ADVANCED GAMMA TRACKING ARRAY

AGATA response at high multiplicities

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AGATA week, Milano September 2017

What do we mean by high multiplicity?

We did the commissioning of AGATA@GANIL

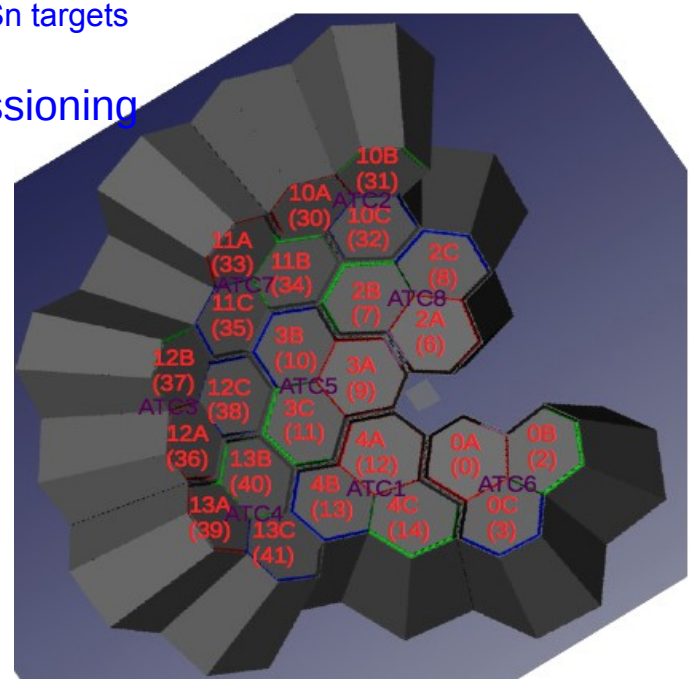
- In-beam data ^{158}Er (Multiplicity 30)

  Nice data set (same data exist for GRETINA and Gammasphere)

- We also did a source run with ^{166}Ho (multiplicity 4-5)

High spin commissioning : $^{122}Sn(^{40}Ar[170MeV],4n)^{158}Er$ V/C=2%

Stack of two 0.5 mg/cm2 122Sn targets
(from J. Green- ANL)



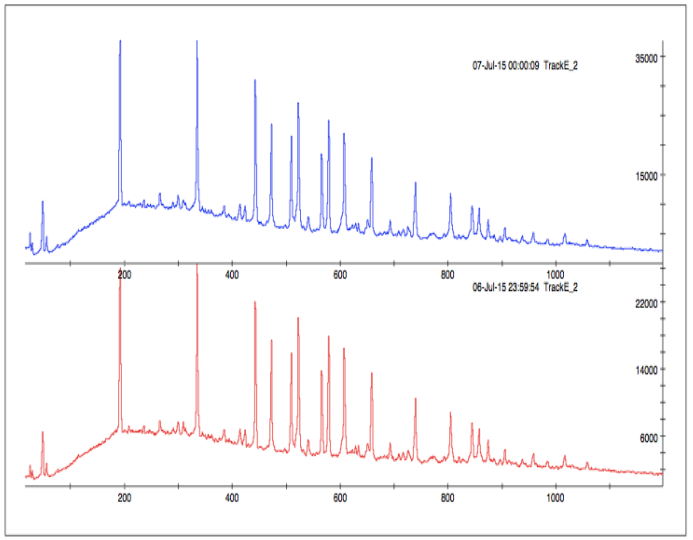
Same reaction has been used at Argonne for the GRETINA commissioning
Same reaction has been run with Gammasphere at that time too

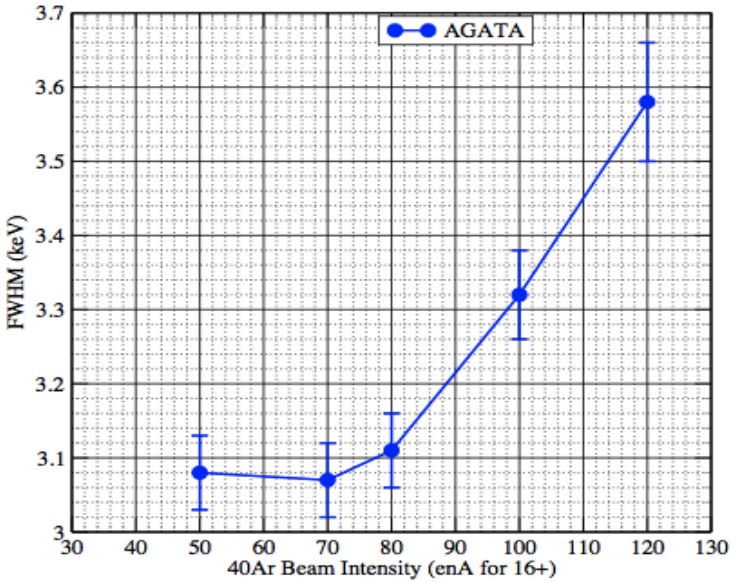
The array was set @23.5 Nominal distance
18.5 cm (GRETINA distance)
13cm compact configuration

Trigger conditions :

Fold 1 up to Fold 7 on the core
Rates : 5 kHz/crystal up to 30 kHz
Beam Intensity : 3 to 7.5 pnA

Double gated spectra 18.5 cm and 23.5 cm
50 enA (3.1 pnA), Fold 5 trigger





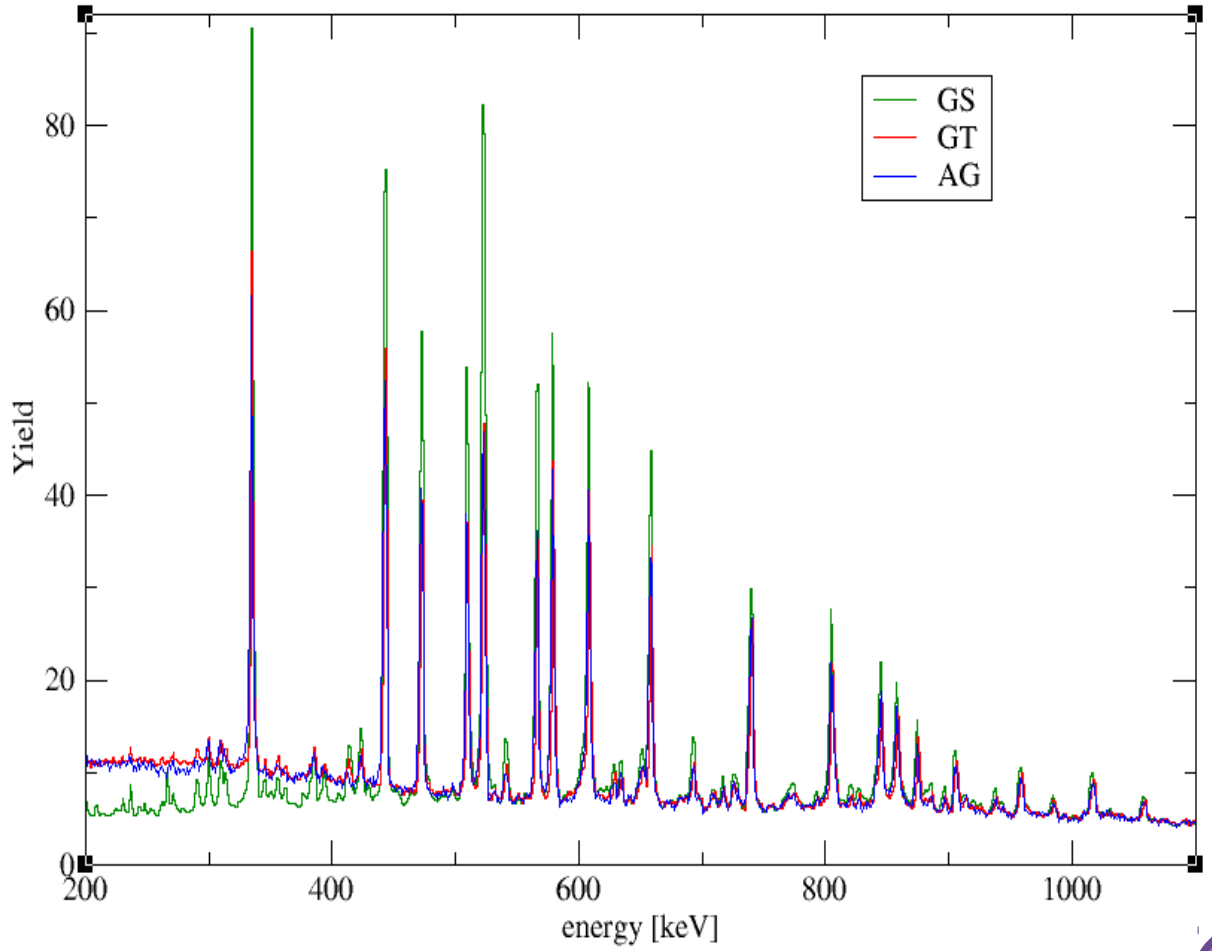
6 kHz 30 kHz

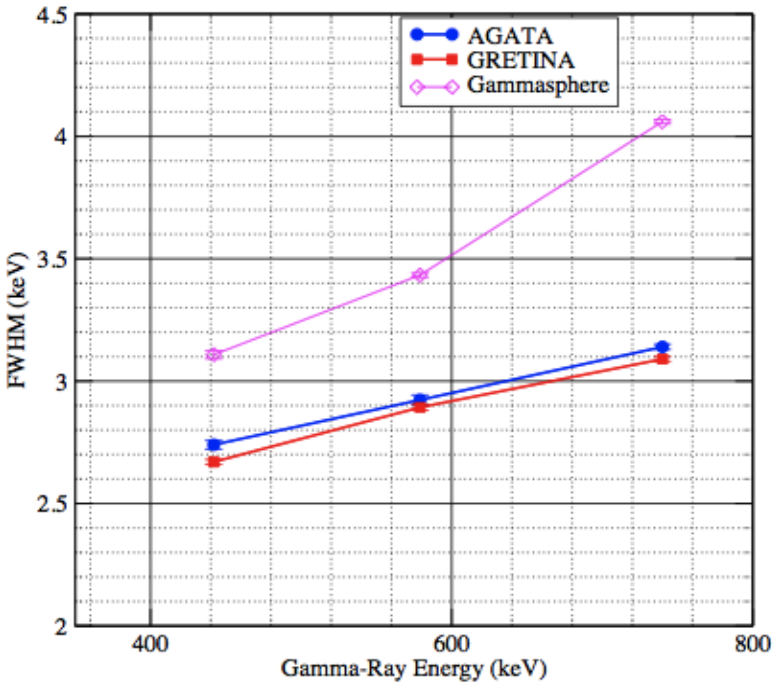
Slide shown at the AGATA week and ACC meeting 2015

High spin (multiplicity) performance of the tracking arrays

AGATA(AG) and GRETINA(GT) at same distance, 18.5 cm & Gammasphere(GS)

-γγ matrix total projection

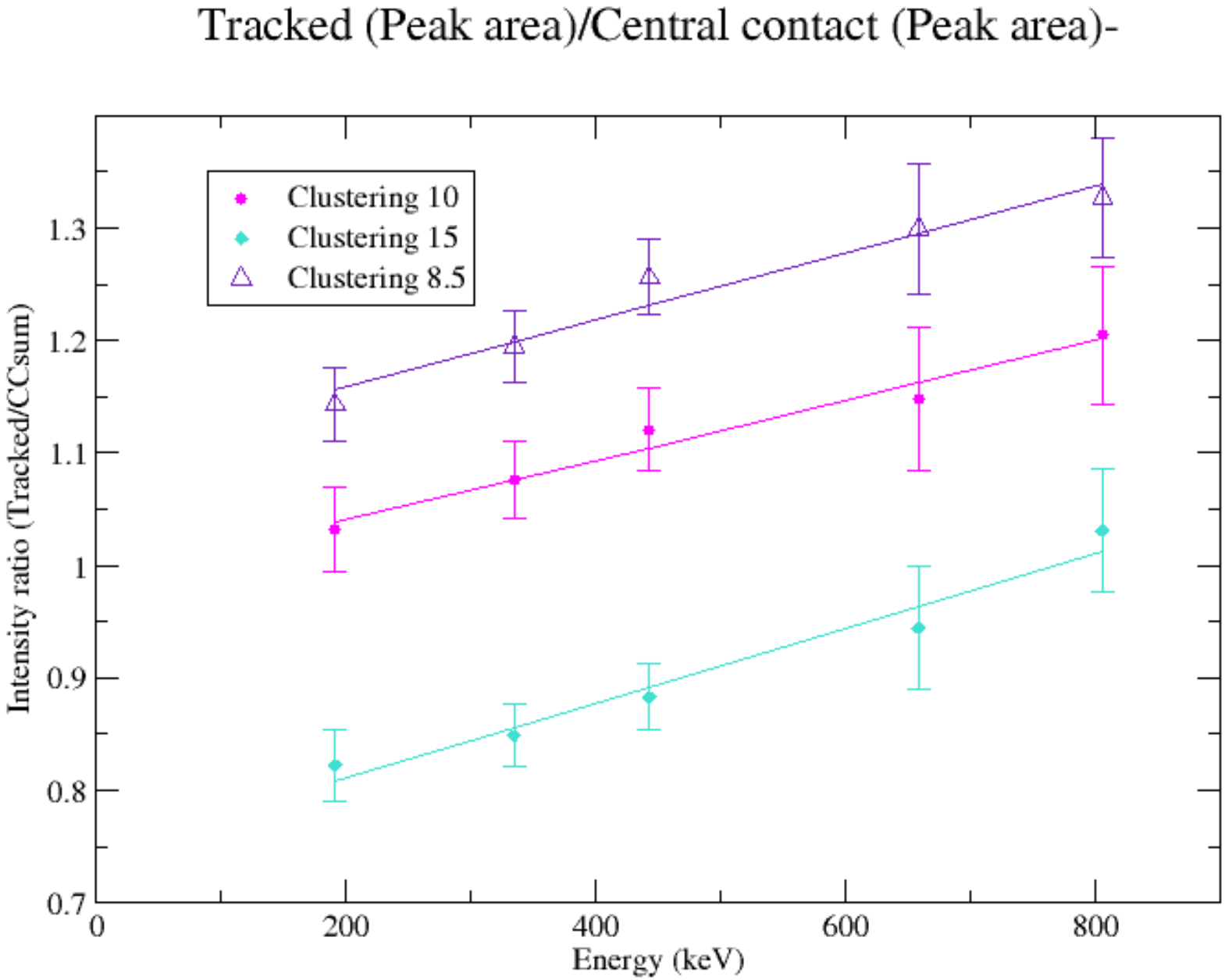




Ved Sep 2 15:21:48 2015

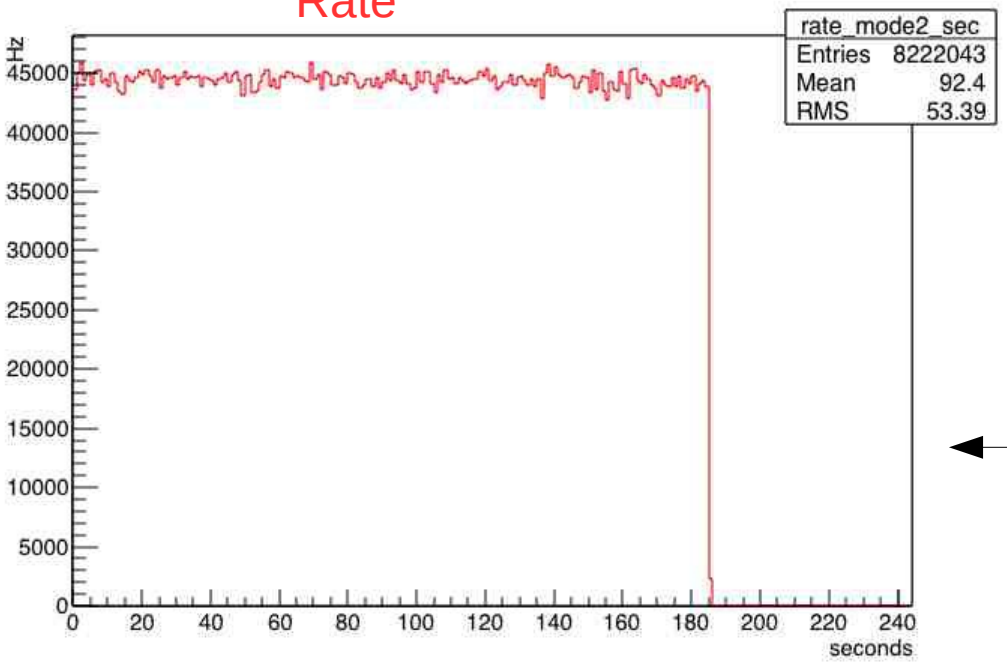
Need to improve the PSA/signal decomposition
Need to work more on tracking optimization

TBD : compare
GS with only 24 modules to AG
Disable70 crystals in Gammasphere



One needs to carefully optimize the tracking parameters for high multiplicity

Rate

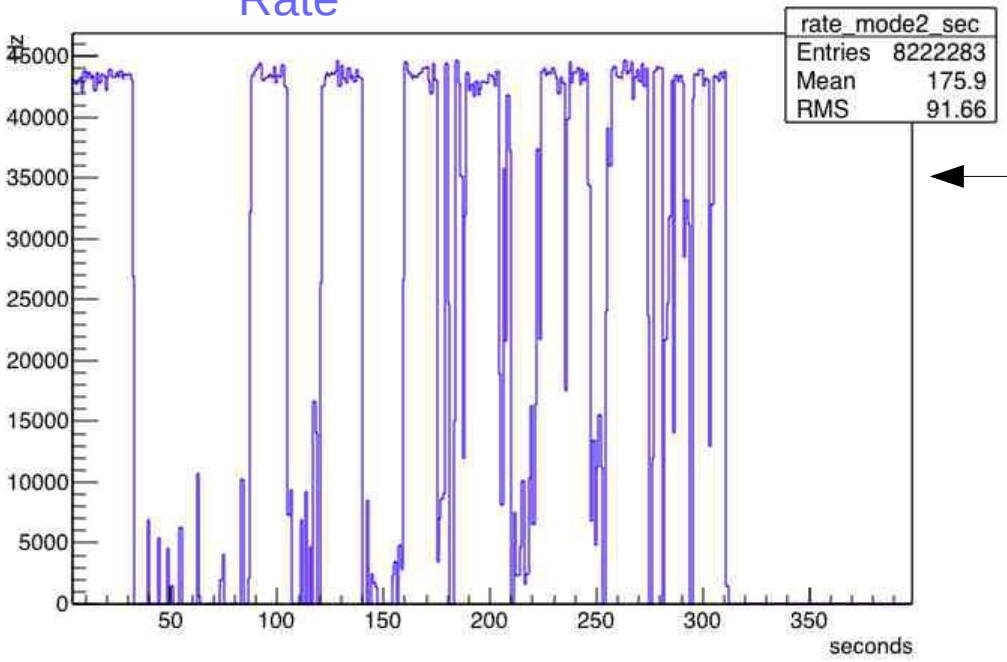


We collected 2 runs with the same trigger condition/buffering/beam intensity

Fold 7 – 120 enA
Rate : about 16-20 kHz/crystal

Without writing the traces

Rate

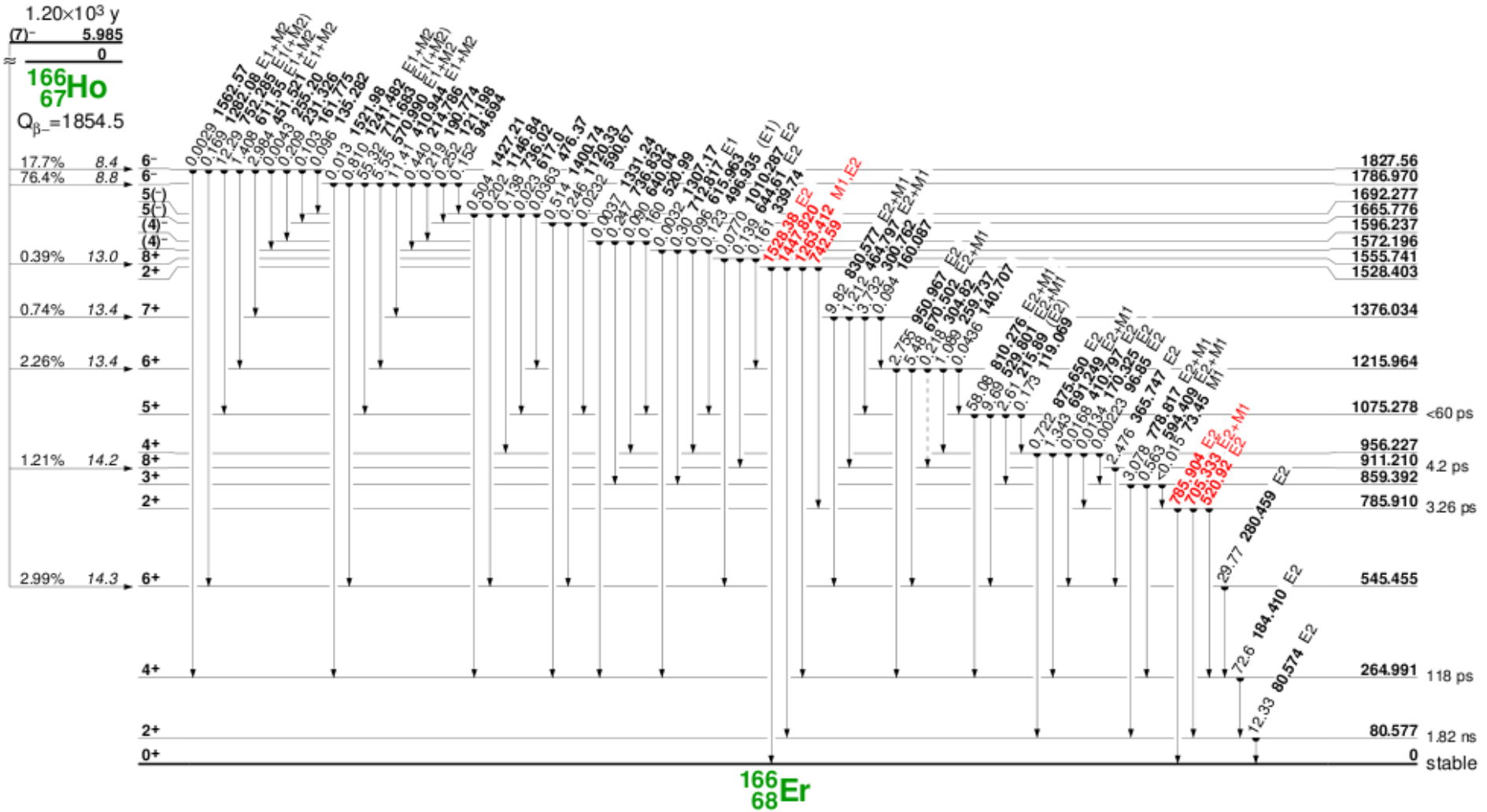


Running with traces on disk!

40% loss!!!!

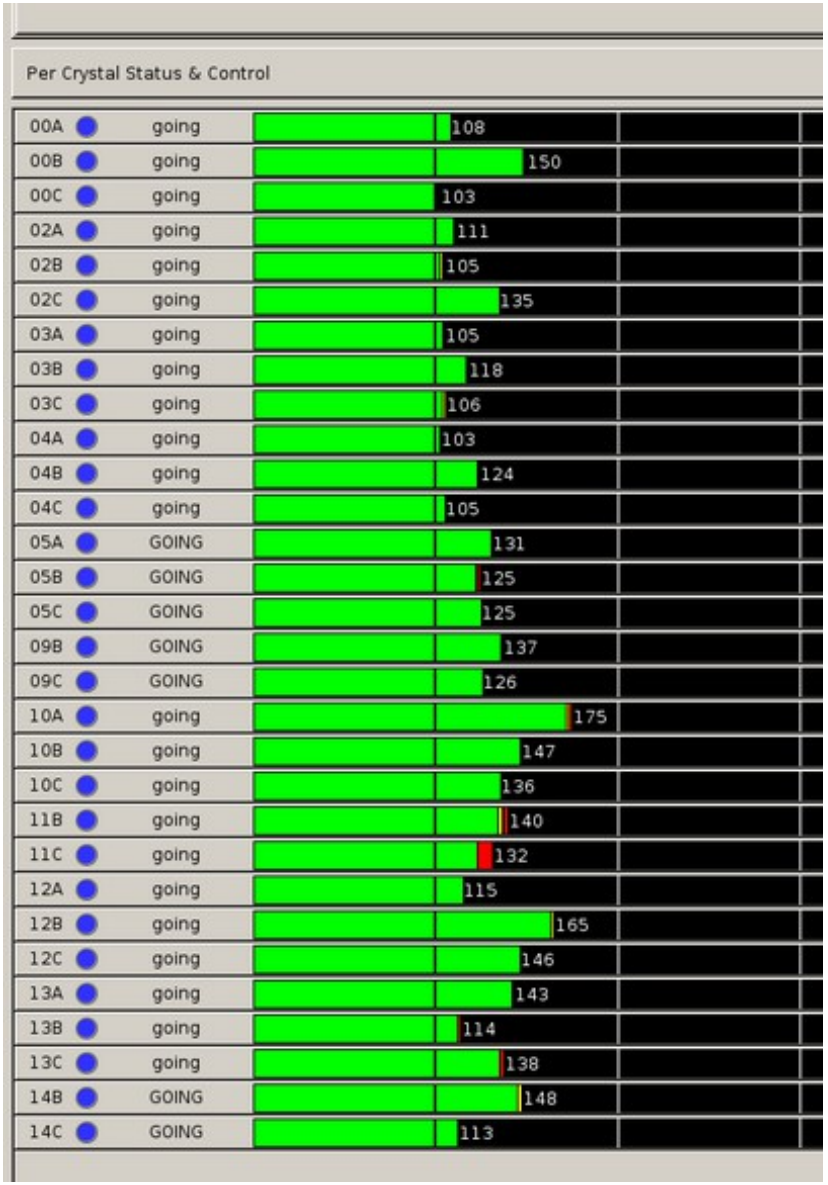
Learned lessons : Writing traces during a high multiplicity exp. is not recommended- prohibited

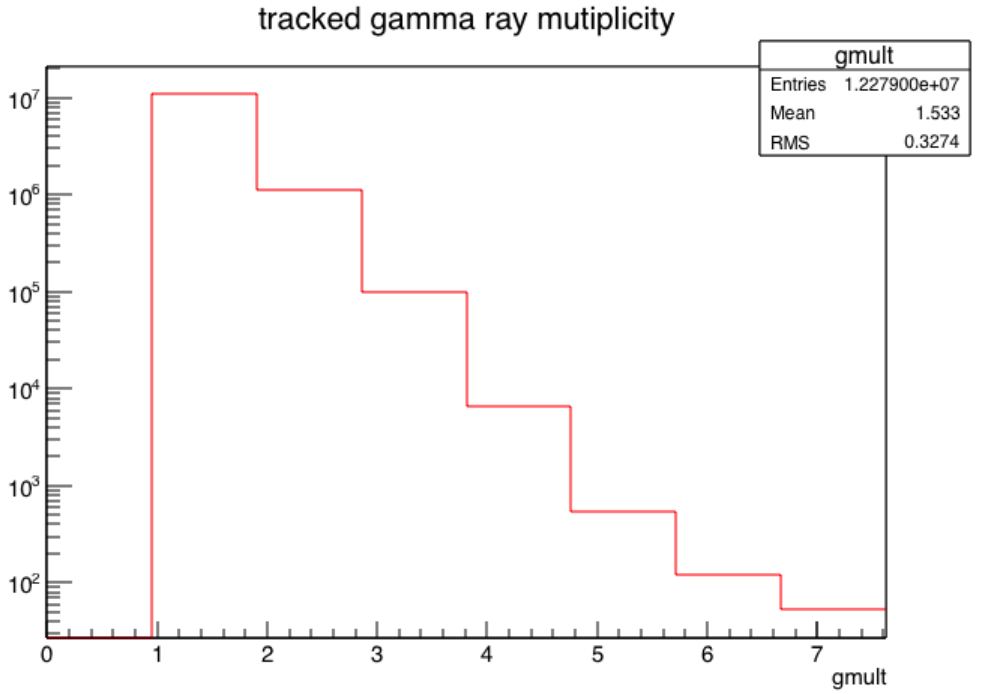
^{166}Ho source run march 2016
Multiplicity 4-5 & nice Energy coverage range

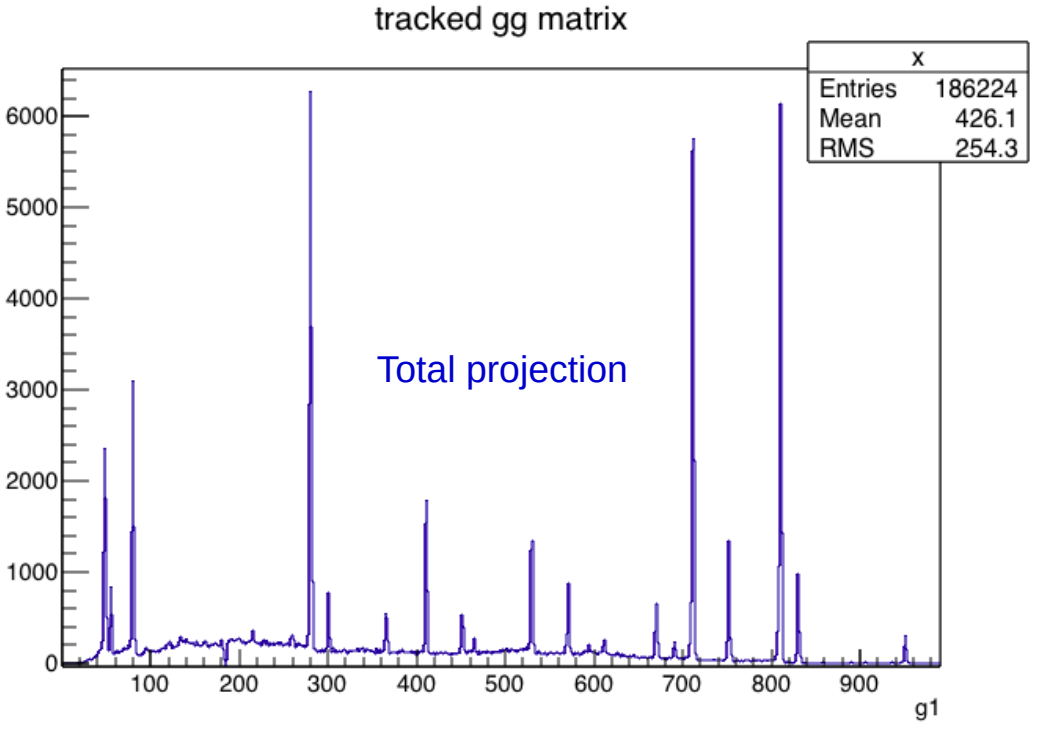


March 2016- AGATA with 30 crystals

Week ^{166}Ho source and short run

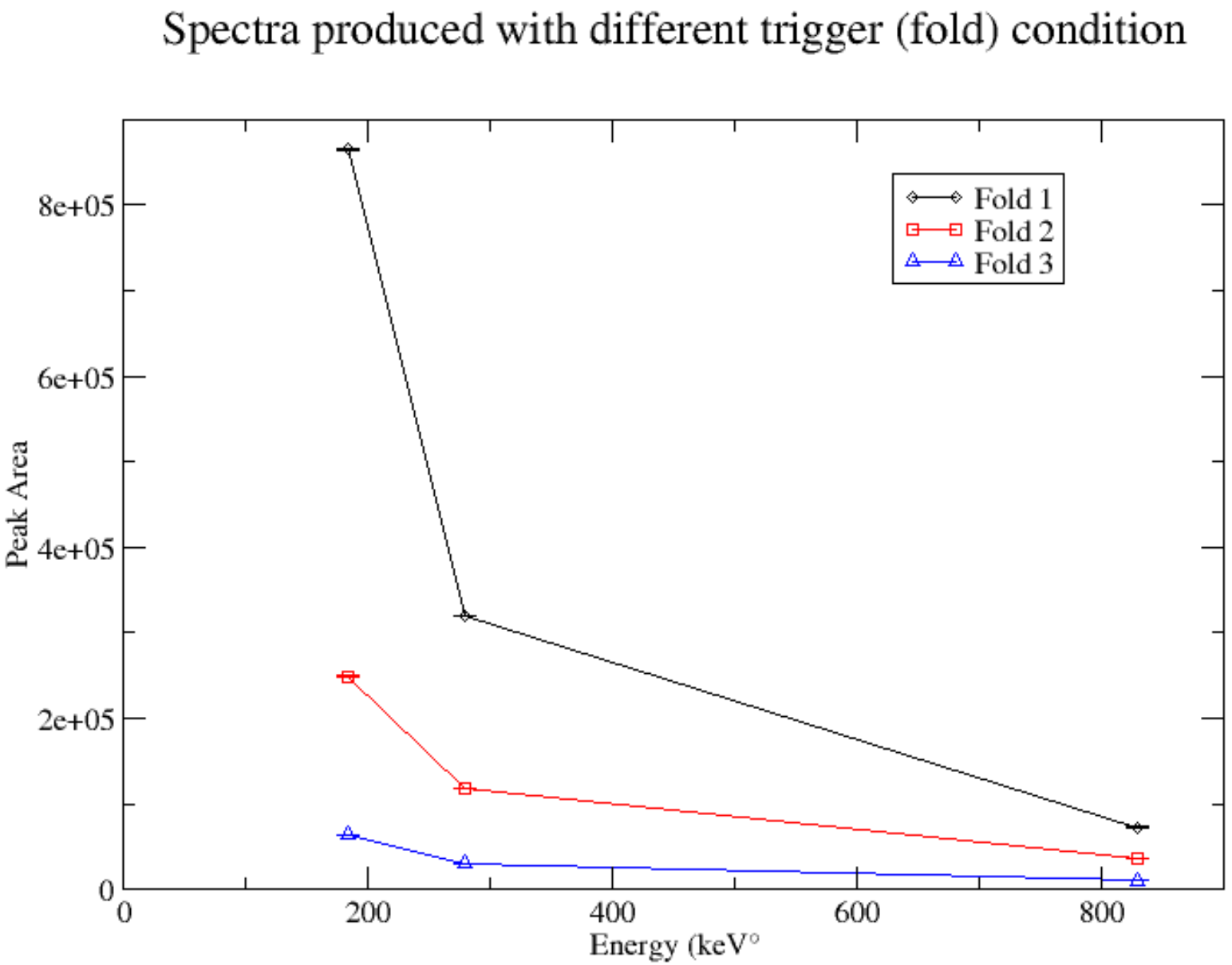


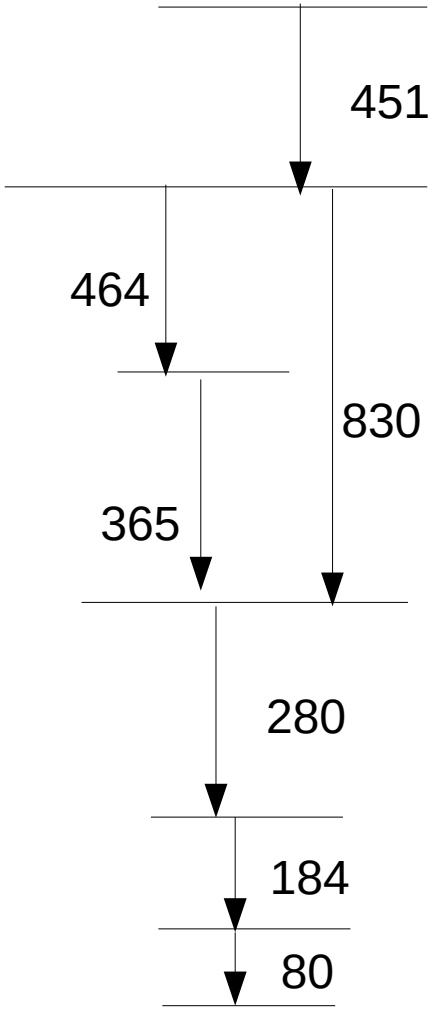


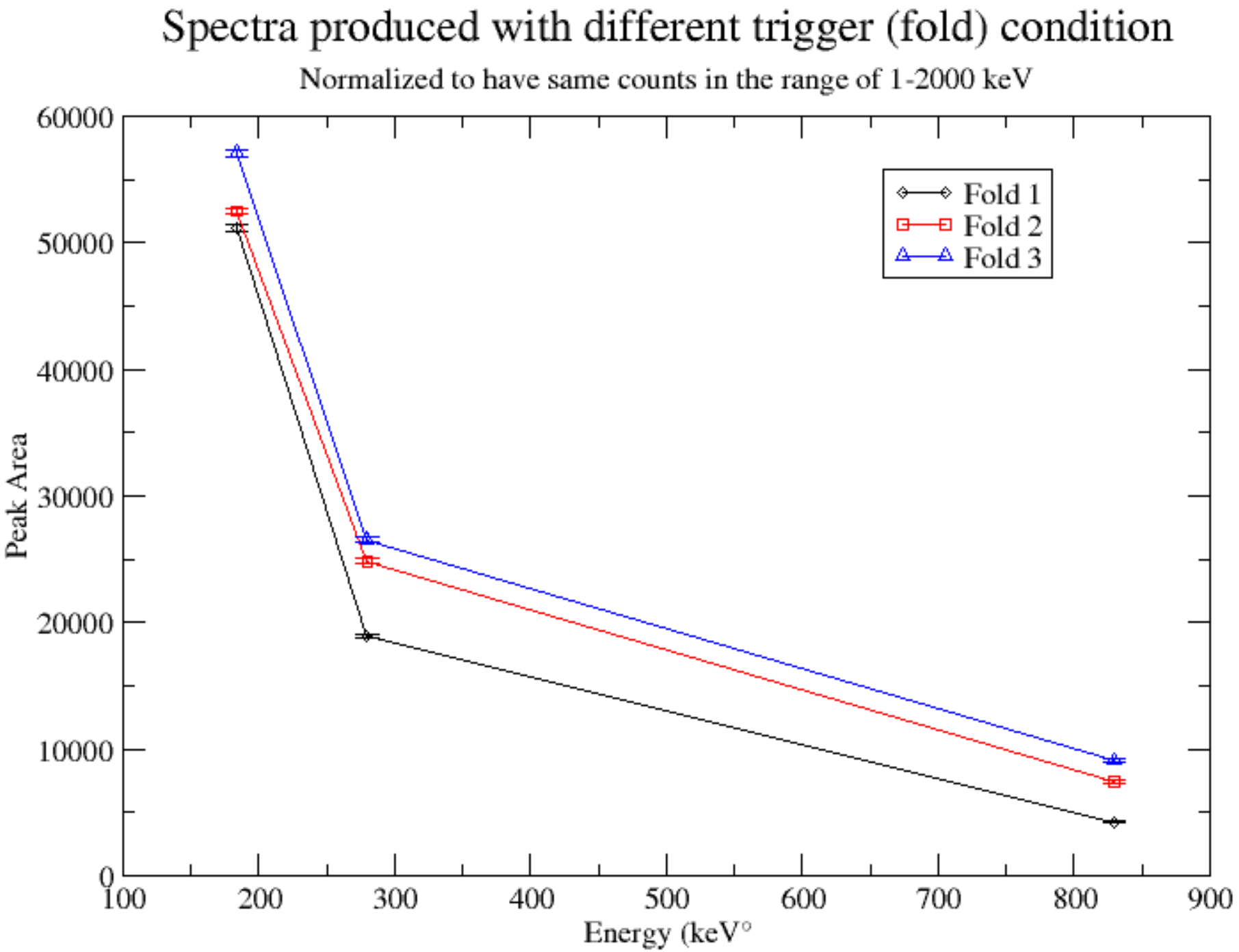


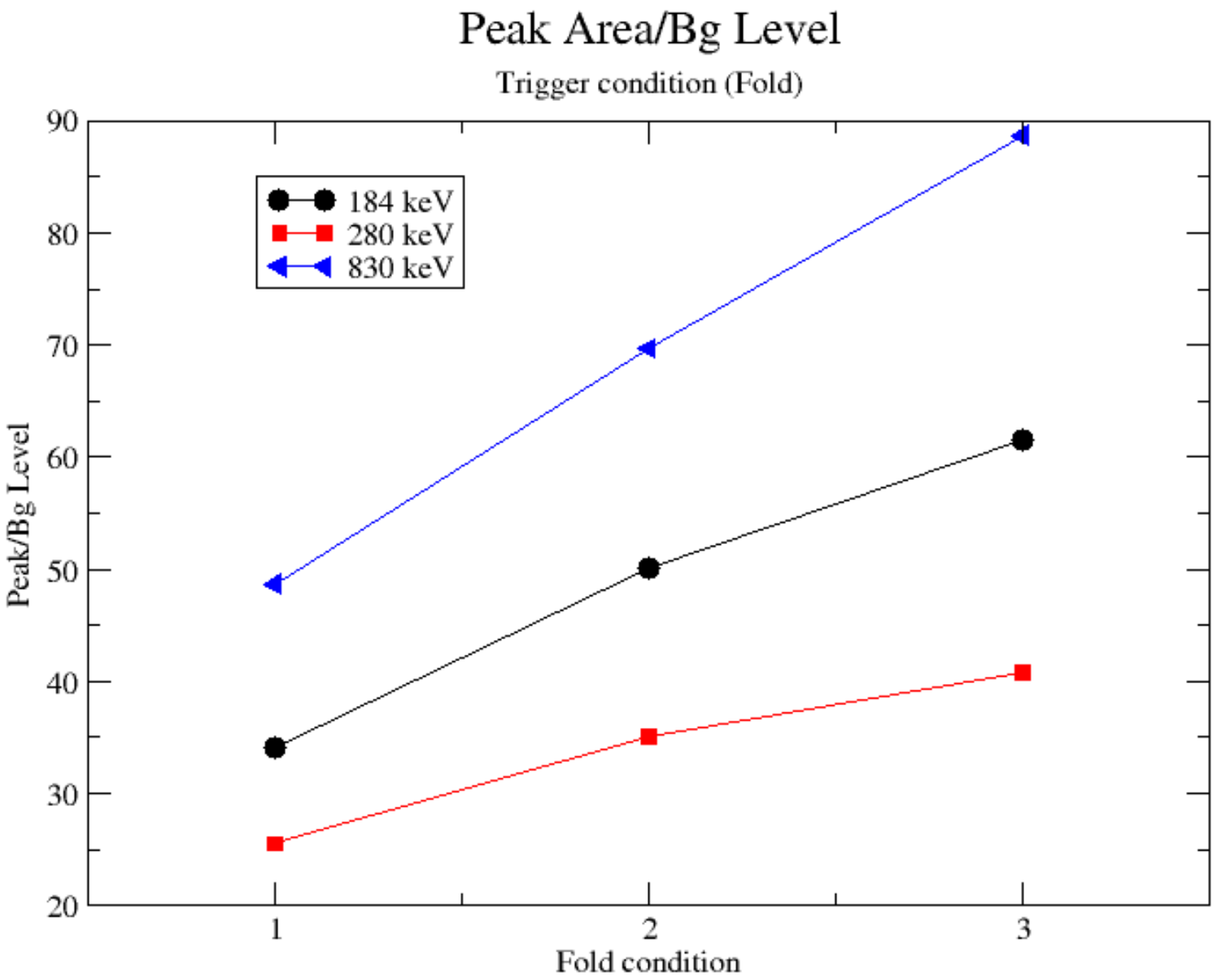
Intensity pattren as a function of the number of crystals in tracked data

Fold >= 1, 2, 3



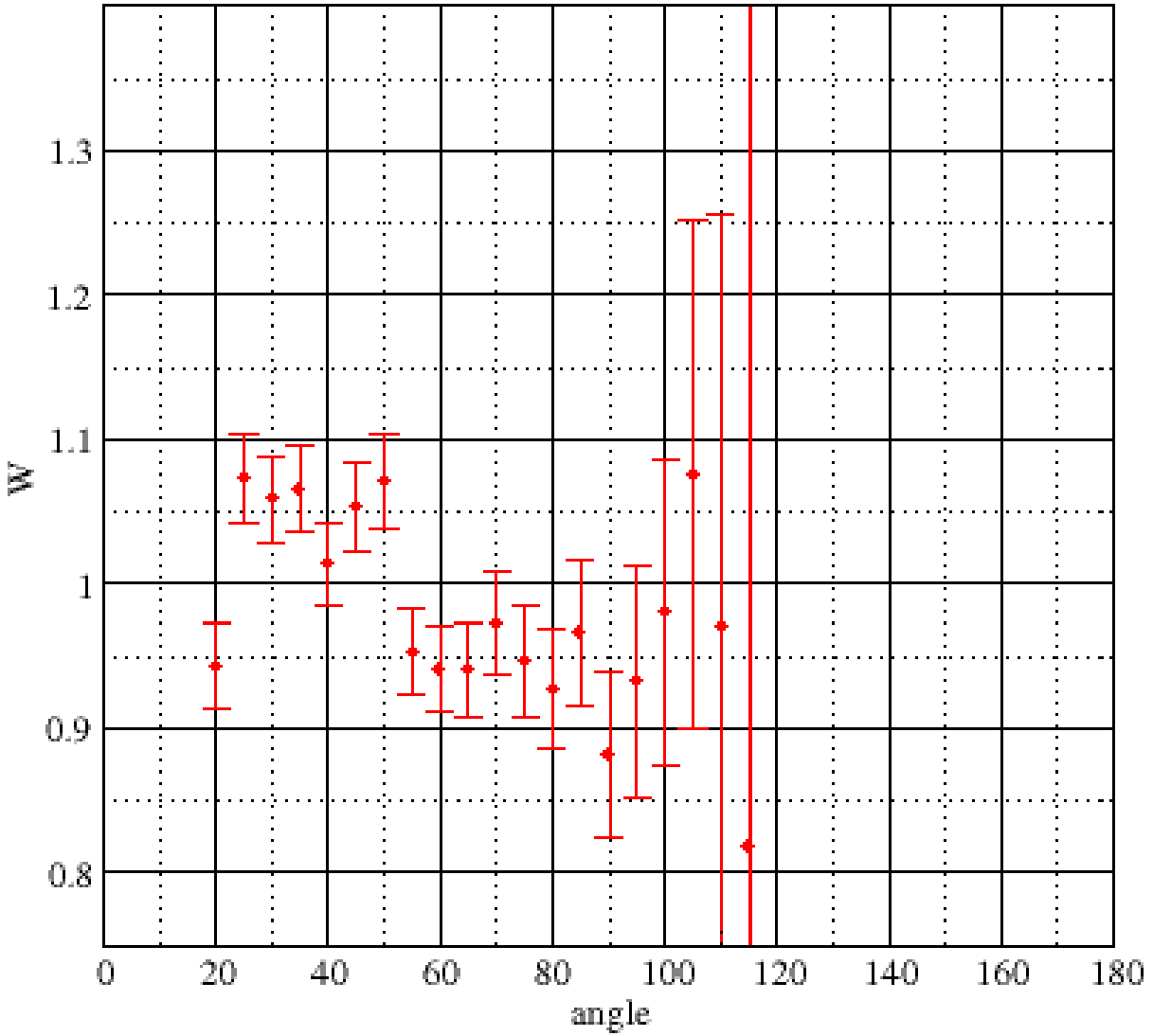



Spectra produced with different trigger (fold) condition
Normalized to have same counts in the range of 1-2000 keV
Fold 1
Fold 2
Fold 3
Peak Area
Energy (keV°
60000
50000
40000
30000
20000
10000
0
100
200
300
400
500
600
700
800
900


Peak Area/Bg Level
Trigger condition (Fold)
184 keV
280 keV
830 keV
Peak/Bg Level
Fold condition
90
80
70
60
50
40
30
20
1
2
3

Angular correlation- ^{166}Ho Peaks: 280&184,

Weak signal - But there



Statistics ? Source not centered?

Conclusion…

Response function at high multiplicity :
With more crystals will be better
45 crystals in the array

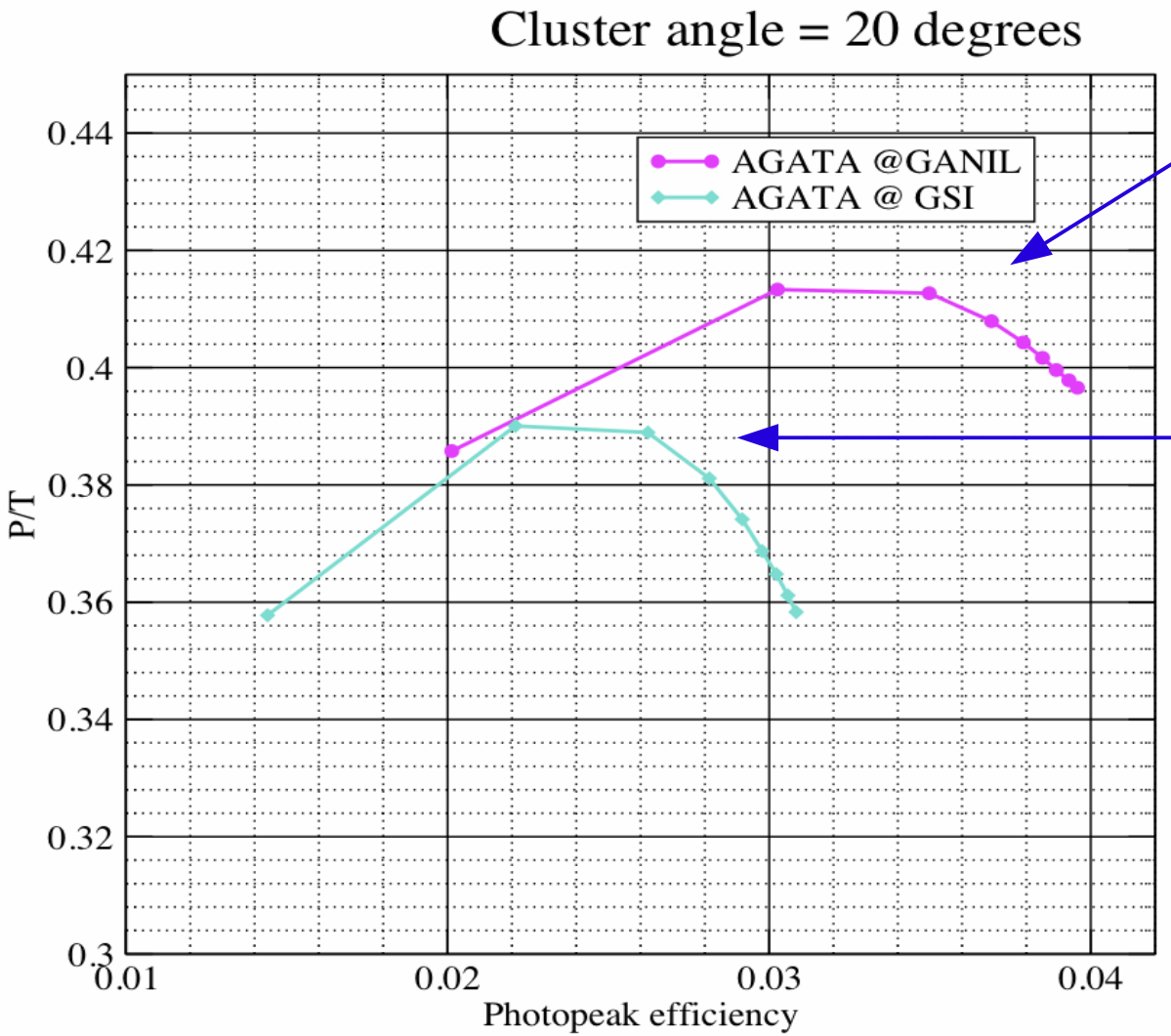
TBD : Compare Er data to Gammasphere with 24 crystals in the array

Extra slides

AGATA GSI & GANIL

Tracked data including single interactions

More crystals results in better performance



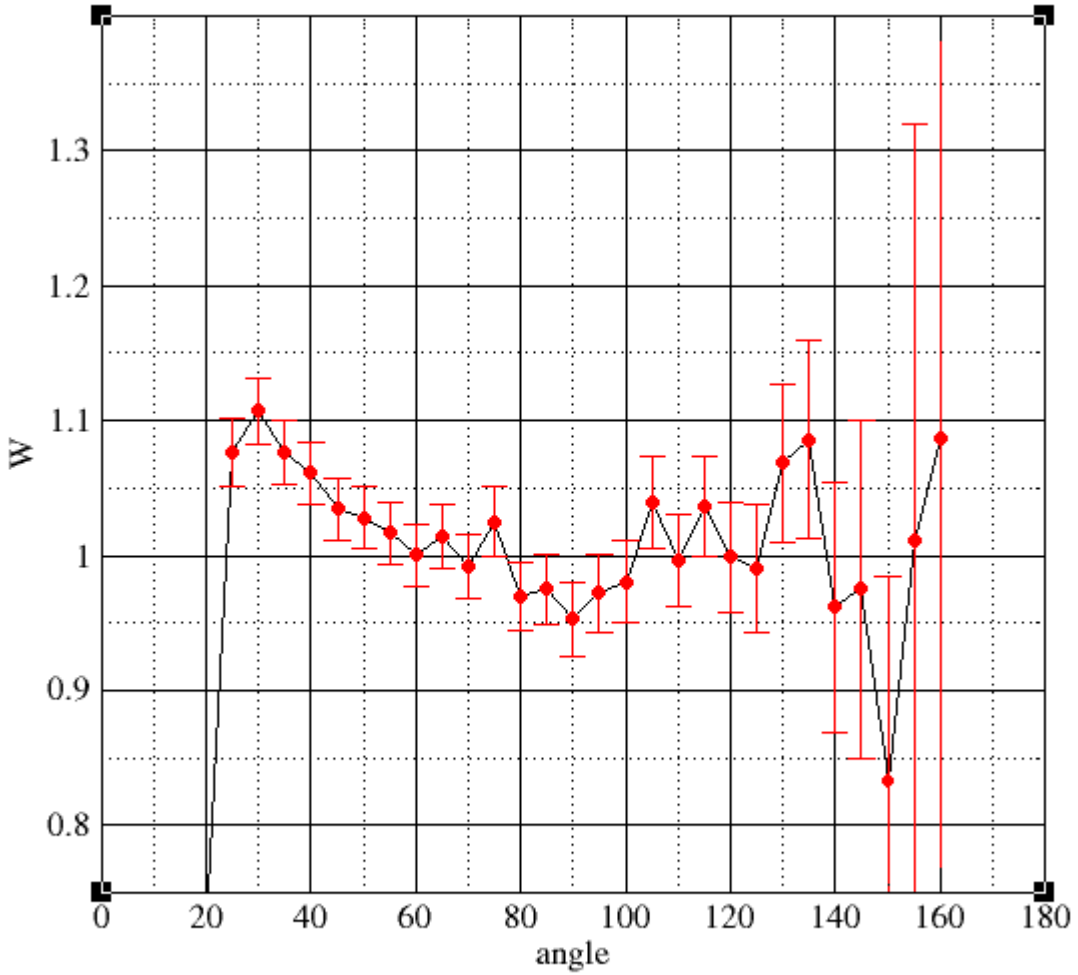
FOM =0.8
Eff=3.7 % P/T= 41%

FOM=0.8
Eff=2.8 % P/T= 38%

Scaling efficiency : OK
21/29 * 3.7% = 2.7 %

Scaling P/T : no

^{166}Ho- Peaks: 280&184, nice E2s GRETINA data



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