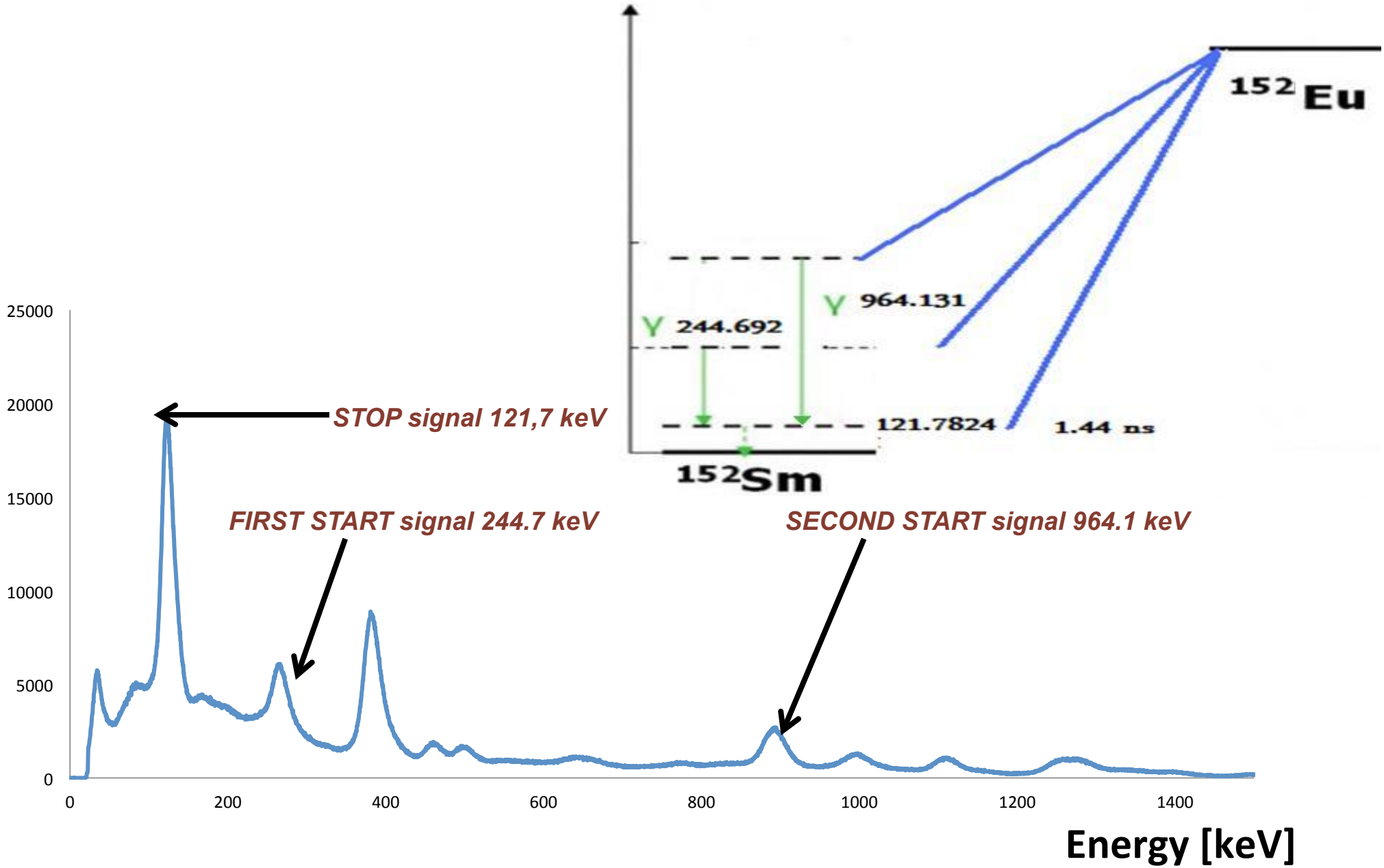
TIMING CALIBRATION USING ^{60}Co



Fitting with a gaussian

- Width is related to time resolution.
- Factory time resolution is 0.45 ns for $LaBr_3$ detector

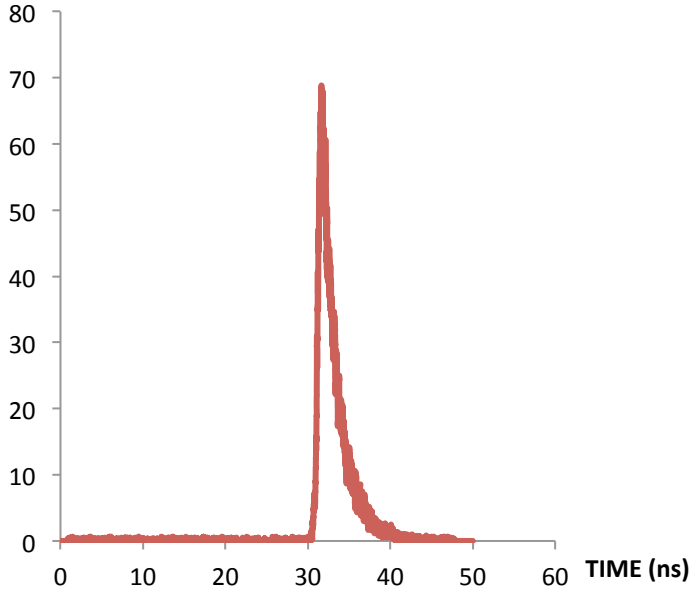
MEASUREMENTS USING ^{152}Eu SOURCE

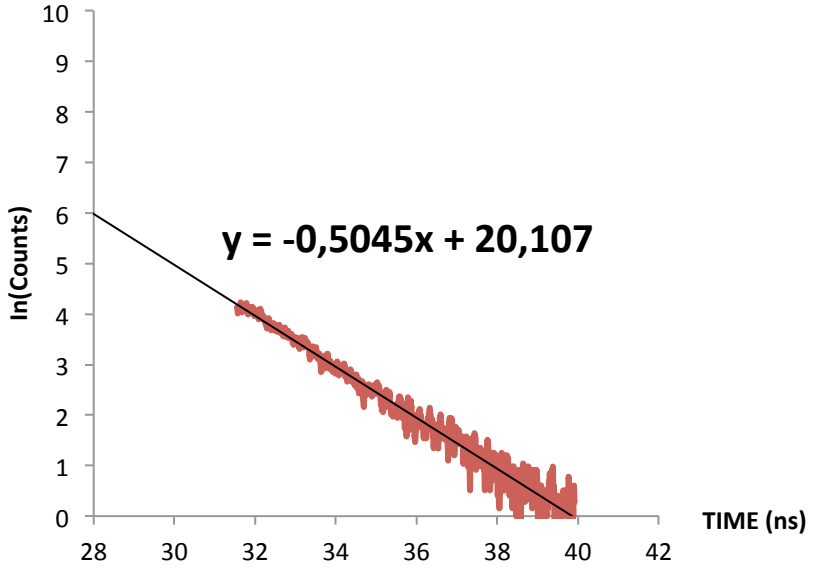


We performed two experiments: two start transitions

TIMING MEASUREMENT

^{152}Eu (964 keV Start)





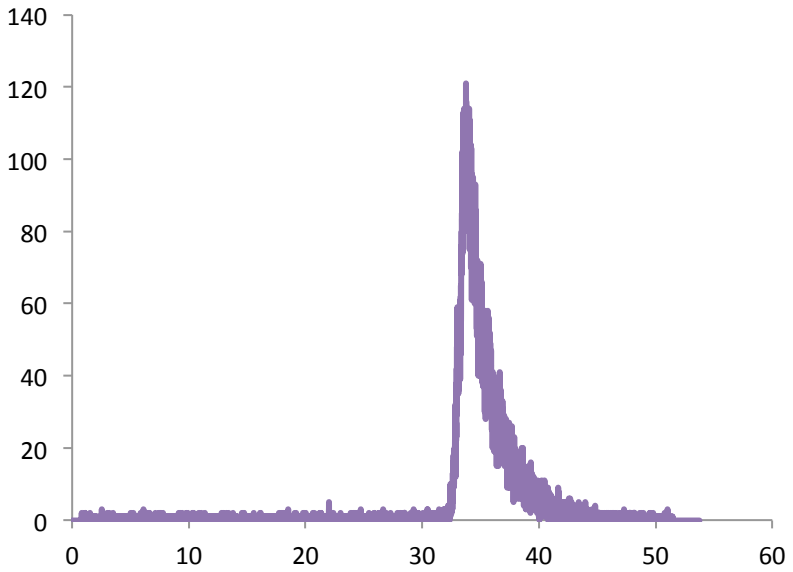
$N=N_0e^{-\lambda*t}$ → $lnN=lnN_0-\lambda t$ → $lnN=-\lambda t+lnN_0$

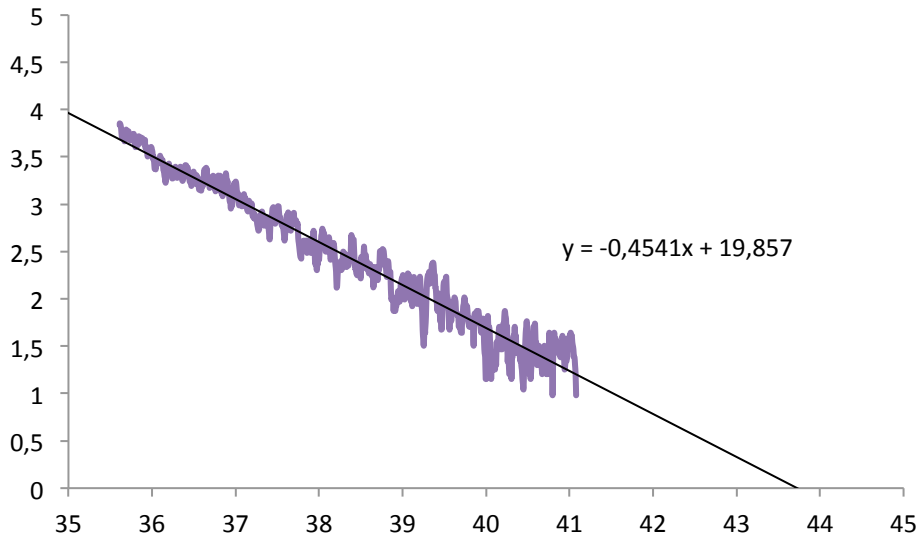
$lnN=-\lambda t+lnN_0$ → $y=a*t+b$ → $a=-\lambda`$

LITERATURE LIFE TIME=1.44 ns ***LIFE TIME OBTAINED=1.37 ns***

TIMING MEASUREMENT

^{152}Eu (244 keV Start)





LITERATURE LIFE TIME=1.44 ns ***LIFE TIME OBTAINED=1.52ns***

Mean Value = (1,52+1,37)/2=1.44 ns

Variance = 0.11 ns

THANK YOU FOR YOUR ATTENTION