Last Analysis Results

Changing the dynamical range

Frascati, 18 Novembre 2011 - SIDDHARTA Iternal Report

The Data Set

- old one: 20110725_1740_1812 (170 Hz - 40KV, “-5microA”) - about 30 min

SDDs temp: top = -115.8ºC, bott1=-107.6ºC, bott2=-109.3ºC

TRoom=22.92ºC

Conditions:

Press: vacuum press = 1.44×10^{-7} mbar, target press = 0.1191 mbar

- new ones: 20111115_1528_1630 and 20111115_1631_1732 (170 Hz - 40KV, “-5microA”) - about 60 min each (more statistics)

Dynamical range changed for chip 61,62,63!

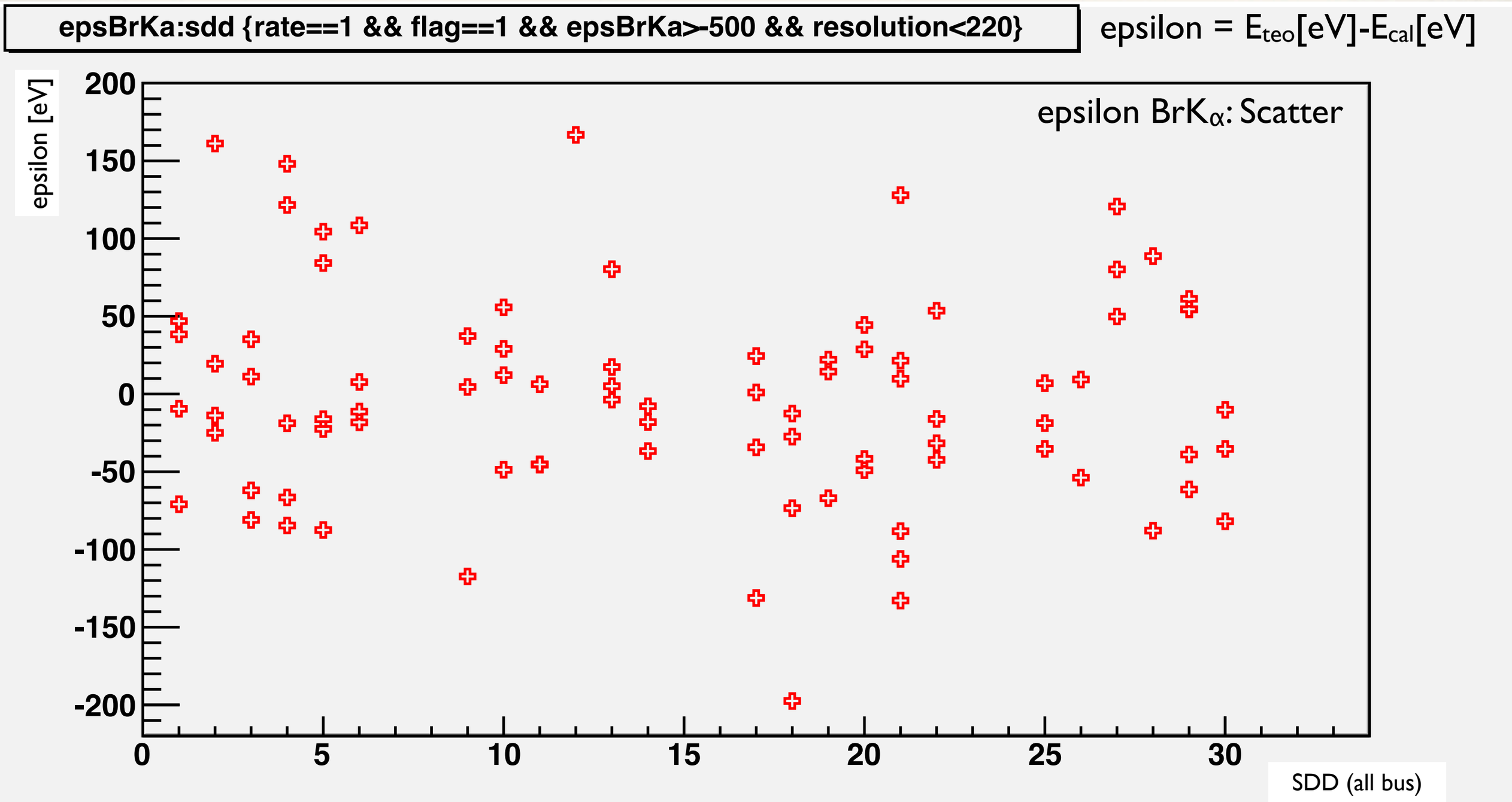
SDDs temp: top = -116.9ºC, bott1=-109.0ºC, bott2=-110.7ºC

TRoom=24.21ºC

Conditions:

Press: vacuum press = 4.94×10^{-6} mbar, target press = 0.1221 mbar

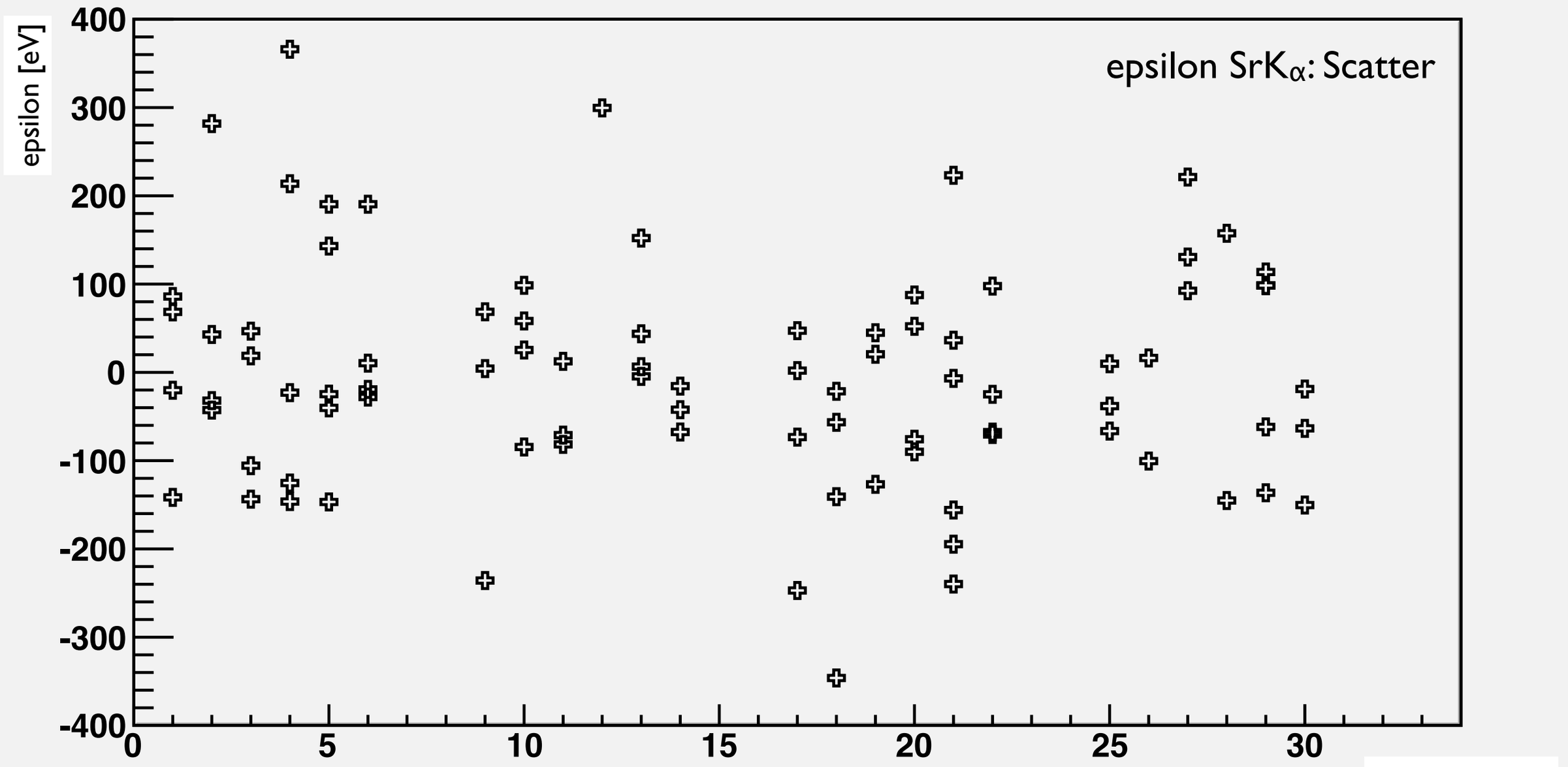
Last meeting: non-linearity (Br)



Last meeting: non-linearity (Sr)

epsSrKa:sdd {rate==1 && flag==1 && epsBrKa>-500 && resolution<220}

epsilon = E_{teo}[eV]-E_{cal}[eV]



Some questions from last meeting

- About the large spread in epsilon: where does it come from?

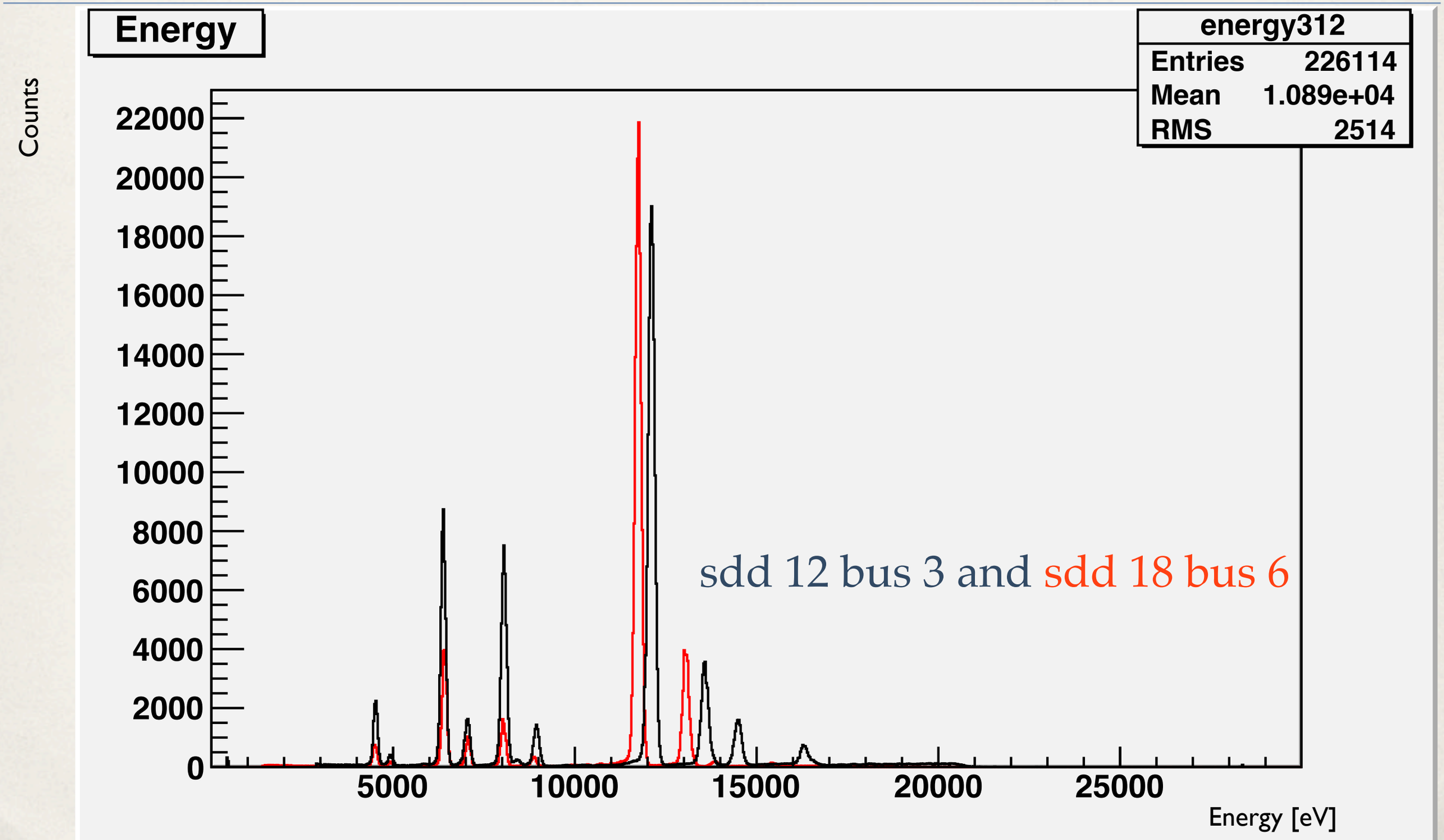
- Is it the analysis program used reliable?

- And then, can we have some hints about the non-linearity source? The detector? The electronics?

Analysis Program Reliability

A huge fault of the program in the worst cases?

Comparing two “bad linearity” SDDs with an opposite trend in the “response function”



Analysis Program Reliability

- So, in the worst cases (a few hundred of eV for the epsilon in Br and Sr region), the non-linearity source doesn't seem a huge fault of the analysis program

- Others check (to do):

check the fits done for possible asymmetries in the shape of the peaks (Hide's Suggestion)

To do the calibrations fixing Ti and Cu lines (Shinji's Suggestion)

Reminder

- A simple fit (3 disconnected gaussian at 2σ) for TiKα, FeKα and CuKα peak (4.5keV÷8.1keV)

- Using these lines for the calibration, we see the positions of Br and Sr Kα and Kβ peaks

Non-Linearity Source

- Changing the dynamical range of tree chips (61, 62 and 63), we can compare the old results with the new ones for these 18 SDDs

- Now, for these 3 chip the dynamical range is changed from “0”-20keV to “0”- 40 keV

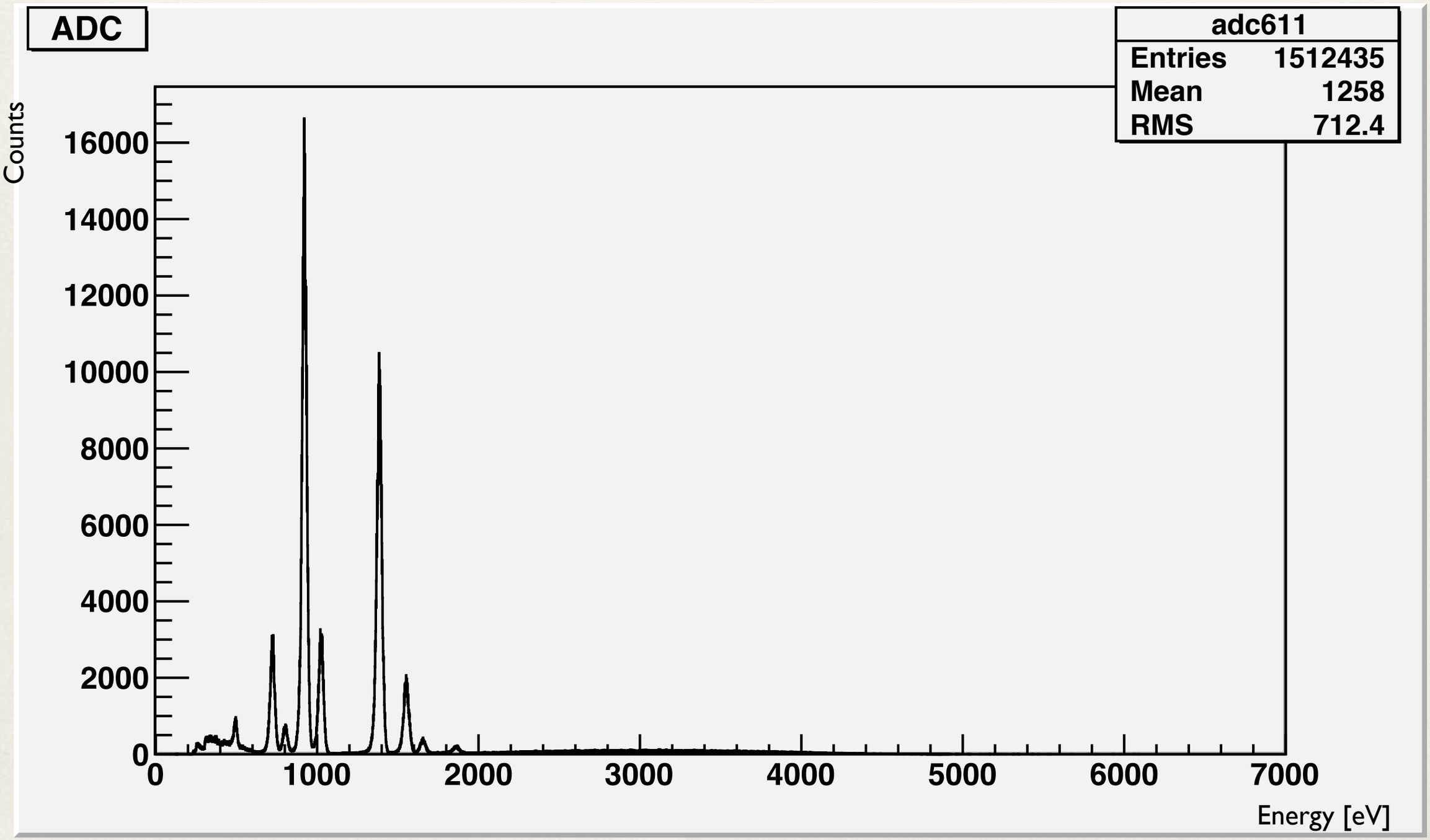
- To avoid any doubt, I have analysed the spectrum coming from these chips one by one by hand

- To have a comparison point I have analysed in this way the old data for these chips as well, choosing the same fit procedure used by the analysis program (the standard simple fit)

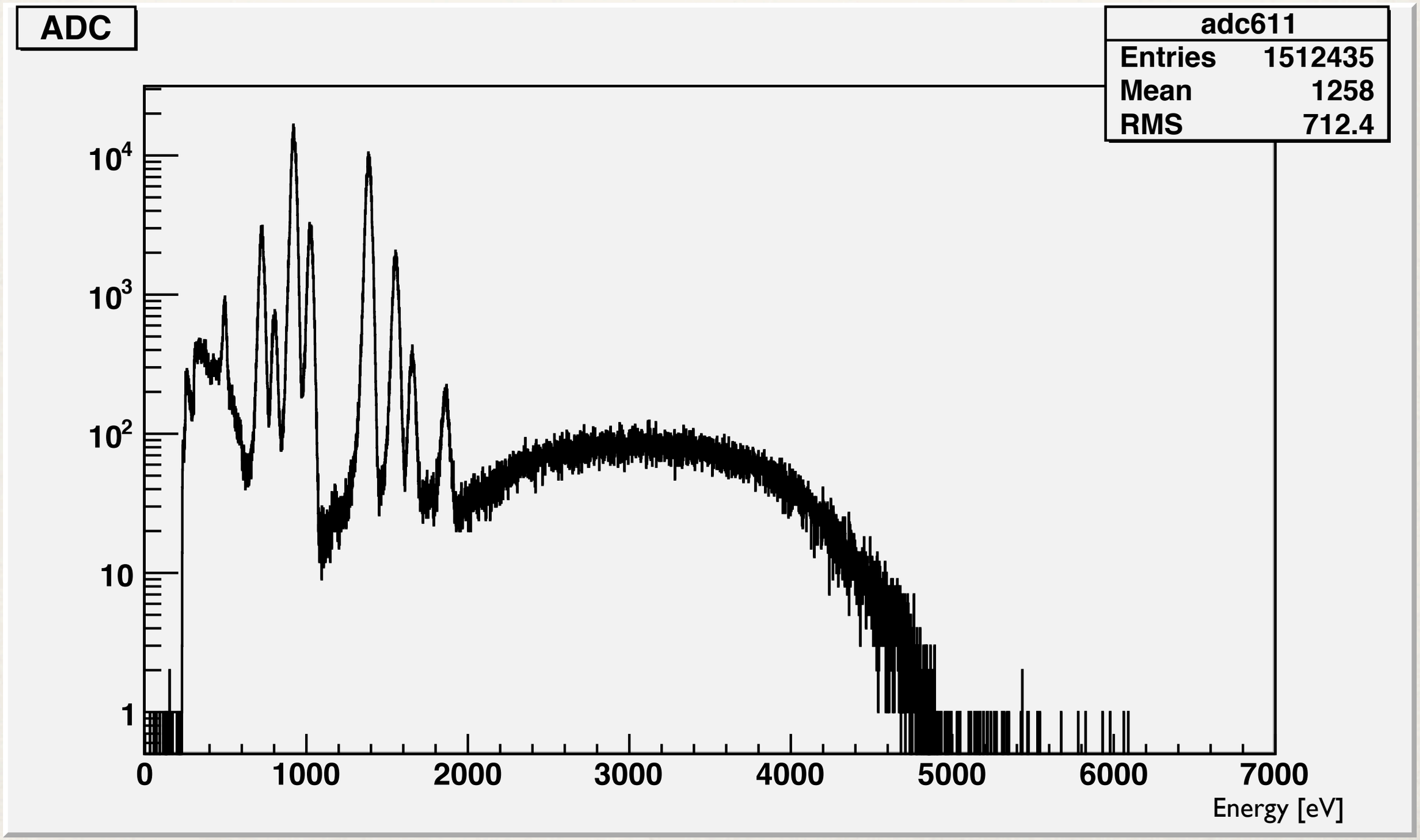
- This is for check in another way the reliability of the program (...I obtained the same results...)

The new spectra

To have more statistics I have summed the 2 new files



The new spectra



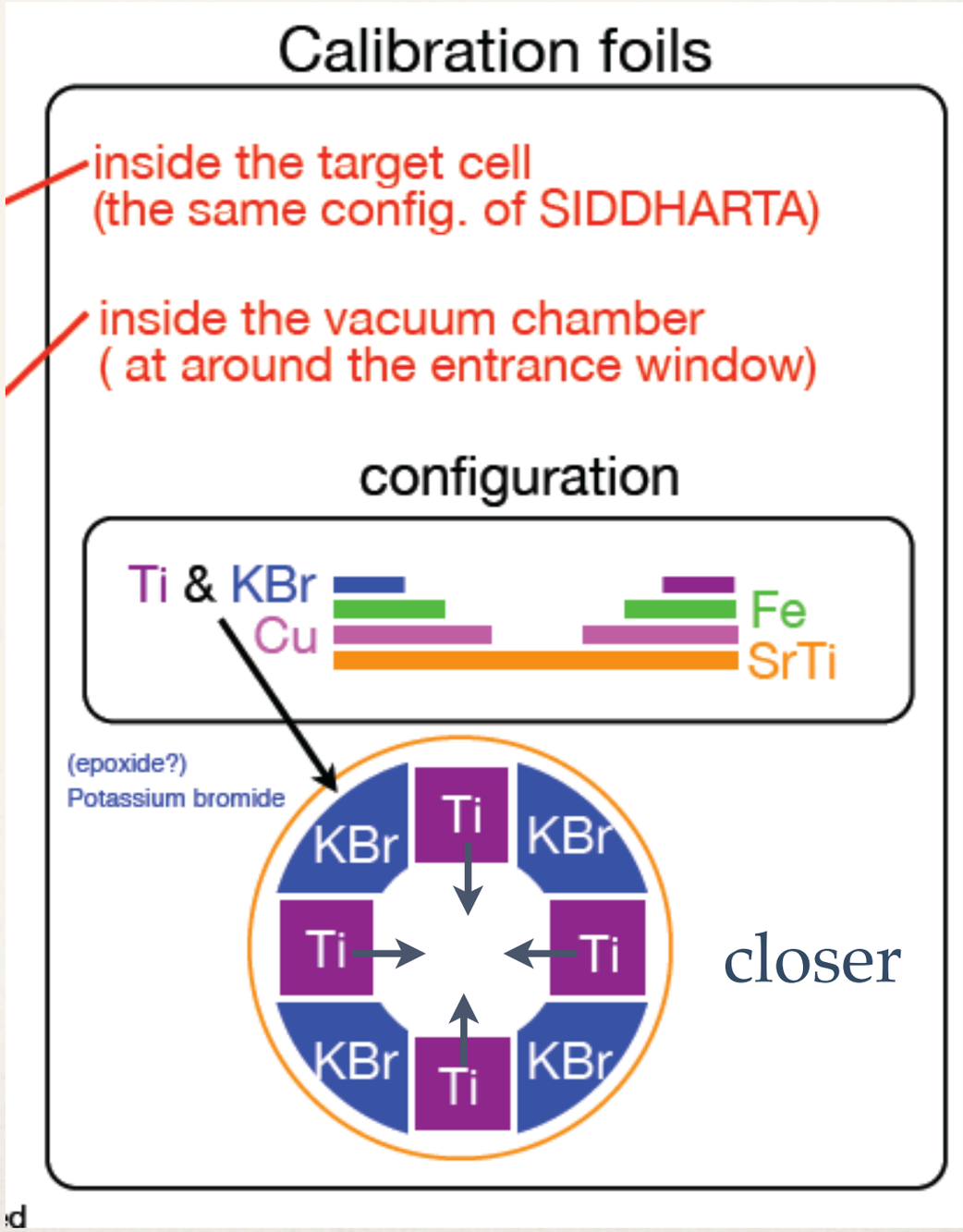
Few comments

- To see the Ti peaks with this new configuration, we have lowered the DaQ-Offset from 0.1V to 0.05V (Massimiliano)

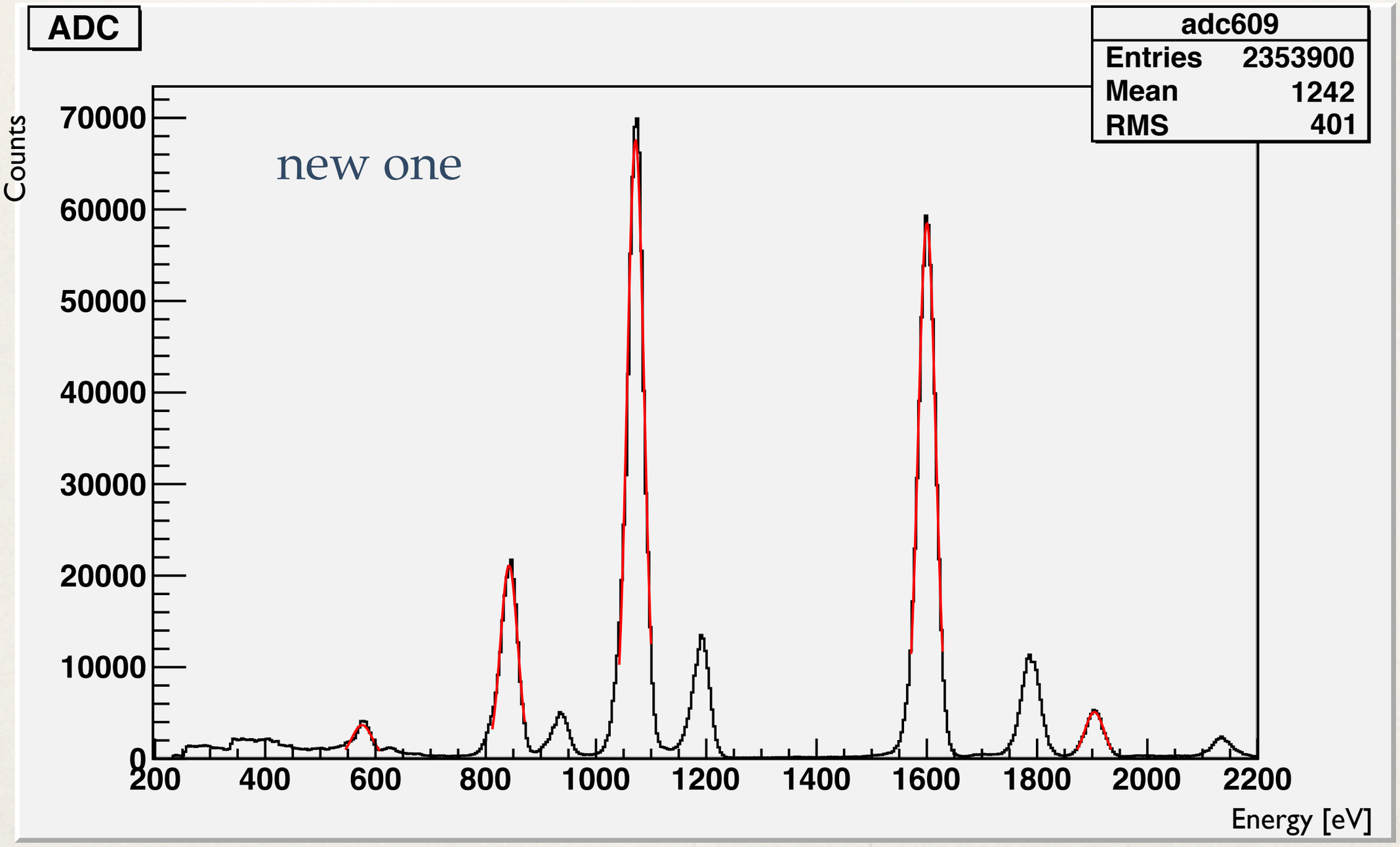
- To have bigger Ti peaks in the spectra, we slightly modified the the foils "sandwich" (Mihail)

but, in some spectra (4) we have still a very small Ti peaks!

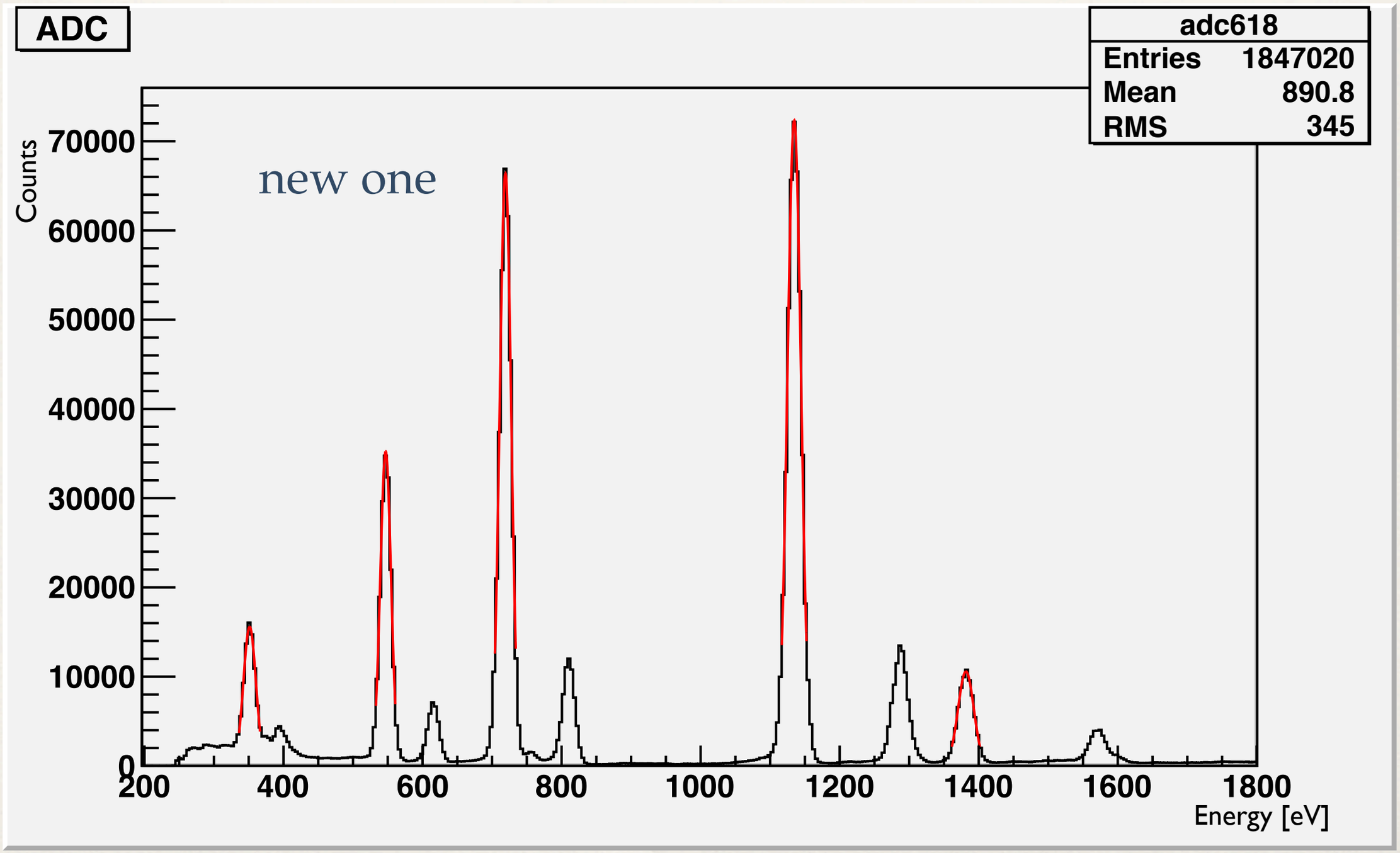
From Shinji's report



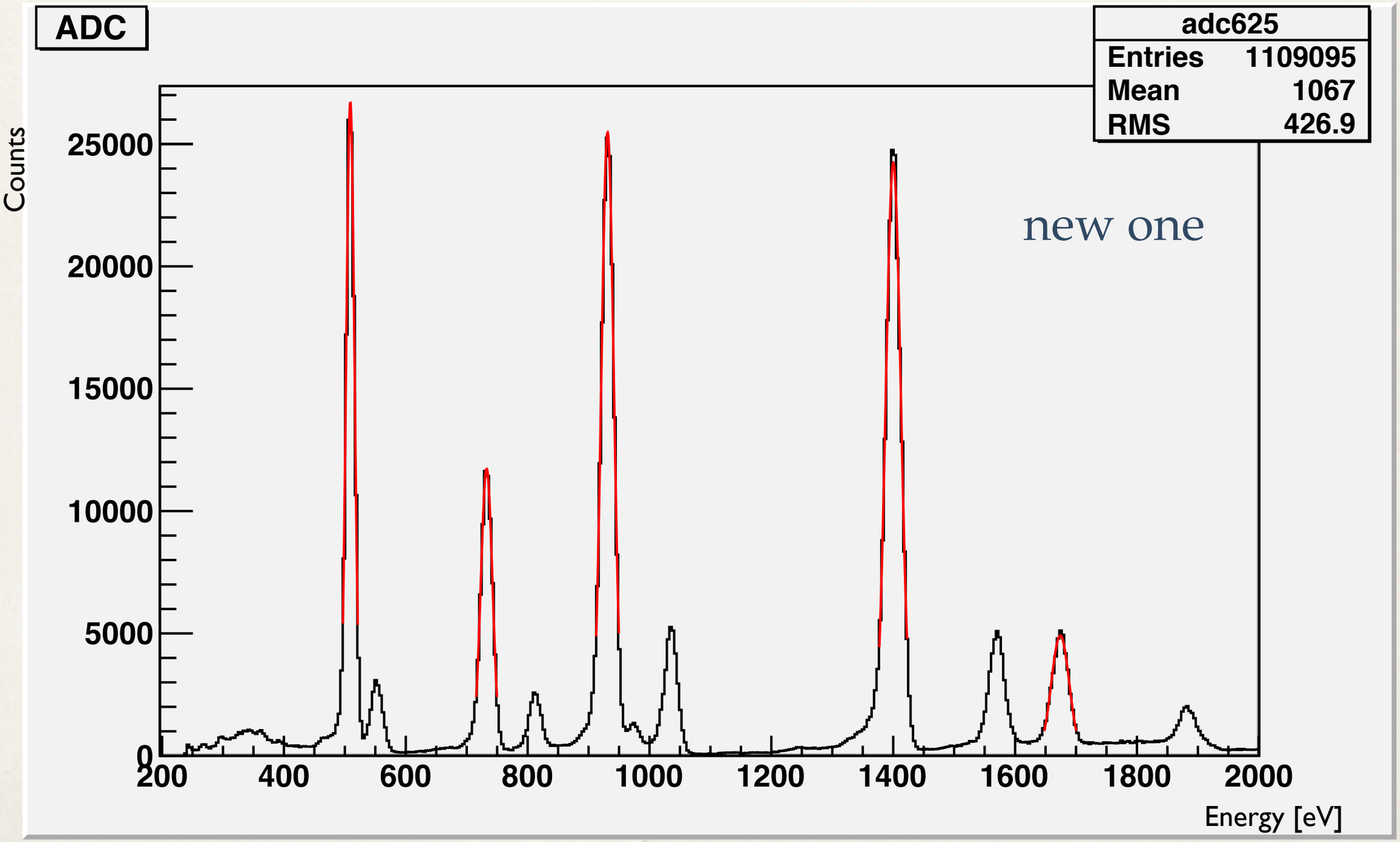
Some example of the fits (1/3)



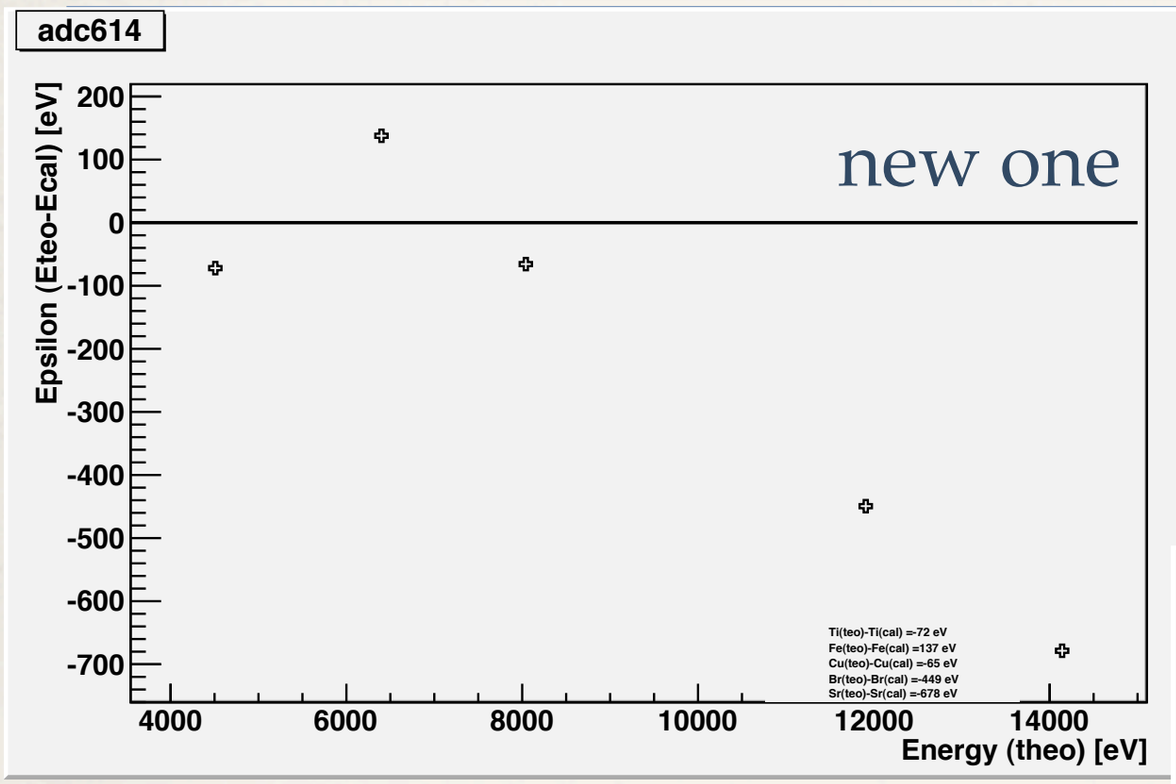
Some example of the fits (2/3)

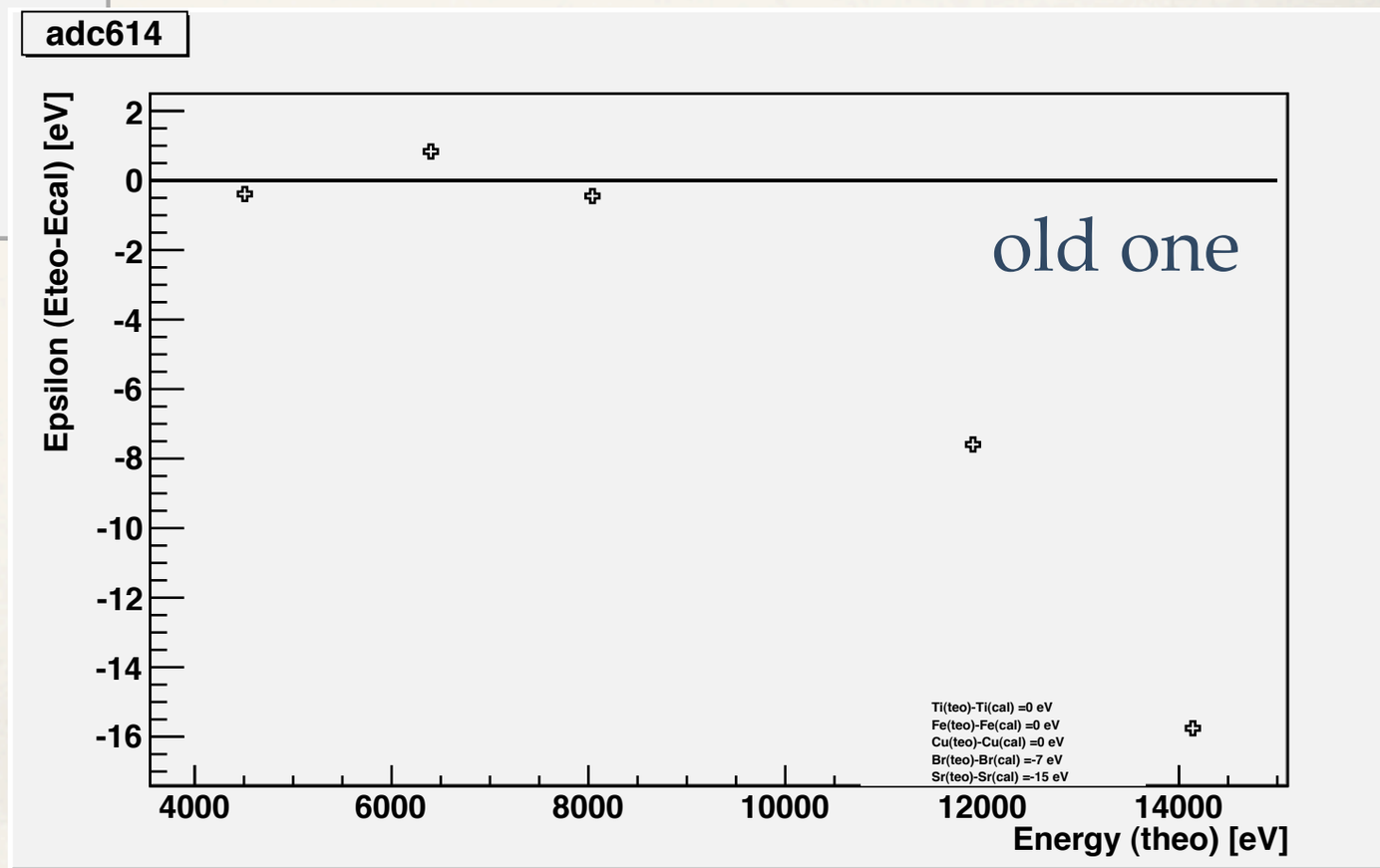


Some example of the fits (3/3)

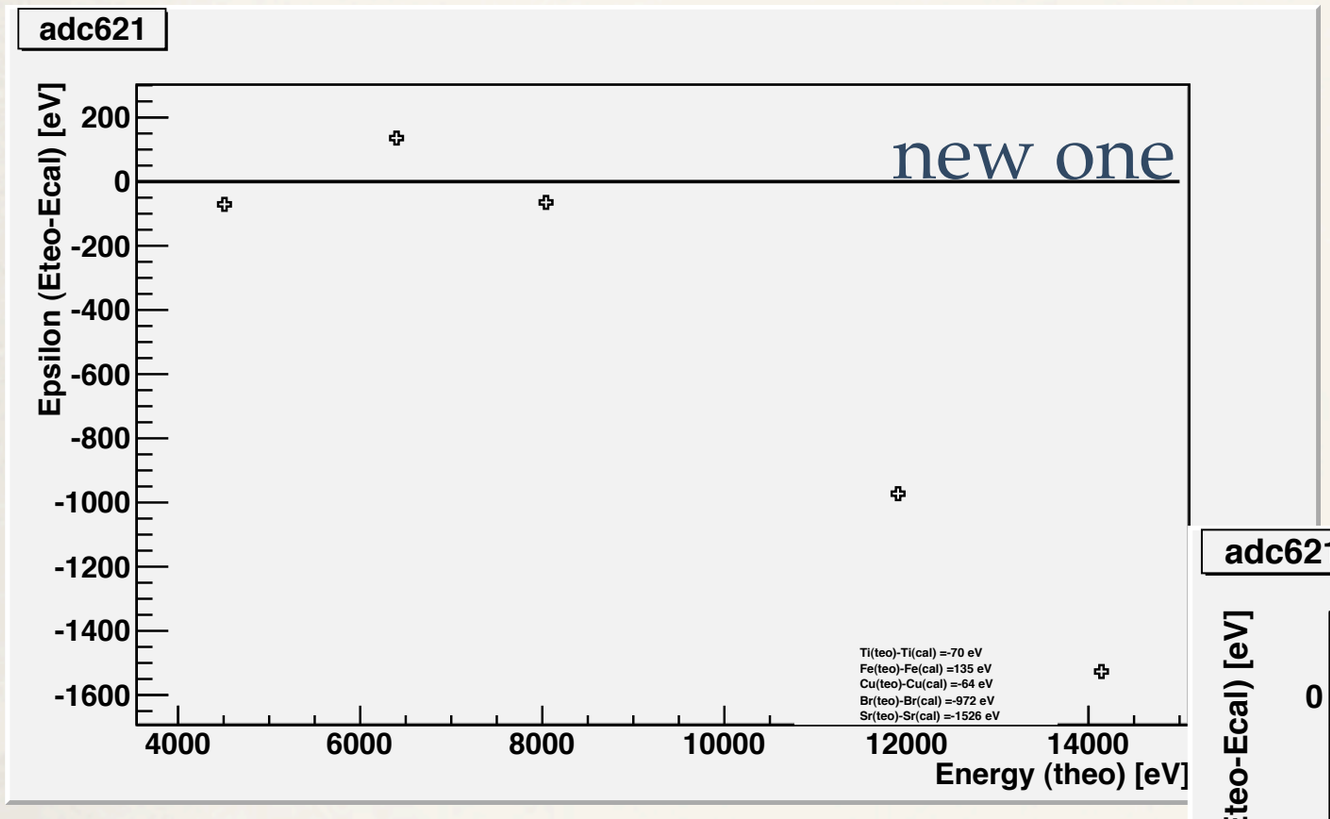


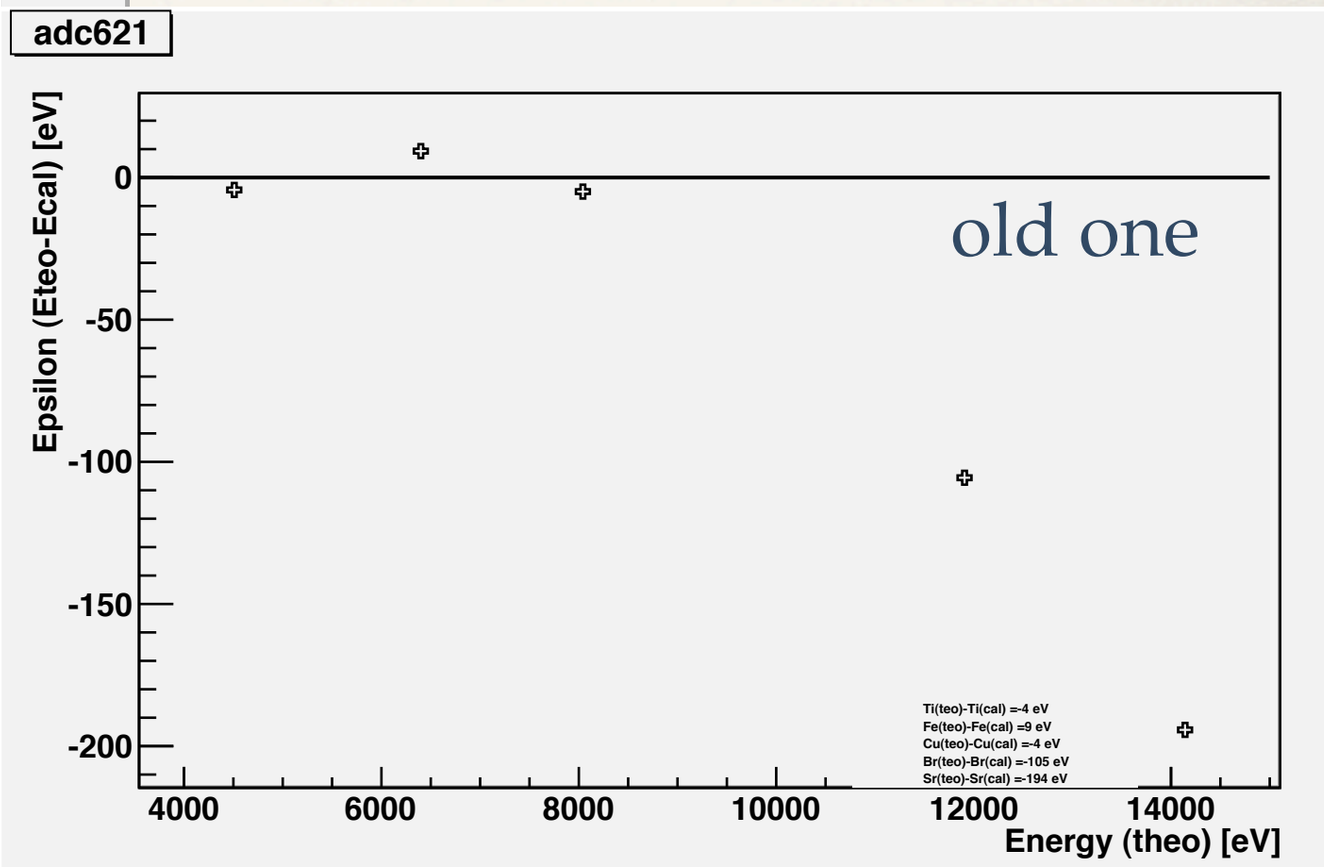
Linearity - some examples (1/3)



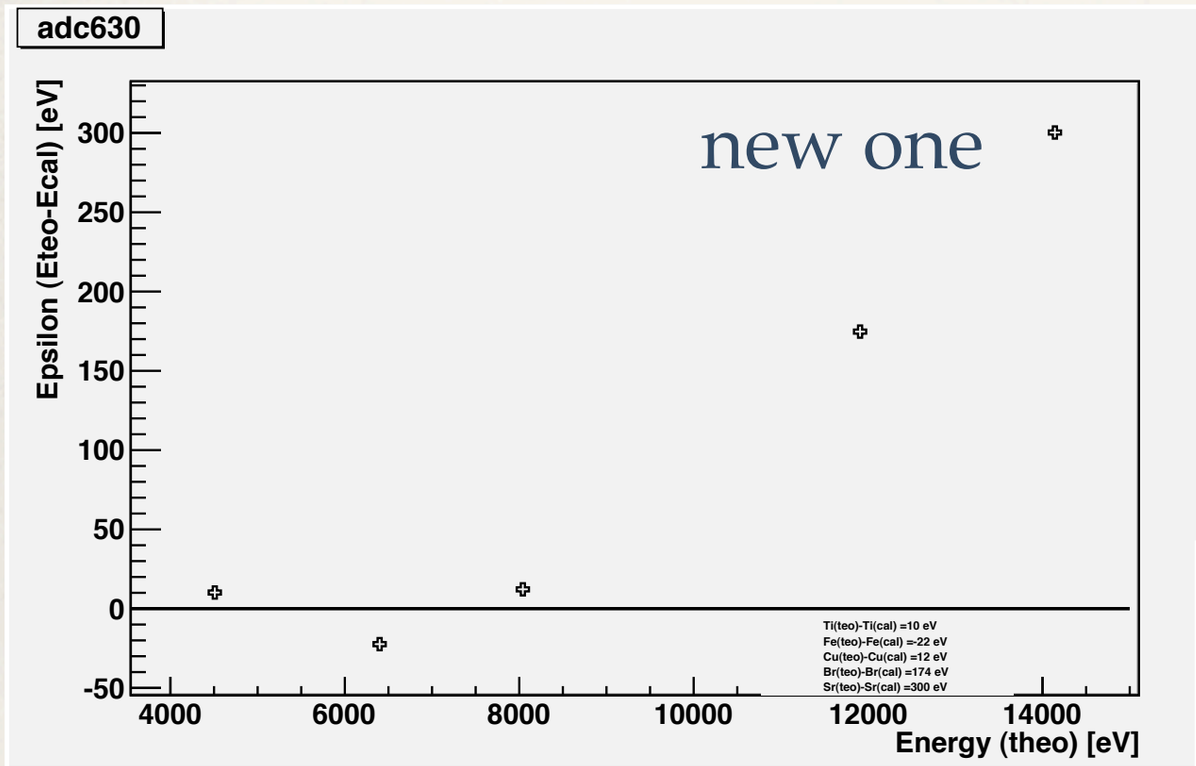


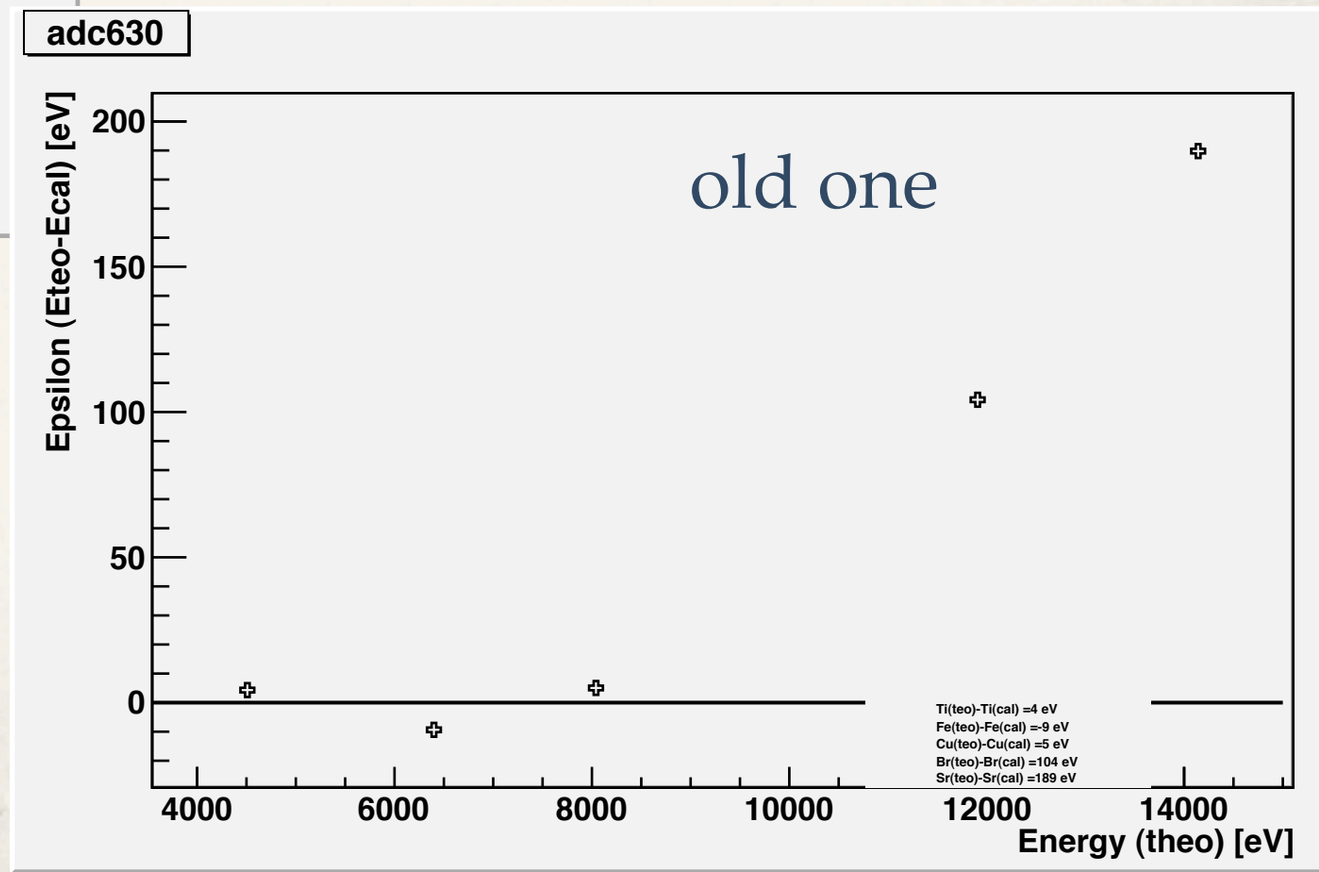
Linearity - some examples (2/3)





Linearity - some examples (3/3)





Summarising

adc	old Br & Sr (eps [eV])	new Br & Sr (eps [eV])
609	4 & 4	107 & 179
611	- 44 & - 80	52 & 65
613	78 & 150	168 & 295
614	- 7 & - 15	- 449 & - 678
618	- 198 & - 347	- 125 & - 264
619	14 & 21	134 & 209
620	- 41 & - 74	- 25 & - 64
621	- 105 & - 194	- 972 & - 1520
625	- 42 & - 71	- 63 & - 122
626	9 & 16	44 & 78
630	104 & 189	174 & 300

Conclusions

- It seems that the non-linearity could come from the electronics (hopefully)
- ...but my knowledges about the overall setup are not enough to bring a definitive conclusion...
- In my opinion, a discussion involving:

  The electronics part

  The detector response part

  The analysis part

- is needed!