Decay-out of the oblate, triaxial and HD bands in ^{136,137}Nd

Orsay, IJClab – C. Petrache, A. Astier, P. Jodidar, A. Korichi

Lanzhou, IMP – B.F. Lv, F. F. Zeng, K. K. Zheng, S. Guo

Liverpool – C. Sullivan, F. Holloway, A. Briscoe

Lyon, I2pI – J. Dudouet, O. Stezowski

Strasbourg, IPHC – G. Duchêne

Padova – D. Mengoni et al

Legnaro, LNL – J. Valiente-Dobon et al

Jyväskylä,JYFL – J. Uusitalo et al

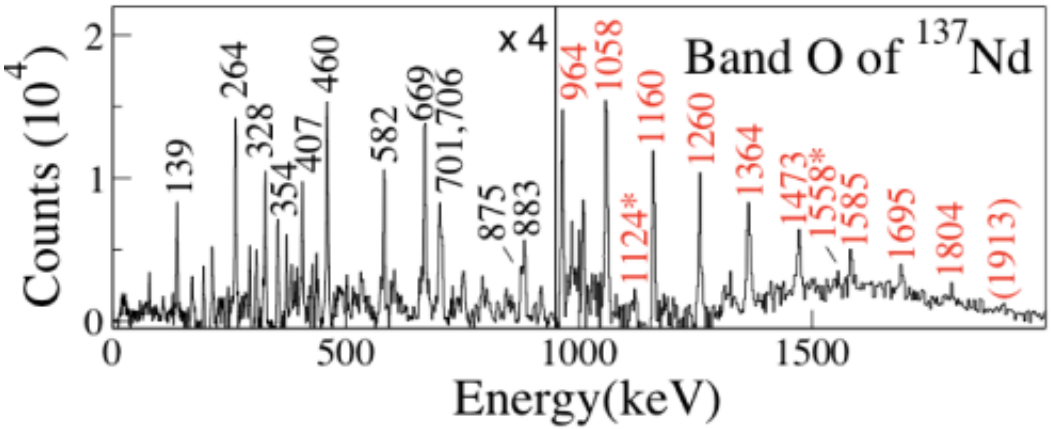
Vancouver,TRIUMF – C. Andreoiu et al

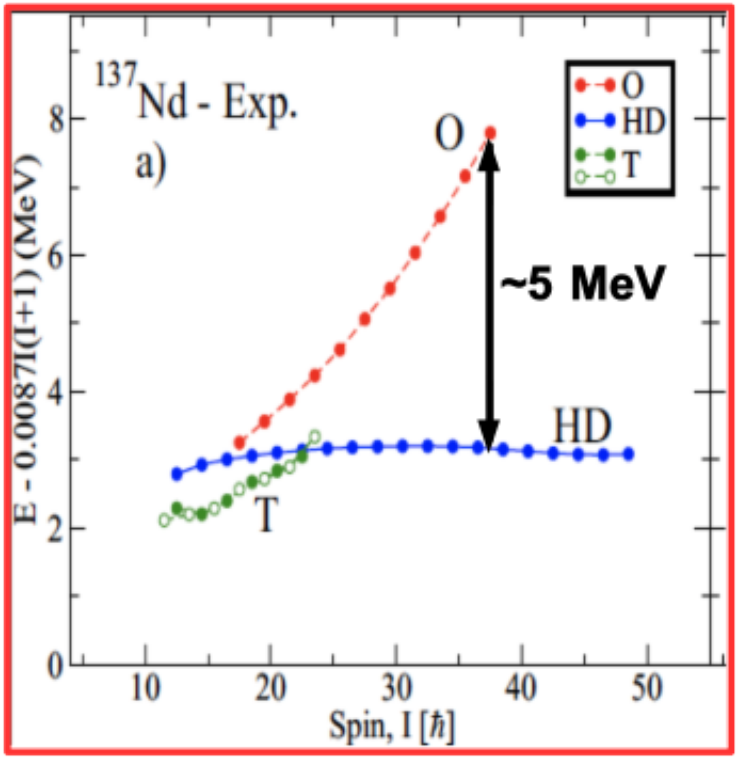
Warsaw, HIL – K. Hadynska-Klek et al

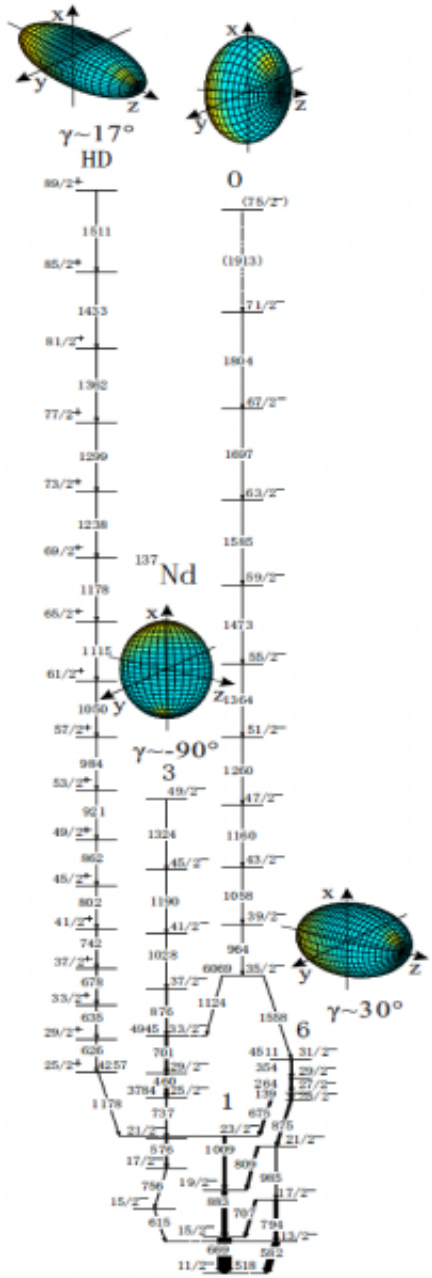
Krakow, IFJ PAN – P. Bednarczyk et al

Debrecen, INR – A. Krako, B. Kruzsicz, I. Kuti,B. Nyako, D. Sohler, J. Timar

Oblate rotation at very high spins : survival in the see of chaos!







AGATA Data Analysis at IMP Lanzhou

Fanfei Zeng, Bingfeng Lv, Kuankuan Zheng

Experimental setup

LNL, Italy

Beam： ^{33}S @ 170 MeV

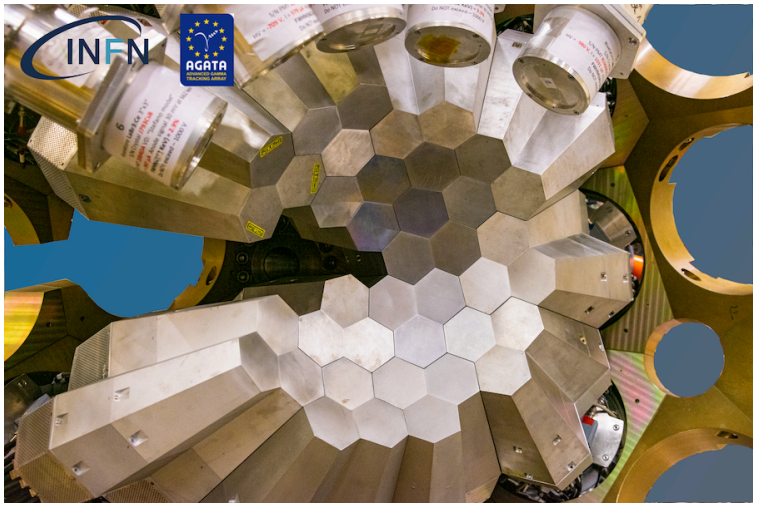
Target: ^{110}Pd, ~ 2 mg/cm^2

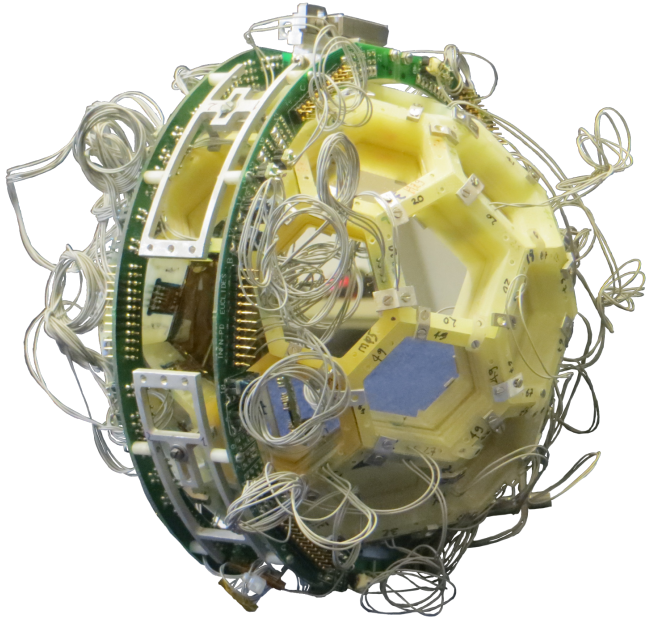
Detector Setup:

AGATA

EUCLIDES

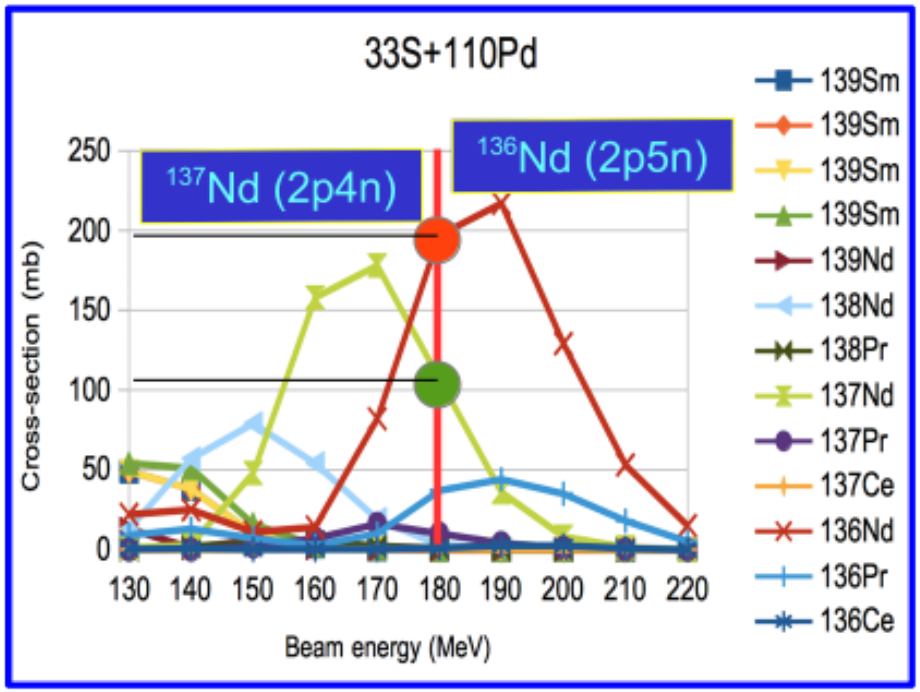
LABR



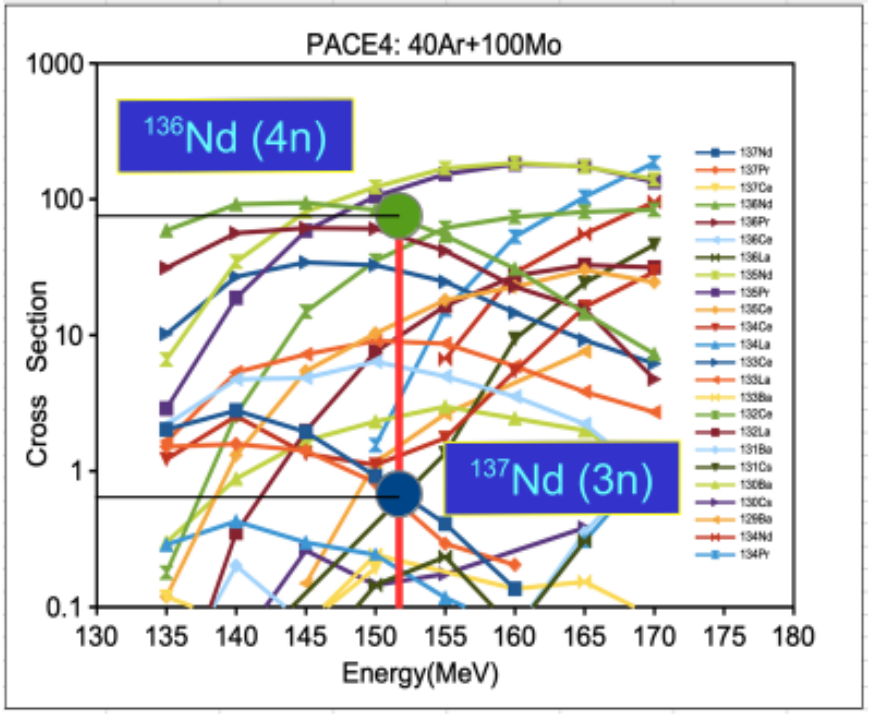


$I_{AGATA}/I_{JYFL} = 1.5 \times 10^3$ due to higher σ and ε_{AGATA}

$^{33}S+^{110}Pd$ (2pxn) AGATA



$^{40}Ar+^{100}Mo$ (xn) JUROGAM



Statistics estimation

I_{beam} = 5 pnA → 1 pnA

$Thickness_{target}$ = 1 mg/cm^2 → 2 mg/cm^2

σ (2p4n or 2p5n)= 100 mb

Beam time= 7 days → 3 days

I_{band} =1%

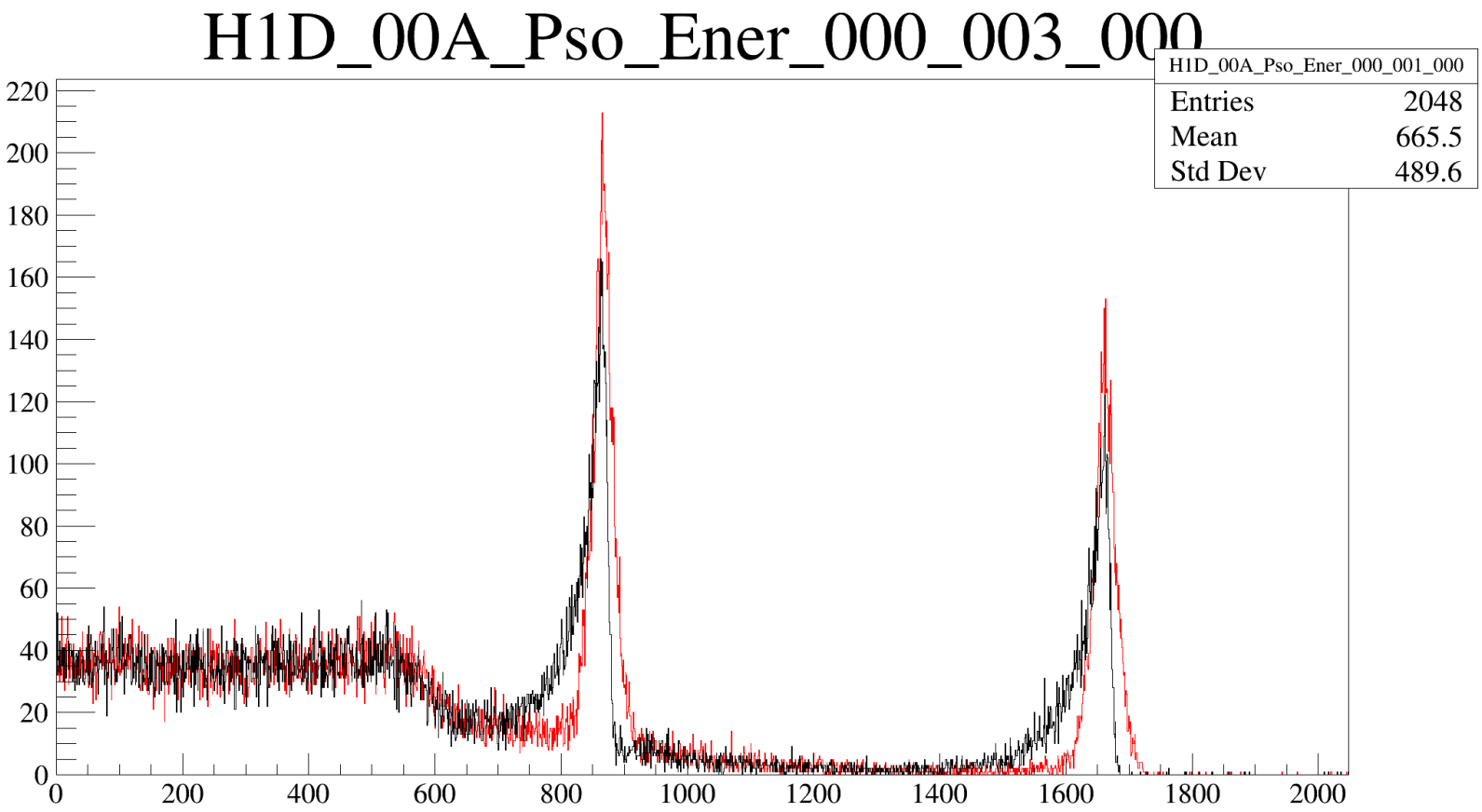
ε_{AGATA}(1 MeV)= 8%(nominal)÷10% (close)

M_{γ} =15

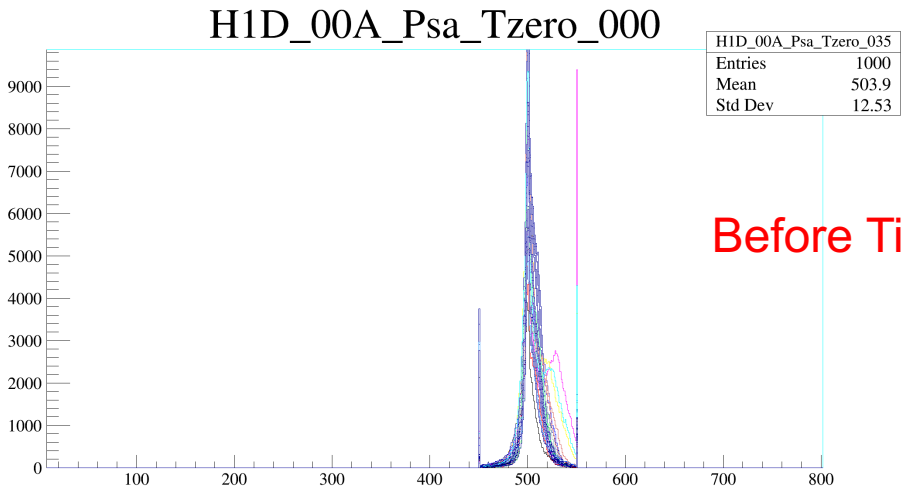
I_{AGATA}/I_{JYFL} = 1500÷3000 (w/o EUCLIDES)

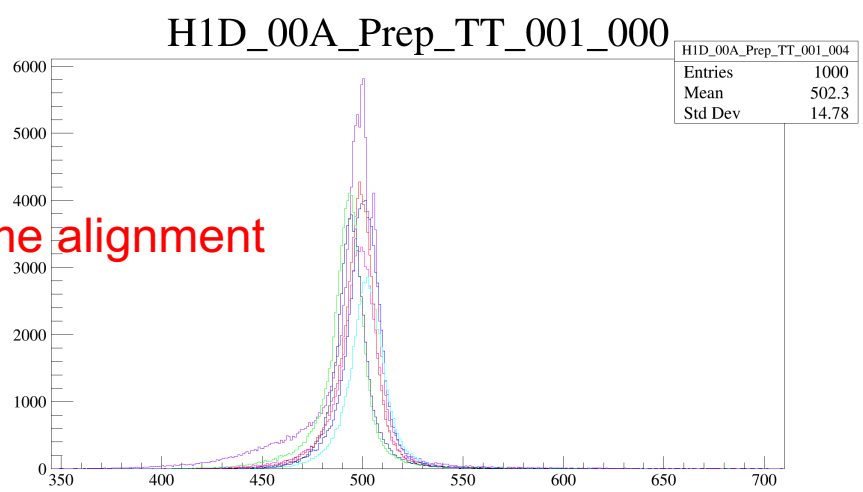
I_{AGATA}/I_{JYFL} = 540÷1080 (with EUCLIDES)

Check Neutron Damage Correction

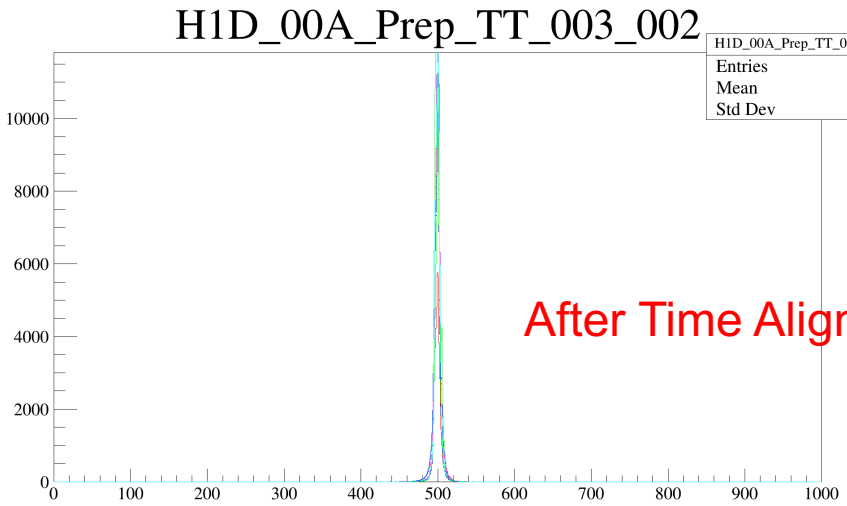


Check TT



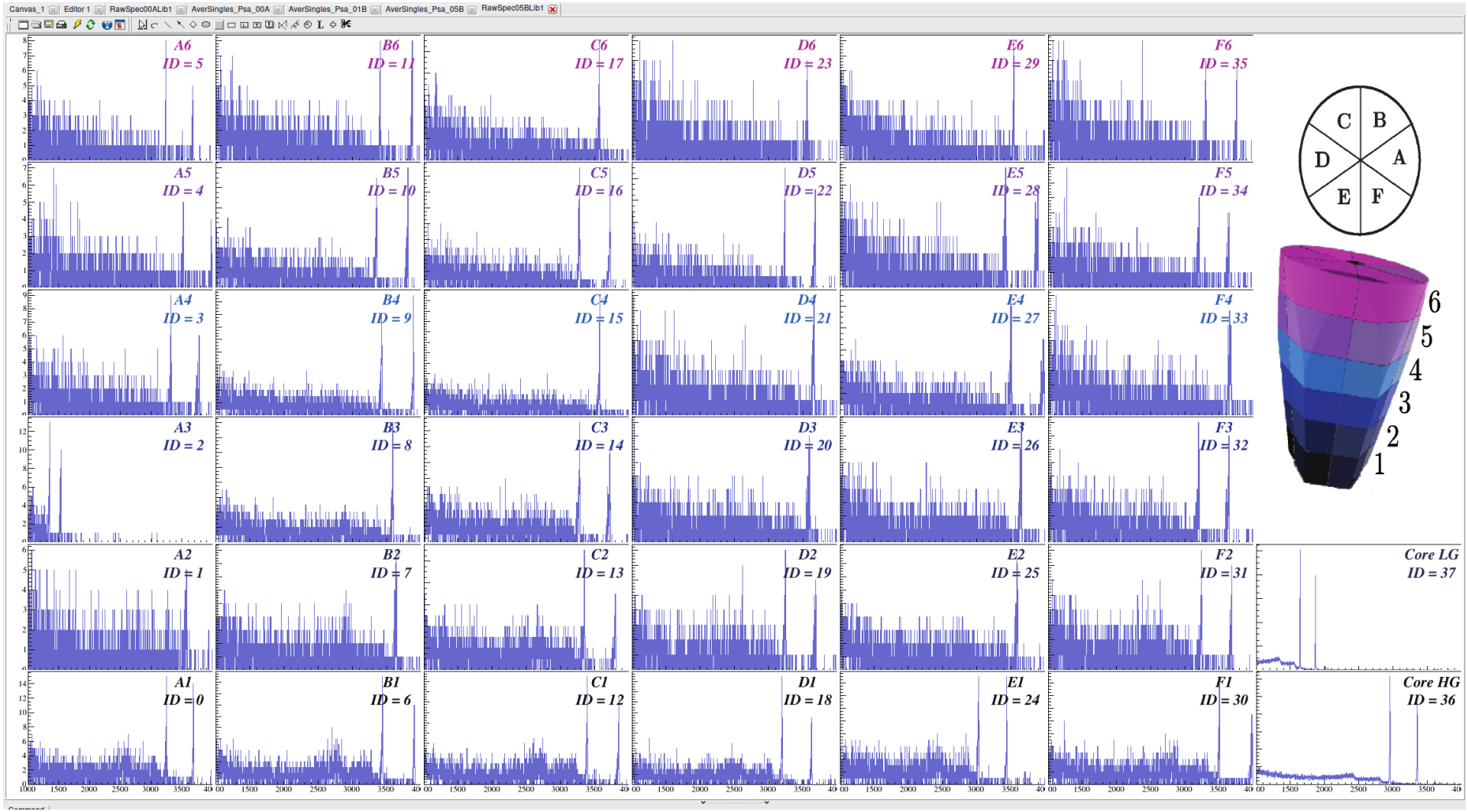


Before Time alignment

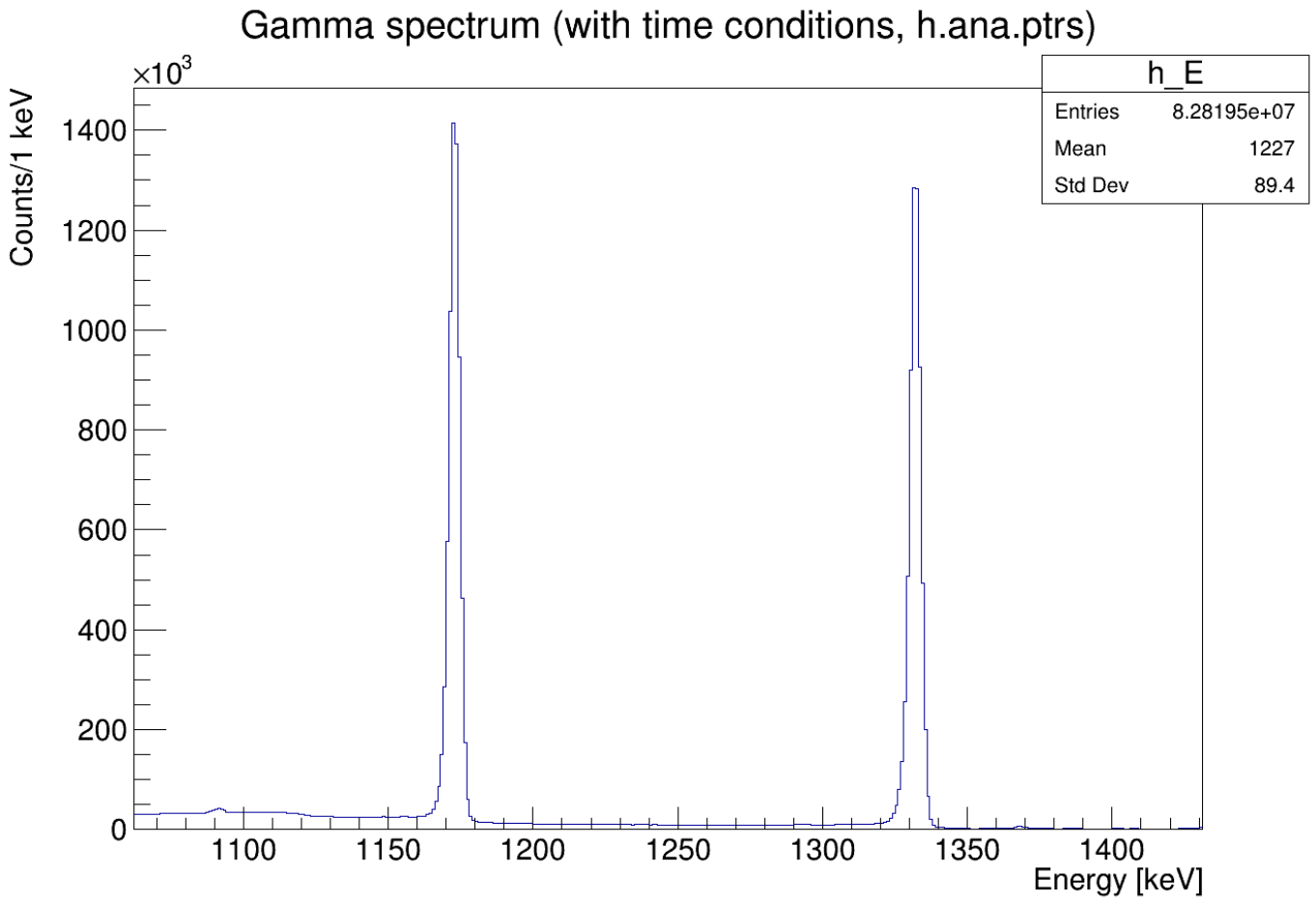


After Time Alignment

Check Calibration



Check Calibration



Tracking

```
TrackingFilter=(
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"EnergyGain             4",
#"ExcludeTracking",
"OftParams            0.05 0.02 1.0 1",
#"OftParams            0.05 0.02 0.8 1",
#"MgtParams            0
#"oftMinProbTrack       0.05",
#"oftSigmaTheta         0.8",
#"oftClusterRedFactr    1",
#"oftFixedAngle         0",
"SourcePosition         0 0 0",
"DiscardEmpty           0",
```
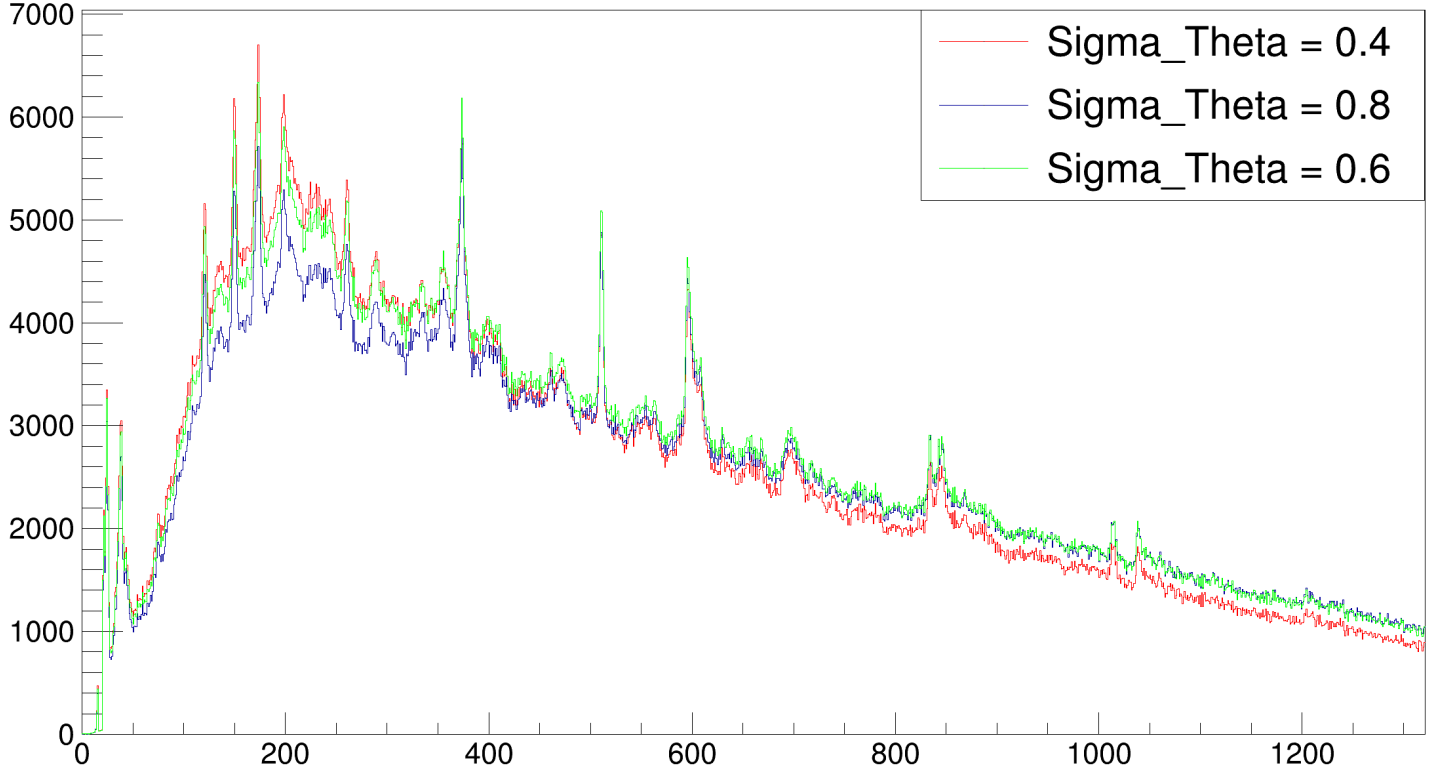
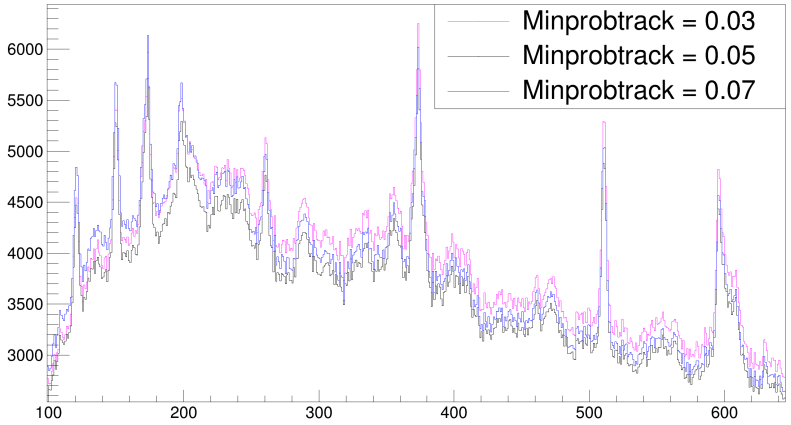

Tracking parameters

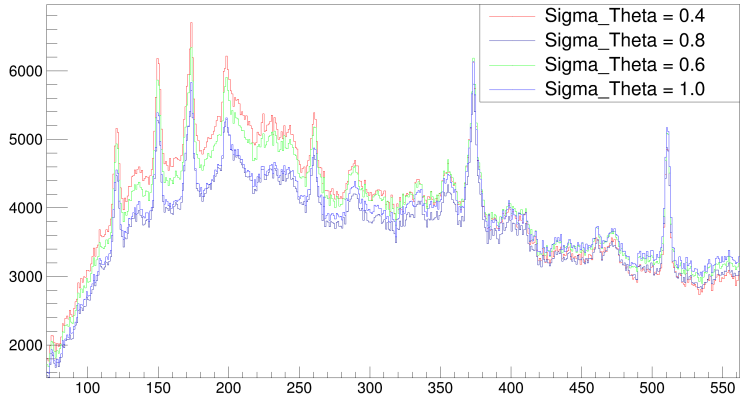


Tracking

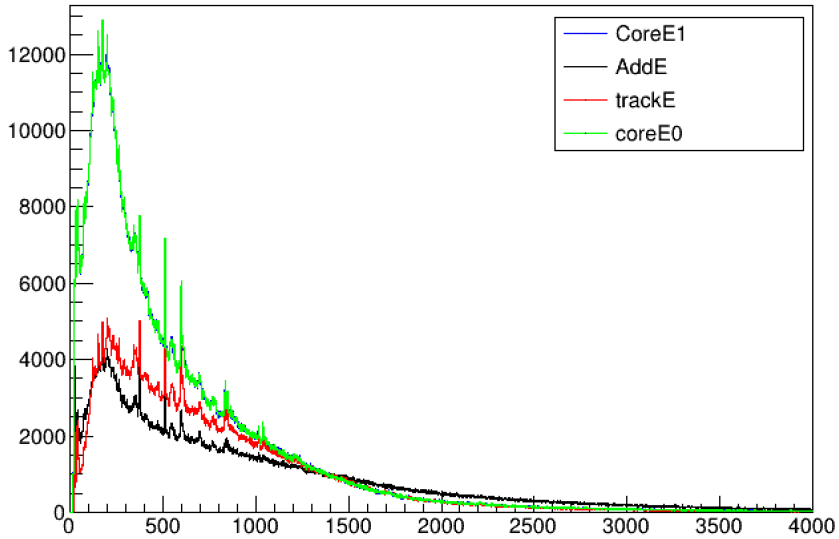
OftMinProbTrack	0.05	minprobtrack (default: 0.05) ⇦ FoM threshold
OftSigmaThetha	0.8	sigma_thet (default: 0.8) ⇦ Position uncertainty (cm)
OftClustRedFact	1	cluster_max_angle_reduction_factor (default: 1-> no reduction)
OftFixedAngle	0	fixed openning angle (default: 0 -> variable opening angle) ⇦ in rad

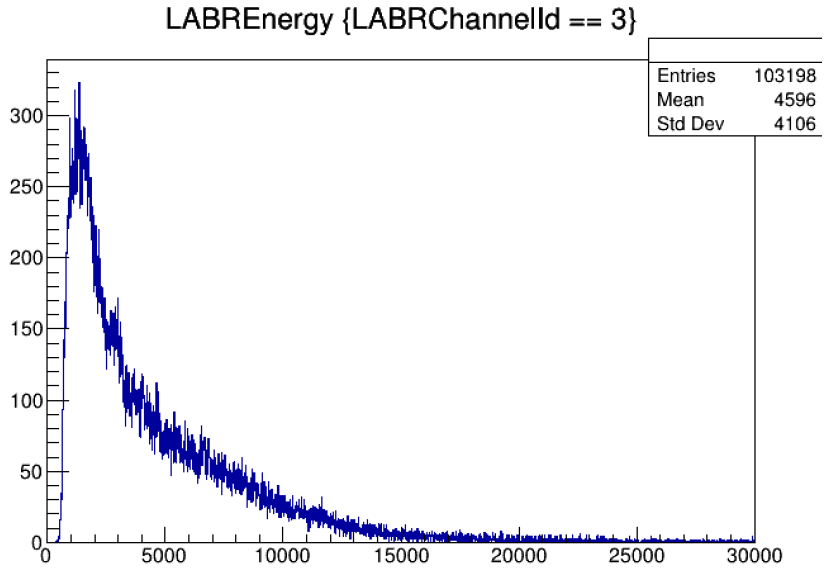
Sigma-theta=0.8 is best

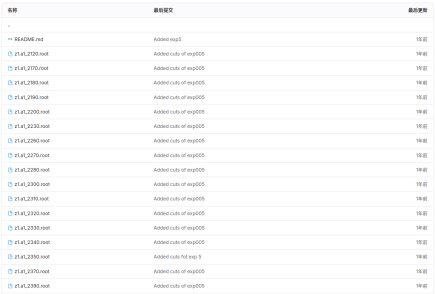


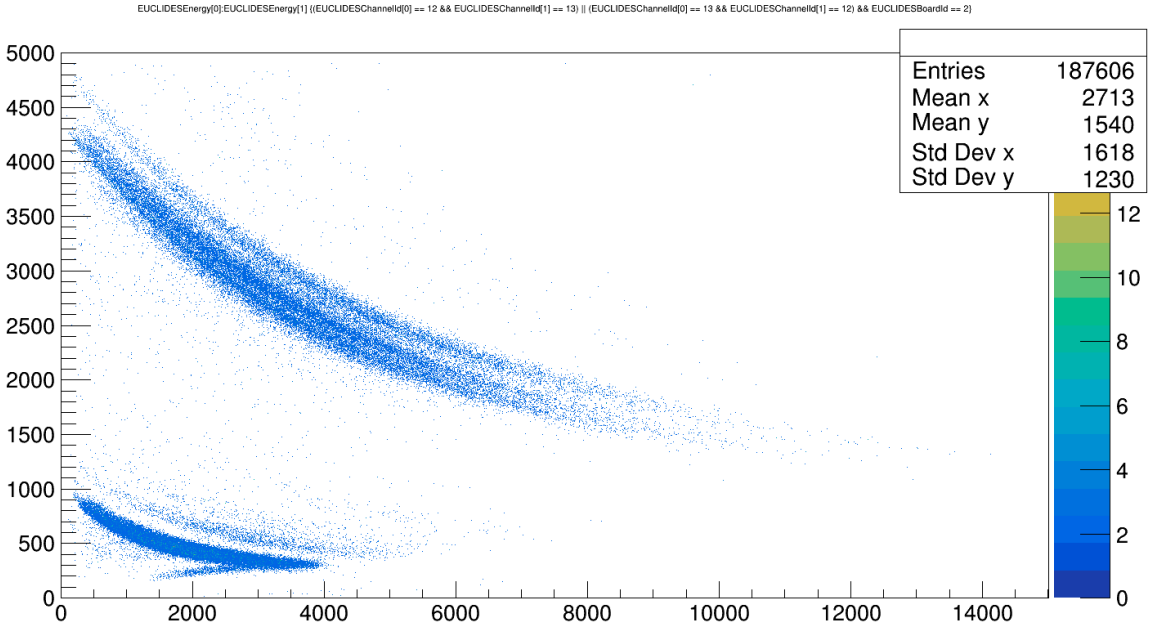


Spectra after Replay

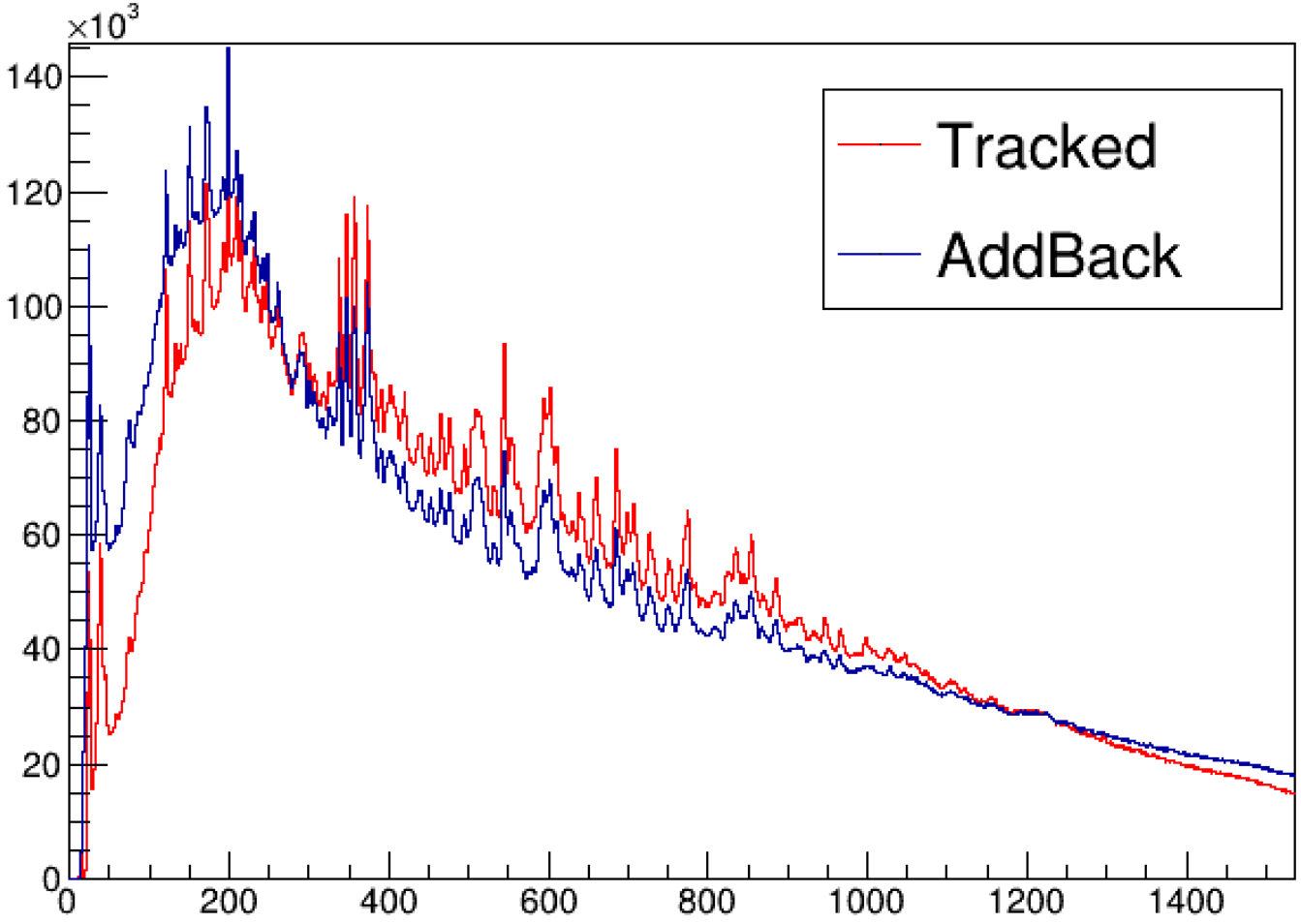




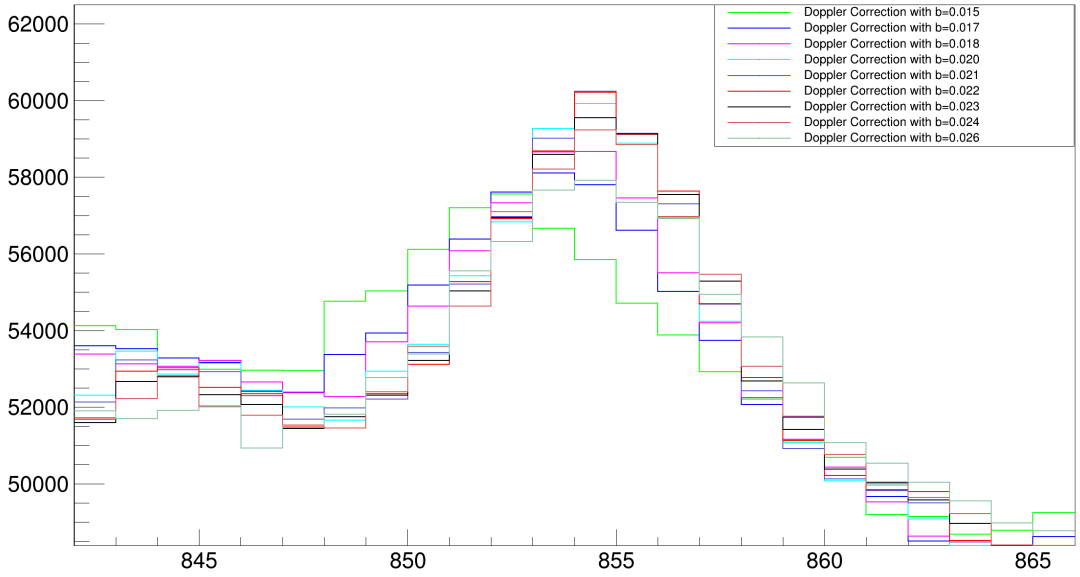


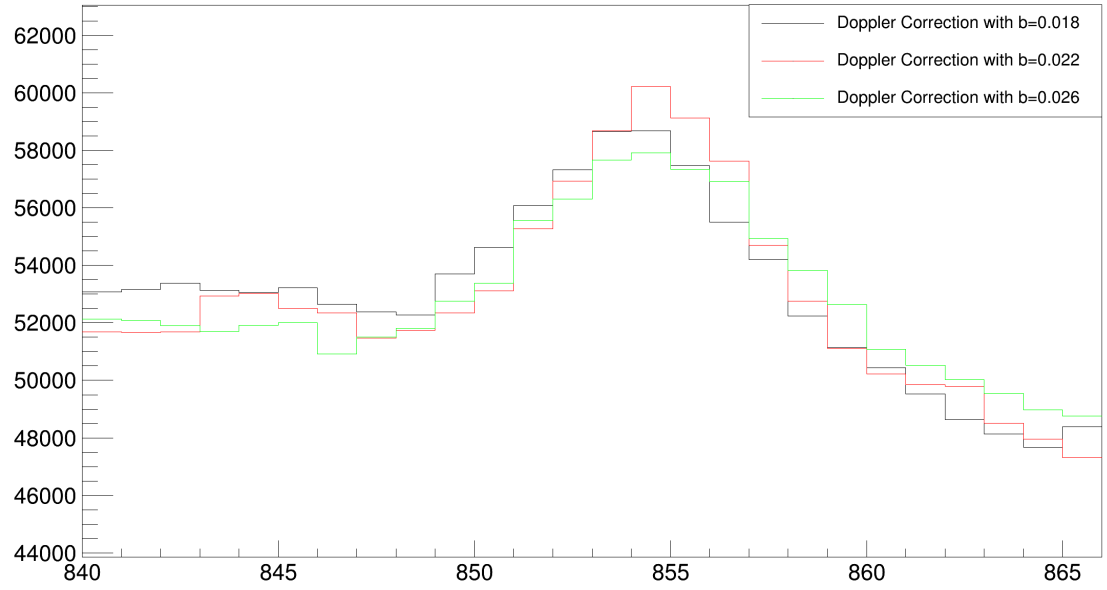


Comparison between AddBack and Tracking

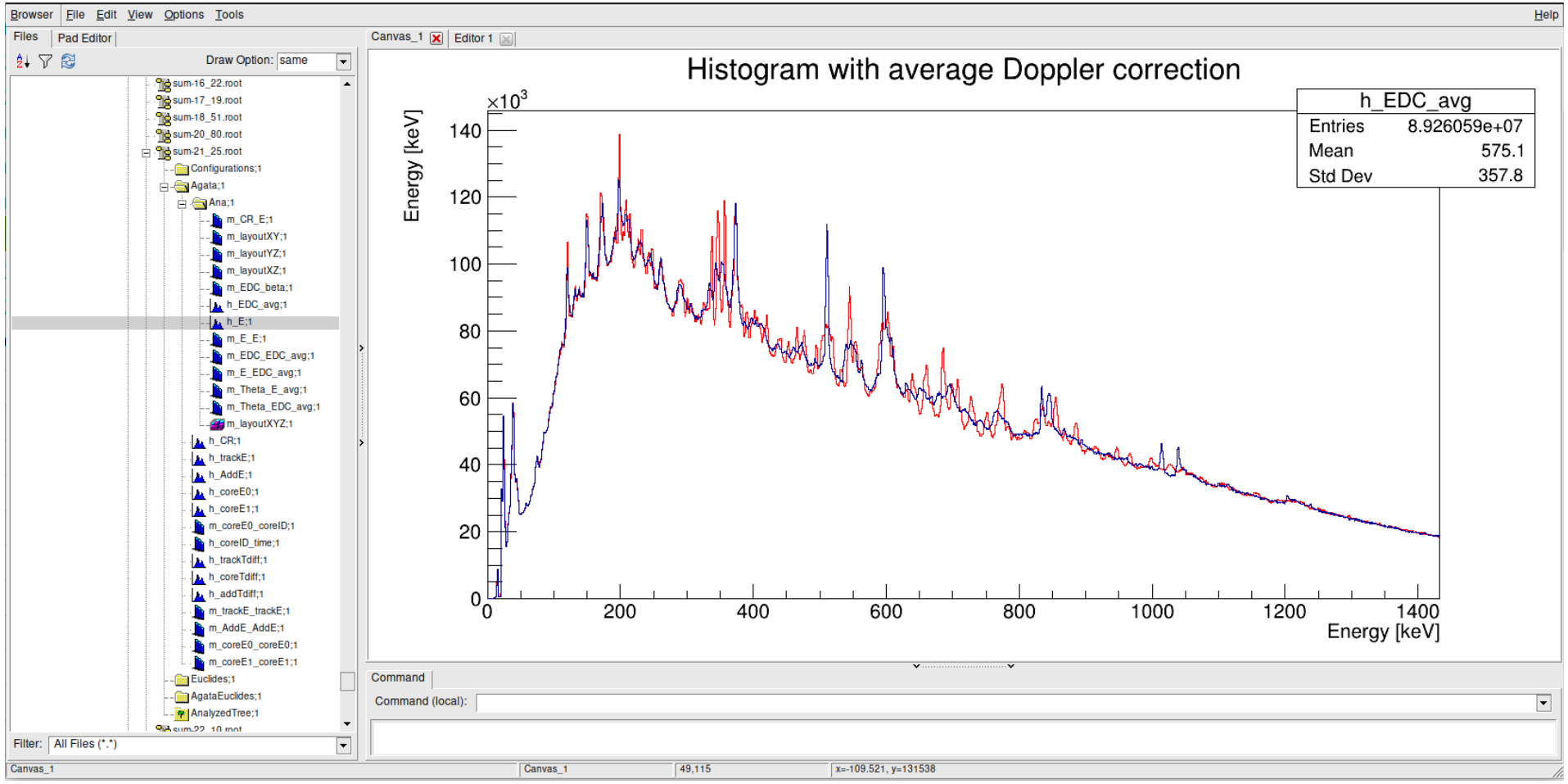


Doppler Correction

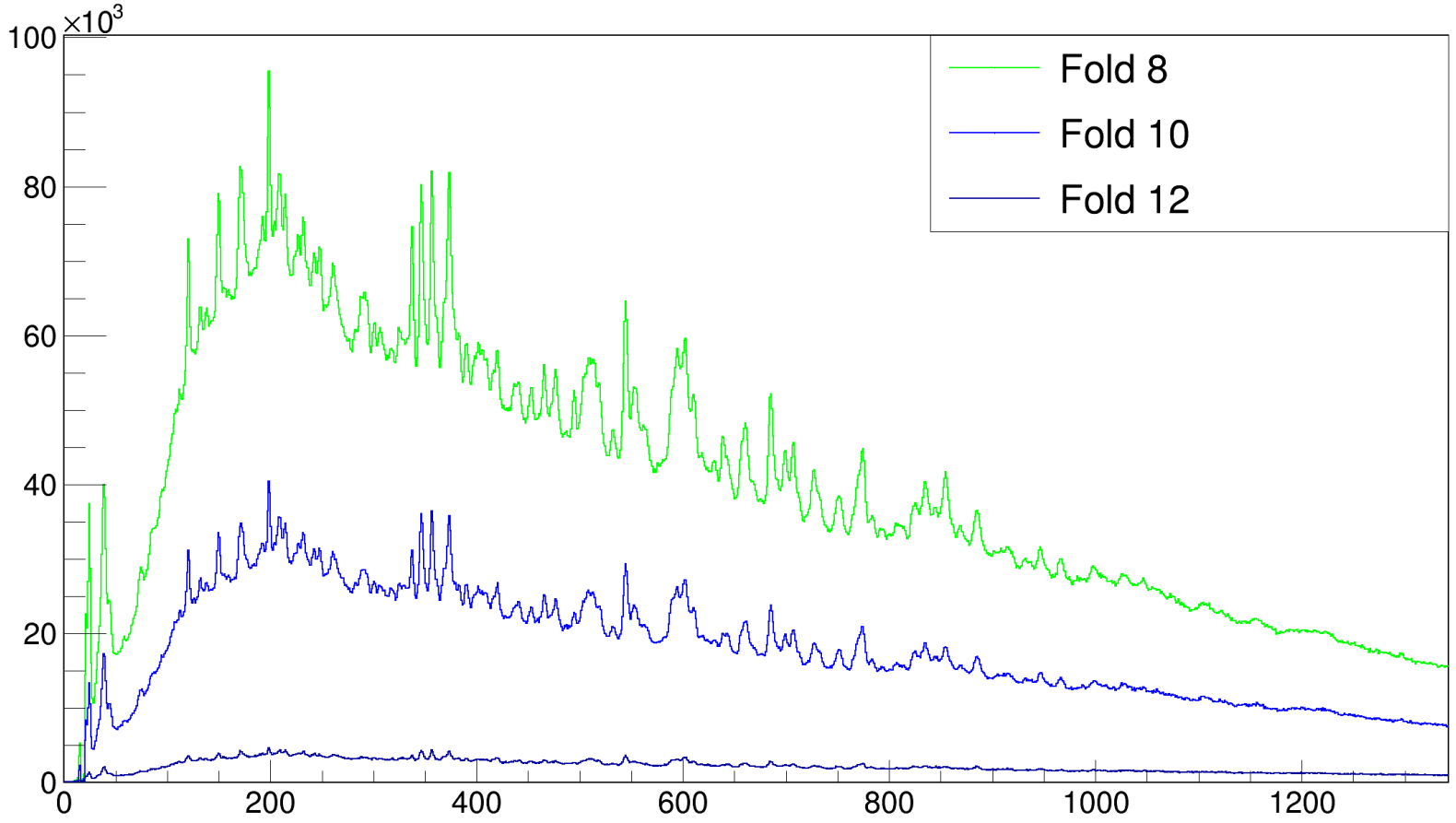




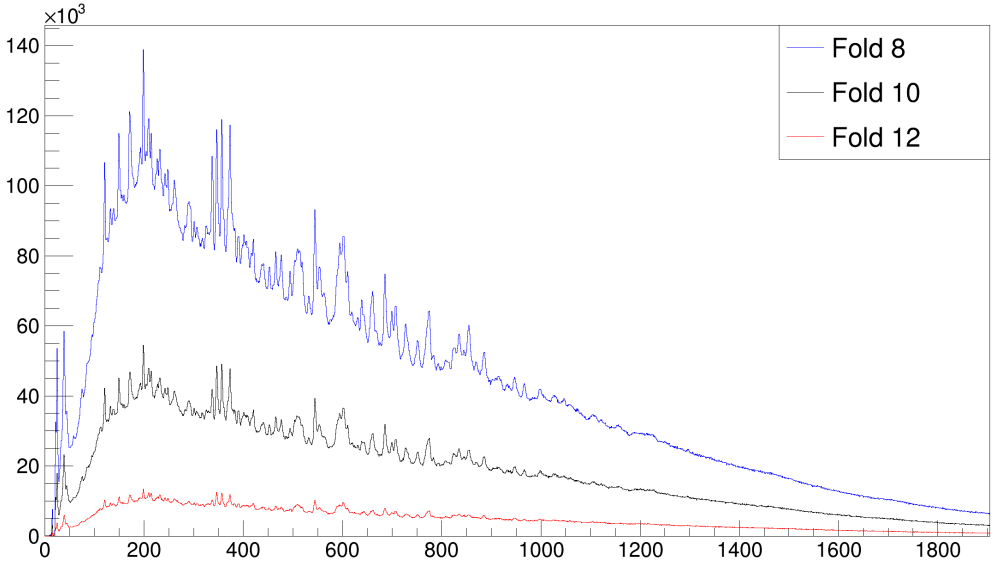
Effect of Doppler correction



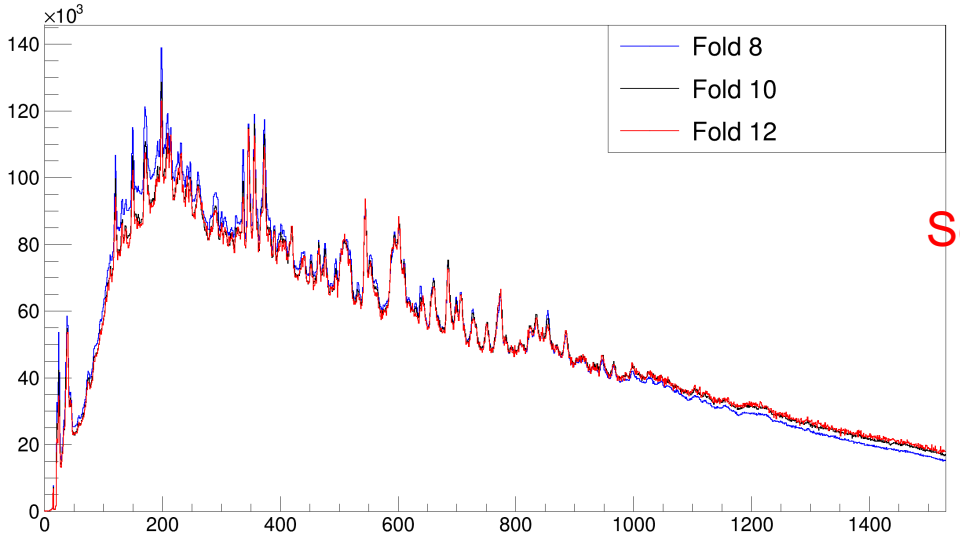
Total projections for different fold



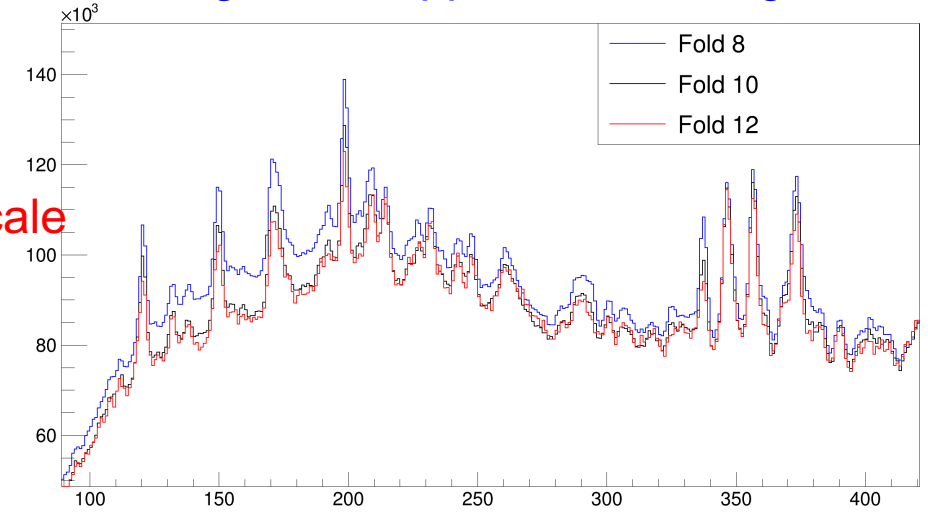
Effect of trigger



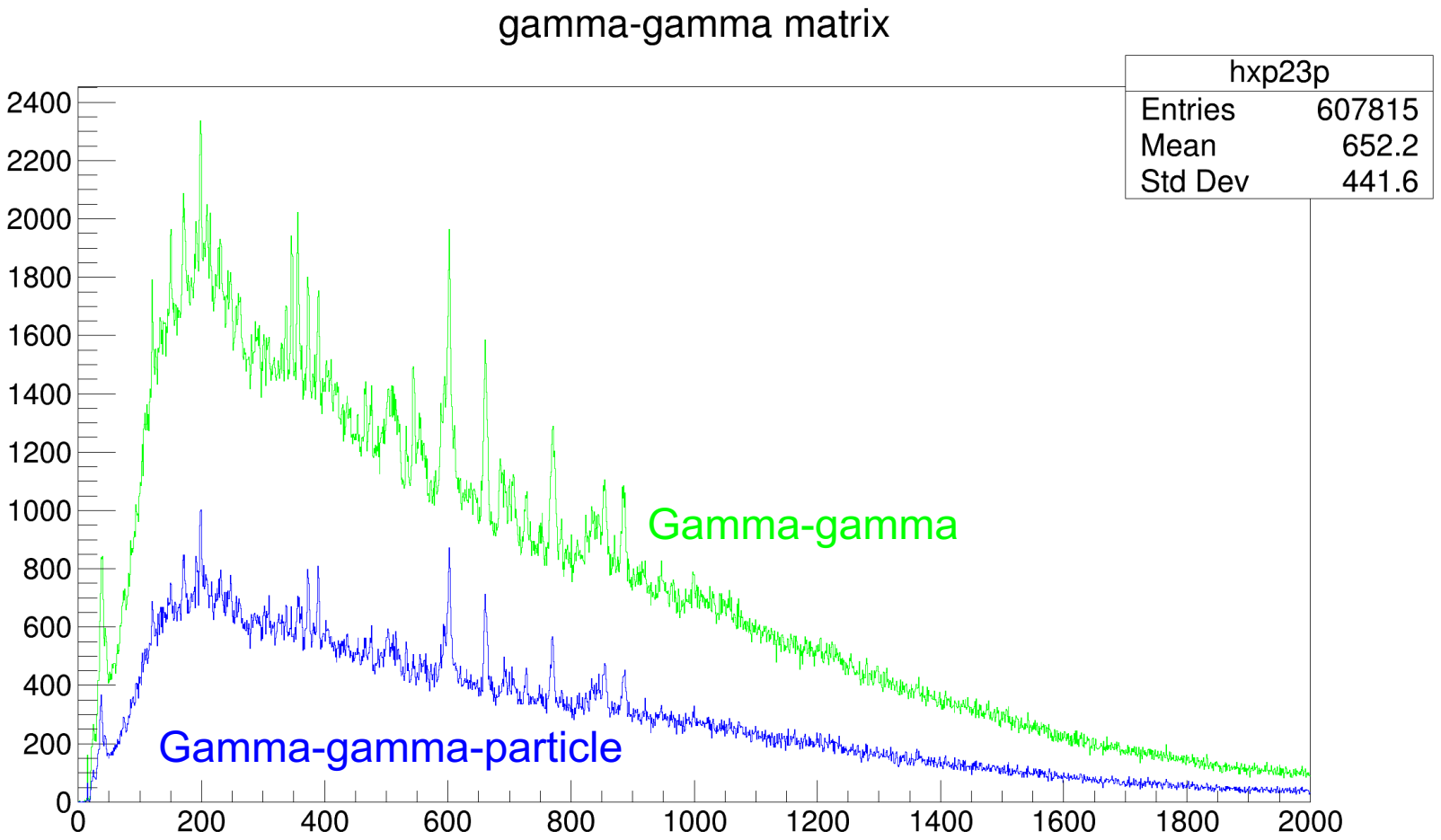
High fold suppress low energies



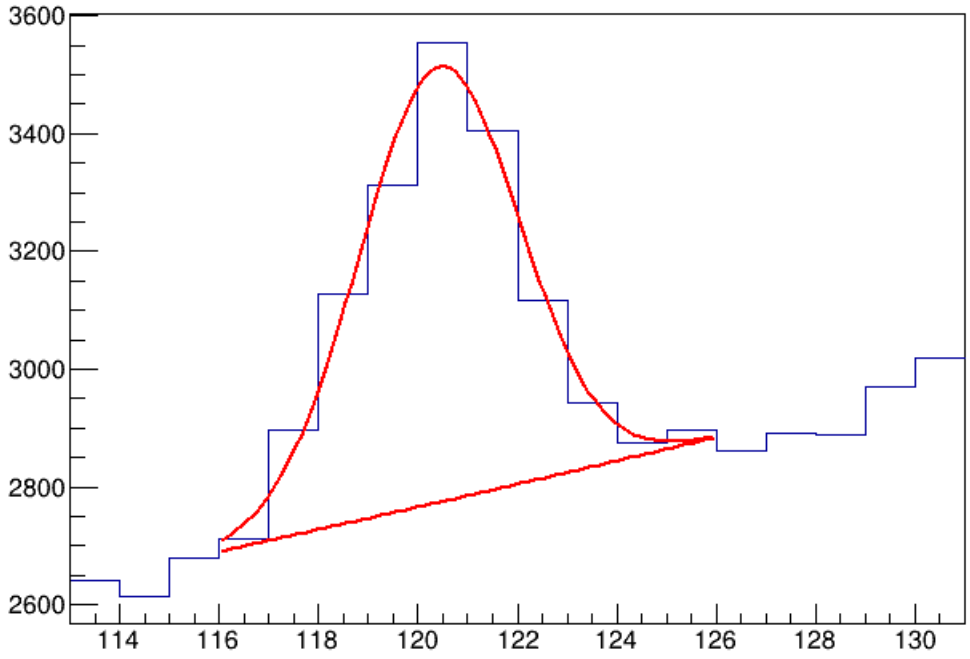
Scale

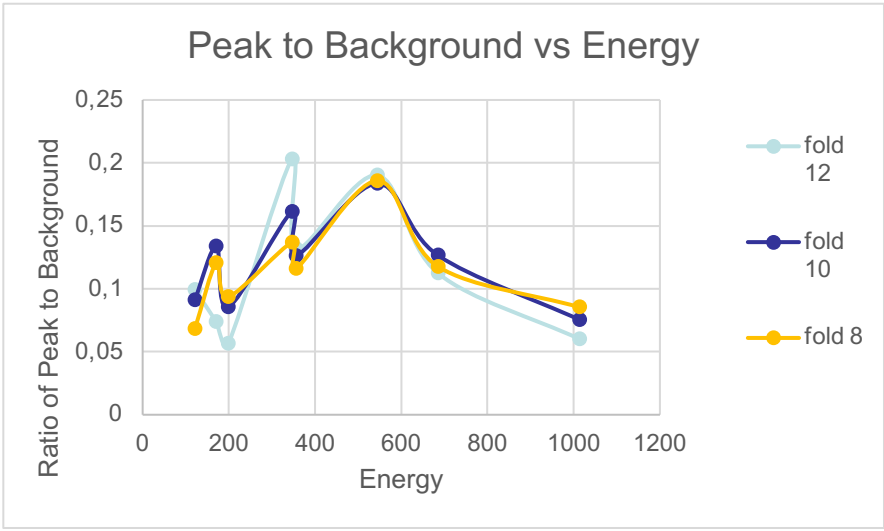


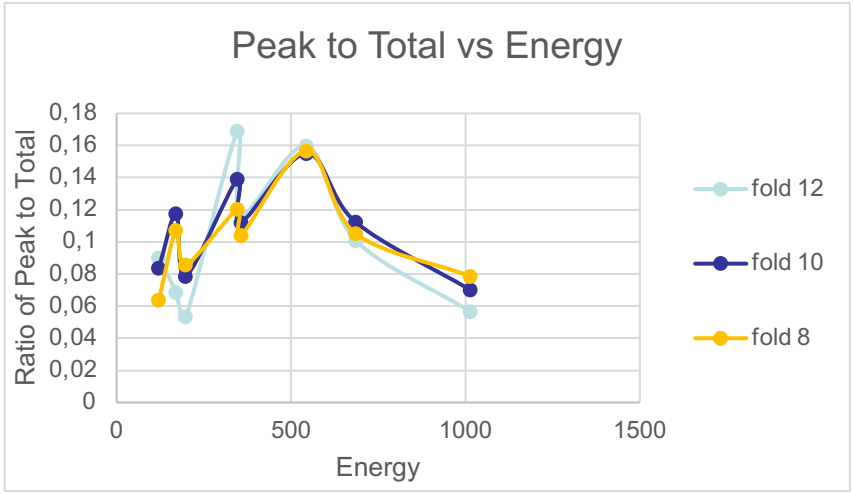
Fold 8
Projection on X axis at 373 keV

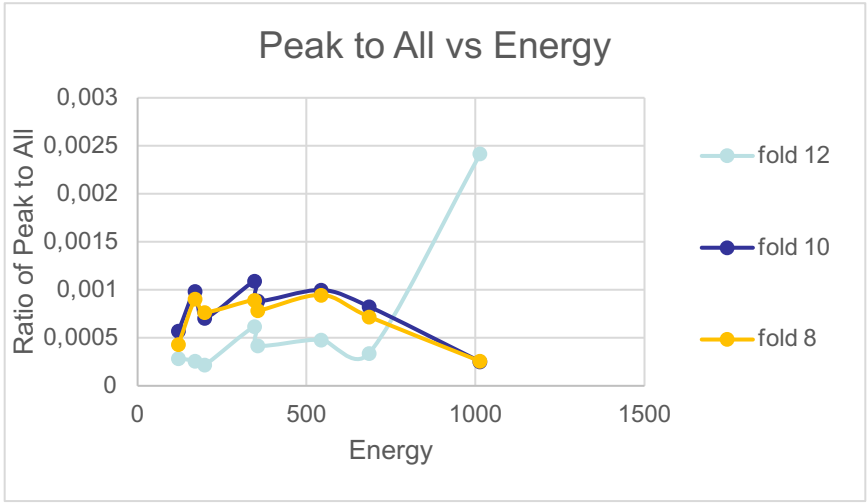


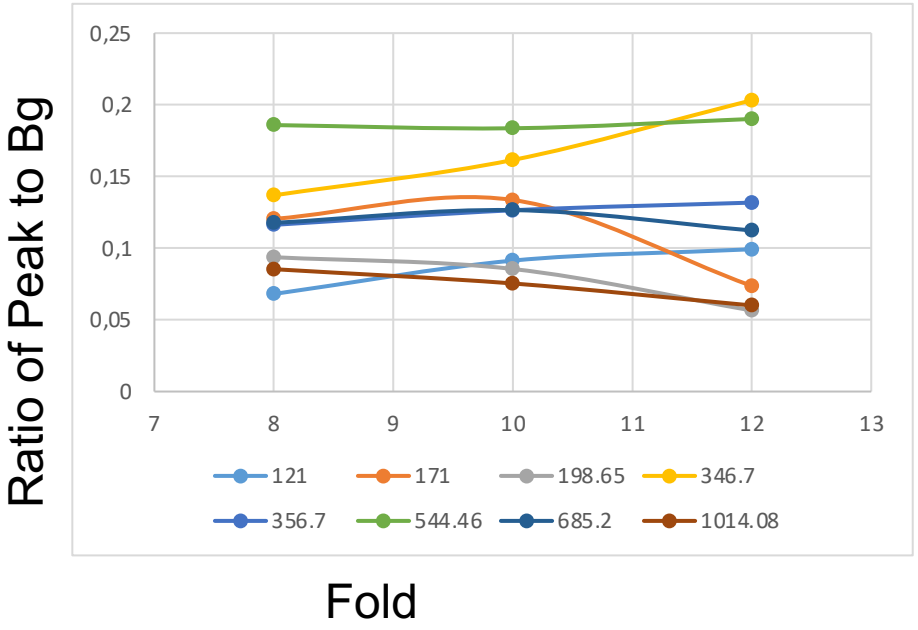
Peak to background/total/all

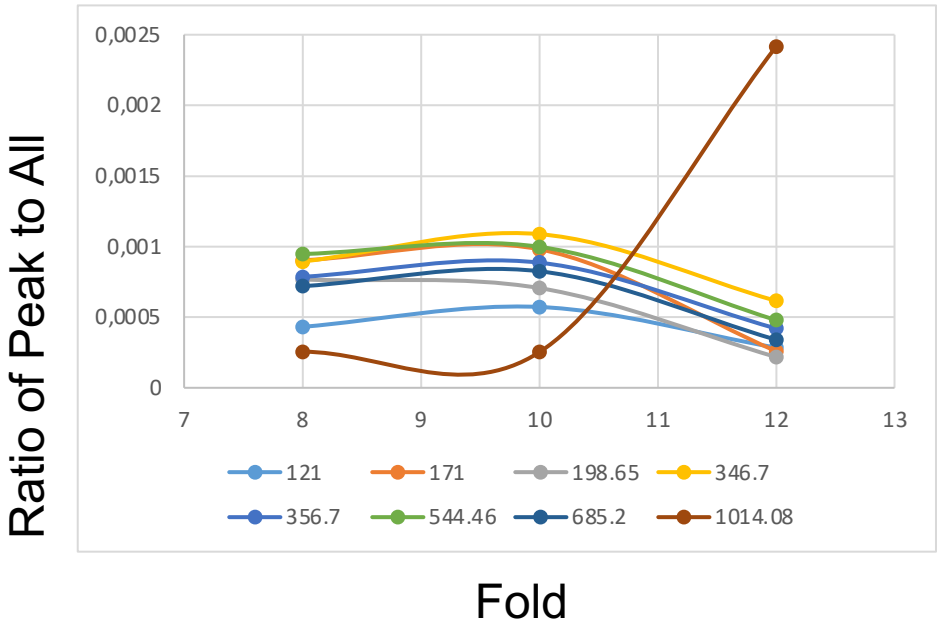


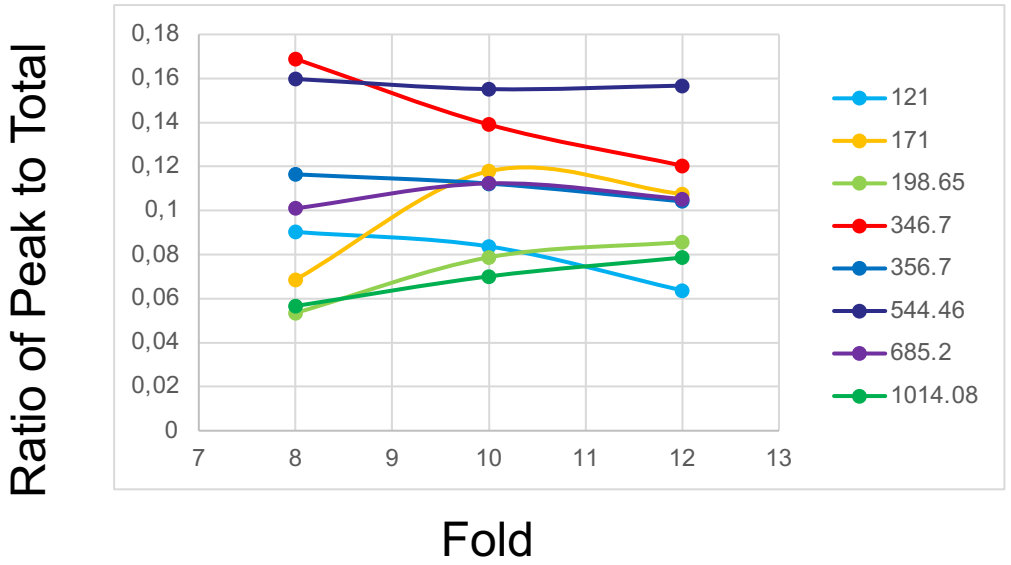




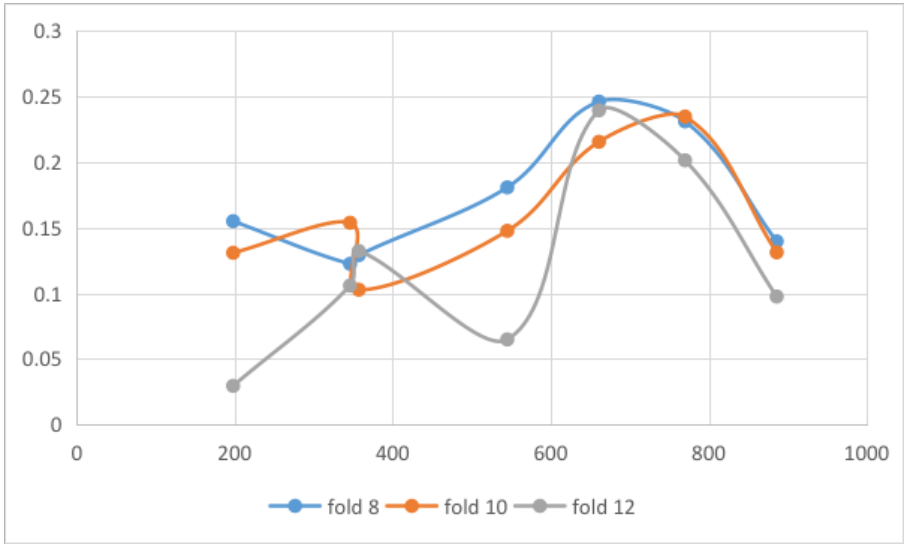



Ratio of Peak to Bg
0,25
0,2
0,15
0,1
0,05
0
7
8
9
10
11
12
13
121
171
198.65
346.7
356.7
544.46
685.2
1014.08
Fold

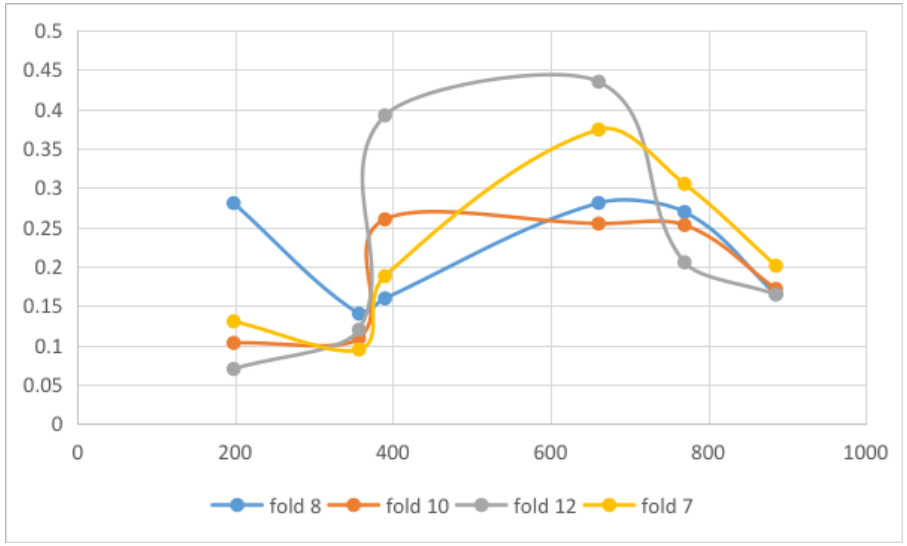

Ratio of Peak to All
0,0025
0,002
0,0015
0,001
0,0005
0
7
8
9
10
11
12
13
121
171
198.65
346.7
356.7
544.46
685.2
1014.08
Fold


Ratio of Peak to Total
0,18
0,16
0,14
0,12
0,1
0,08
0,06
0,04
0,02
0
7
8
9
10
11
12
13
121
171
198.65
346.7
356.7
544.46
685.2
1014.08
Fold

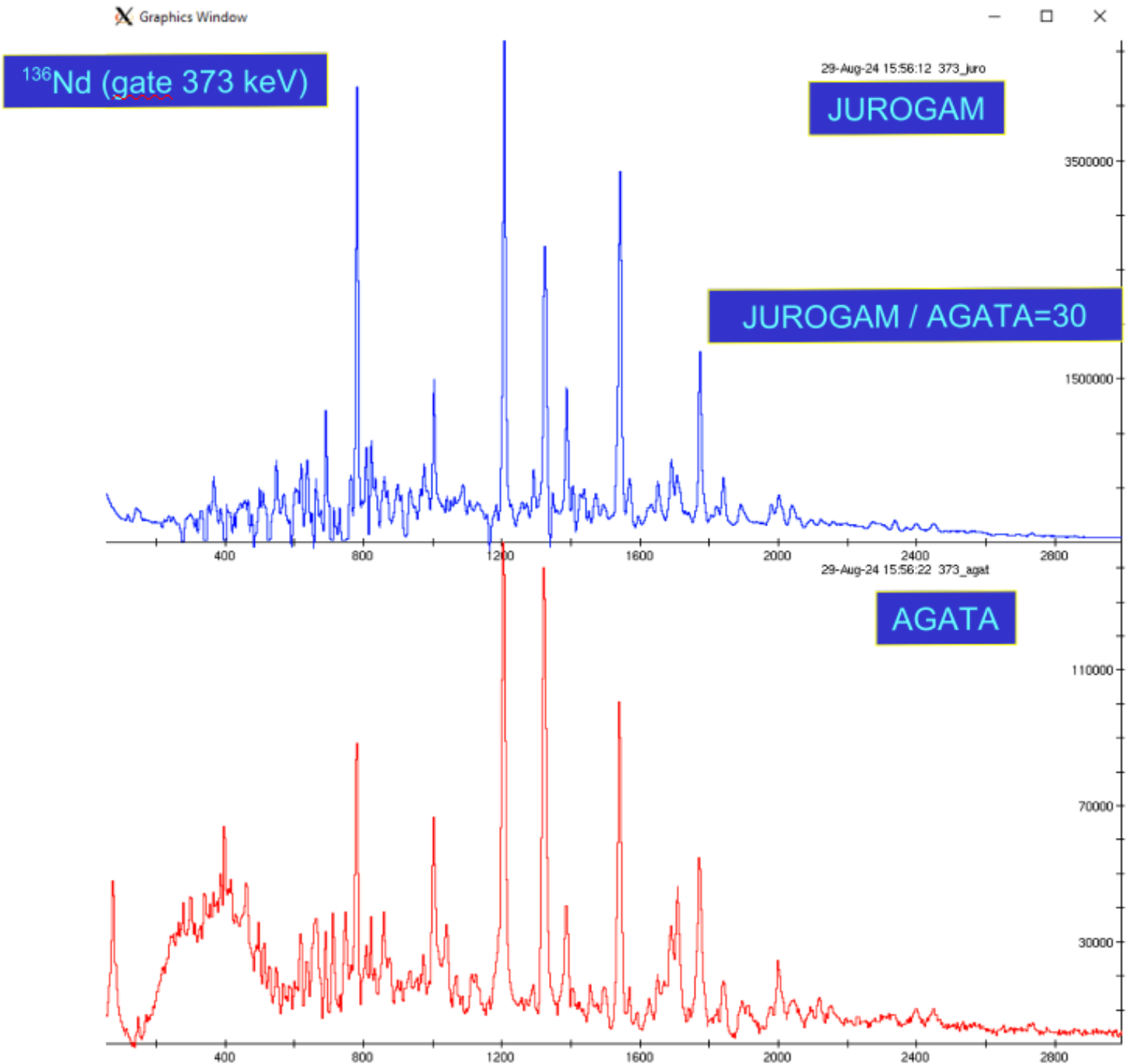
gated at 373 peak to bg

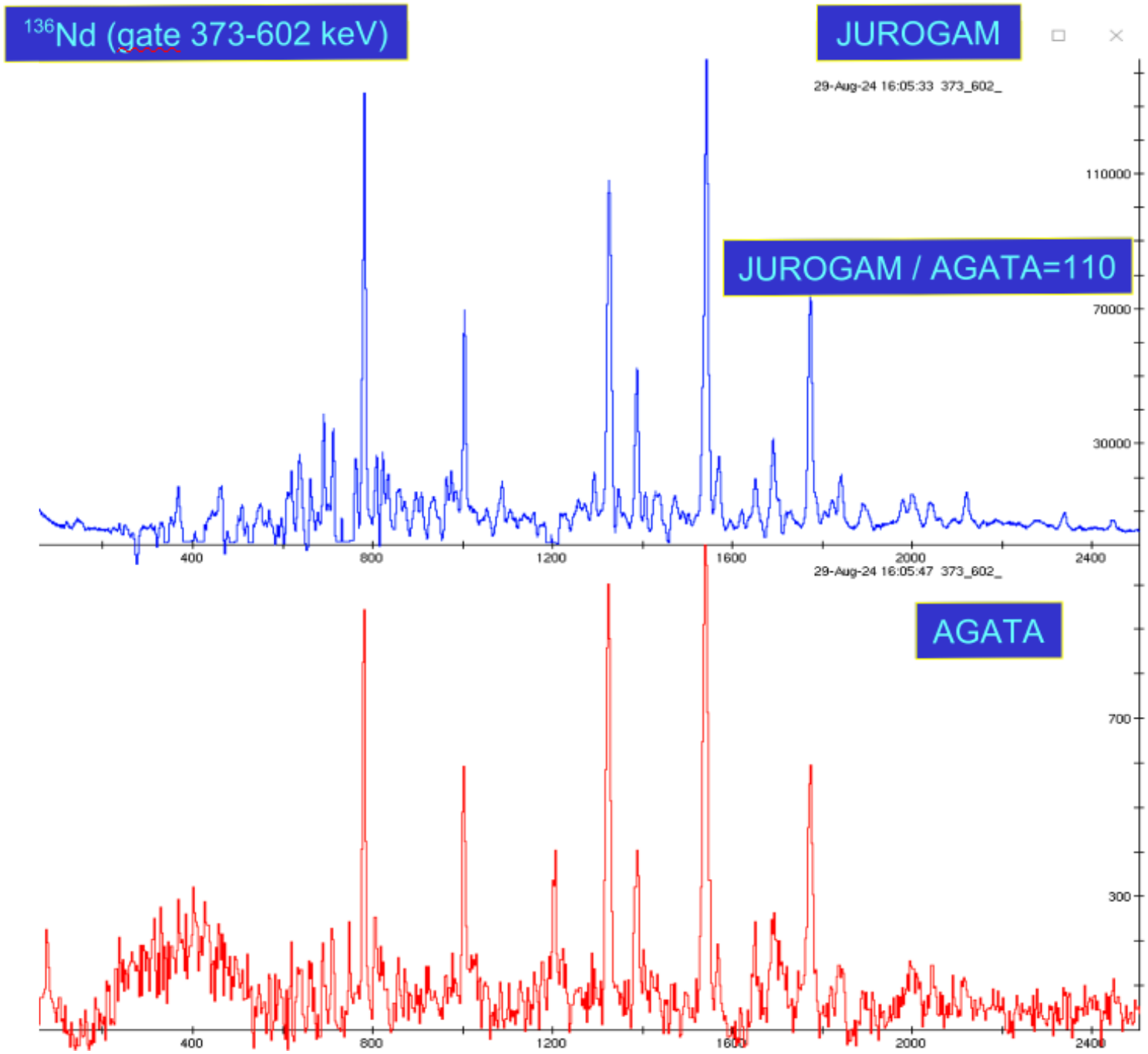


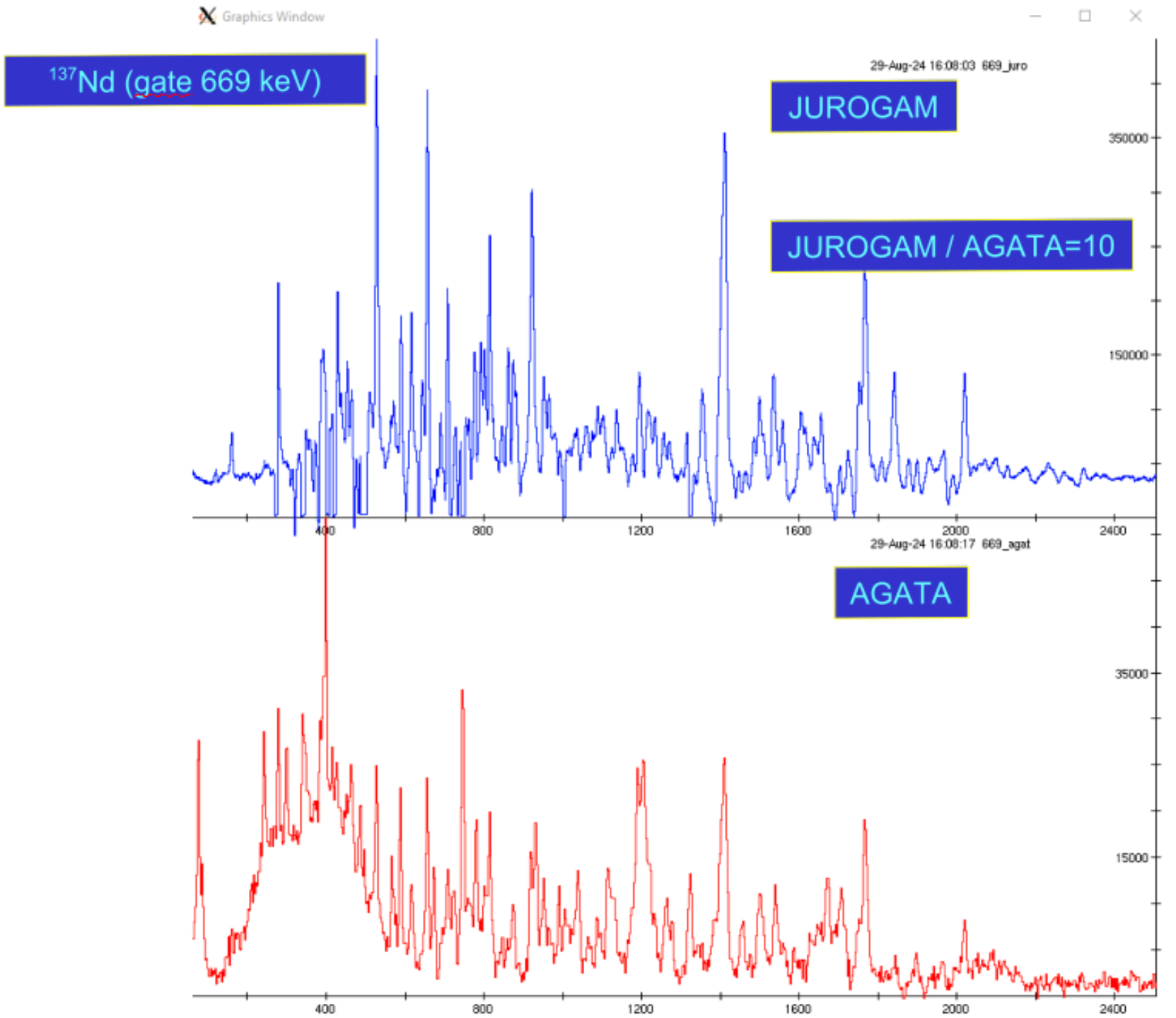
only gamma-gamma coincidence

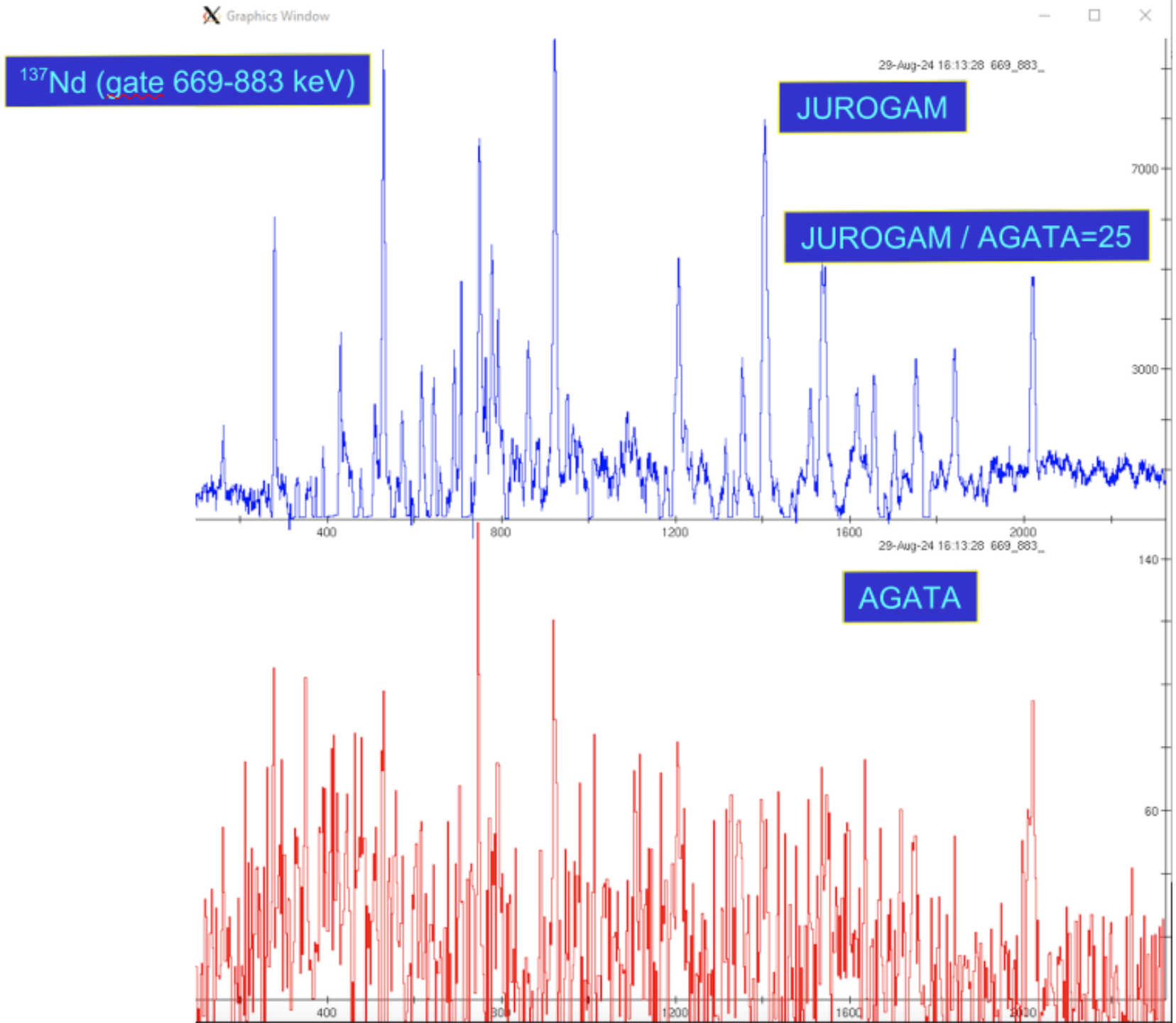


coincidence with particle


Graphics Window
^{136}Nd (gate 373 keV)
29-Aug-24 15:56:12 373_juro
JUROGAM
JUROGAM / AGATA=30
3500000
1500000
400
800
1200
1600
2000
2400
2800
29-Aug-24 15:56:22 373_agat
AGATA
110000
70000
30000


^{136}Nd (gate 373-602 keV)
JUROGAM
29-Aug-24 16:05:33 373_602_
110000
JUROGAM / AGATA=110
70000
30000
400
800
1200
1600
2000
2400
29-Aug-24 16:05:47 373_602_
AGATA
700
300
400
800
1200
1600
2000
2400


Graphics Window
^{137}Nd (gate 669 keV)
29-Aug-24 16:08:03 669_juro
JUROGAM
JUROGAM / AGATA=10
350000
150000
400
800
1200
1600
2000
2400
29-Aug-24 16:08:17 669_agat
AGATA
35000
15000
400
800
1200
1600
2000
2400


Graphics Window
^{137}Nd (gate 669-883 keV)
29-Aug-24 16:13:28 669_883_
JUROGAM
JUROGAM / AGATA=25
7000
3000
400
800
1200
1600
2000
29-Aug-24 16:13:28 669_883_
AGATA
140
60
400
1200
1600

	JUROGAM	AGATA	JUROGAM/AGATA
nb ev (folds≥3)	2,6E+10		
projtot			
total counts	9,5E+10	1,1E+11	
373	1,1E+09	2,0E+08	6
669	1,3E+08	4,0E+07	4
spectrum 1 gate 373:			
602	4,4E+07	1,7E+06	30
661-663 (doublet)	3,0E+07	1,7E+06	20
770	3,7E+07	1,3E+06	33
spectrum 2 gates 373/602:			
770	1,5E+06	1,5E+04	114
661-663 (doublet)	1,2E+06	1,3E+04	108
spectrum 1 gate 669:			
883	2,7E+06	2,6E+05	12
spectrum 2 gates 669/883:			
1009	4,5E+04	2,0E+03	26

Final conclusions

Negative facets:

- Aim of the experiment: not achieved
- Reasons:

- low peak to background
- unefficient channel selection with Euclides for not very proton rich nuclei
- DAQ not fast enough
- Beam on target: ½ of the allotted time (3 out of 6 days)

Positive facets:

- Commissioning for a high-spin high-sensitivity measurement
- Study of best high-fold trigger conditions
- Study of channel selection with Euclides
- Understand the weakness of the DAQ for high-fold events in high-background environment
- (Auto)-training of three young researcher from IMP, one will arrive at LNL soon for a few years
- Understand the conditions to be fulfilled for high-spin, high-sensitivity experiments with AGATA/GRETA

Thank you !