PVeto checks
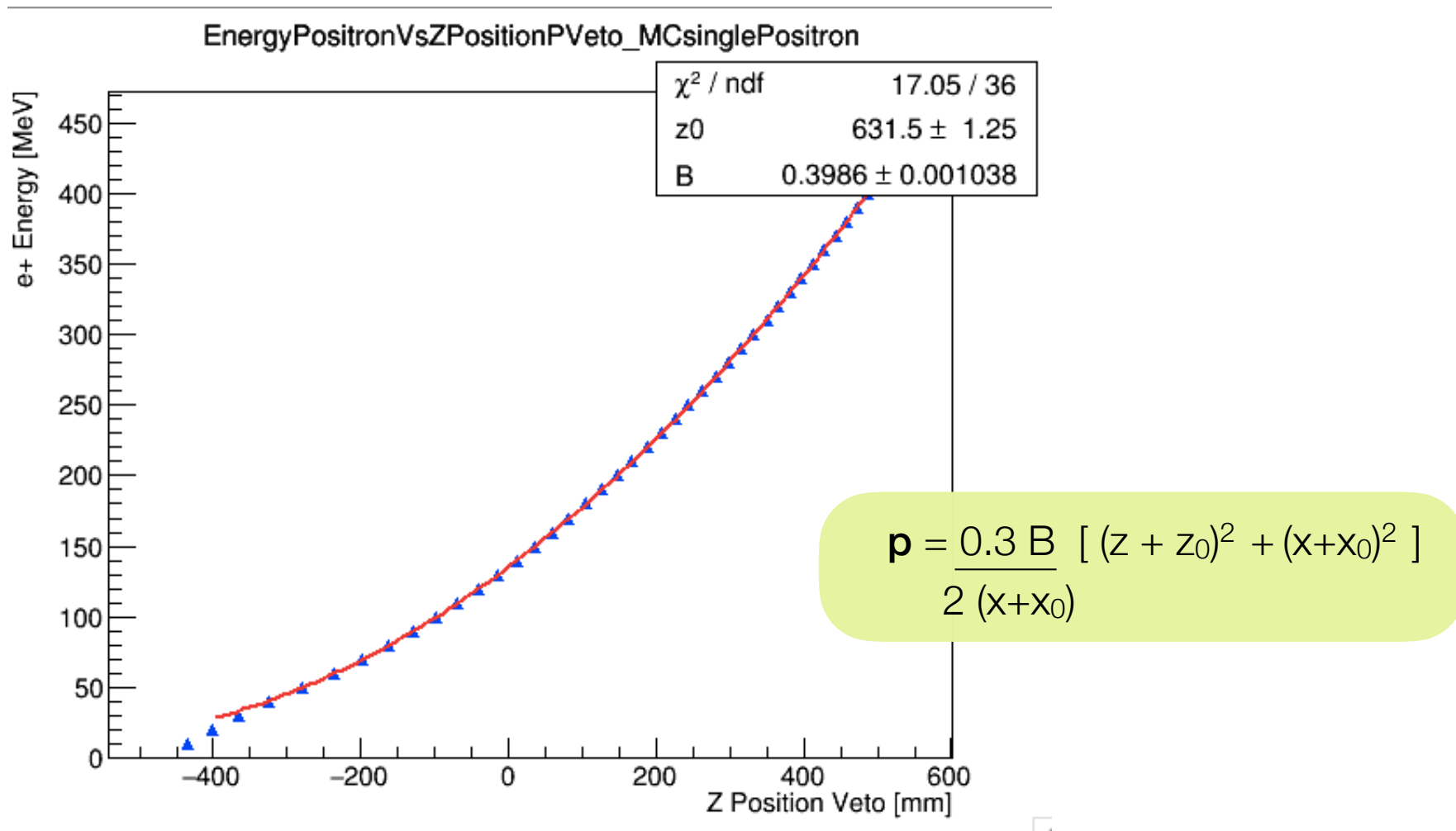
F. Oliva on behalf of the PADME Lecce group

OUTLINE

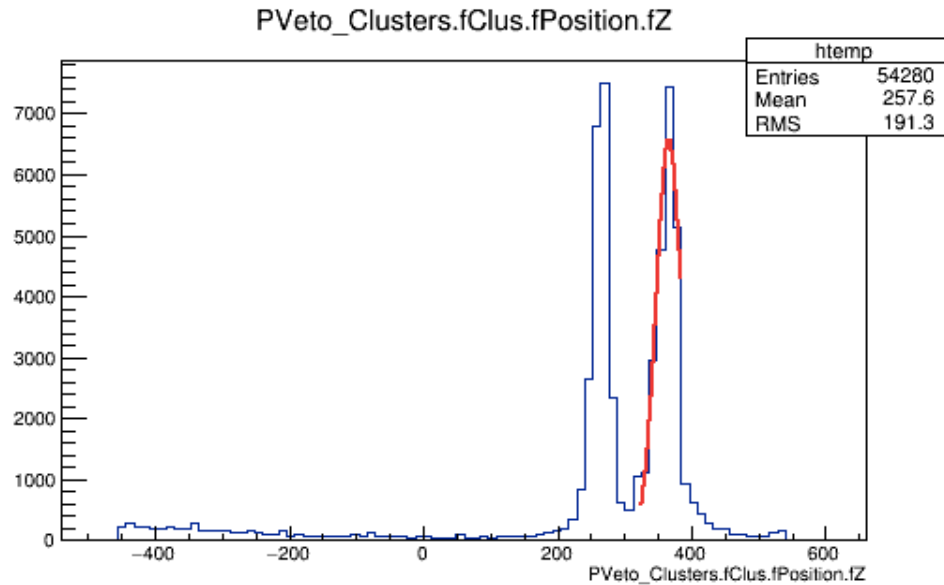*Does the analytic function obtained with MC single positron work for real data?*

Correlation work to obtain the function with the indirect method(from SAC and PVeto coincidence) made after veto tuning and MC time calibration alignment

Analytic function obtained from MC single positron

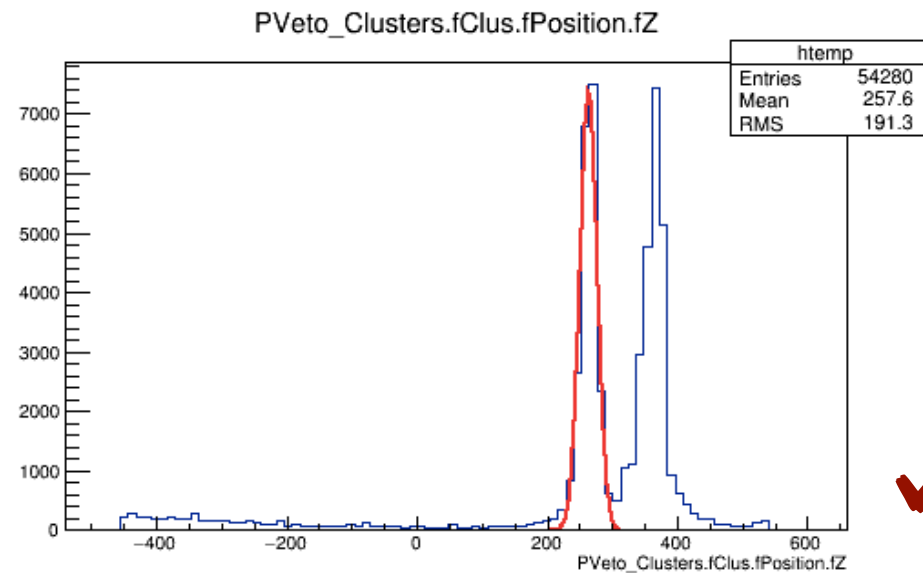EnergyPositronVsZPositionPVeto_MCsinglePositron

χ^2 / ndf	17.05 / 36
z0	631.5 ± 1.25
B	0.3986 ± 0.001038

$$p = \frac{0.3\ B}{2\ (x+x_0)} \left[(z + z_0)^2 + (x+x_0)^2 \right]$$

SINGLE POSITRON DATA   *E=490 MeV*

B obtained from the dipole calibration function

I = 311.80 A   B=0.605 T

Z = 366.25 mm

E (analytic function) = 486.779 MeV*

I = 381.80 A

Z = 263.584 mm   B=0.7455 T

E (analytic function) = 486.936 MeV*

✓ *Check analytic function*   *E=490 MeV obtained*

Federica Oliva   ***From single positron**   PADME internal Meeting

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The analytic function seems to work quite good also for DATA.

Summarizing SAC informations..

DATA

SAC calibration constant allow to have a mean energy of 545 MeV(energy of the single positron beam), so they are trustable
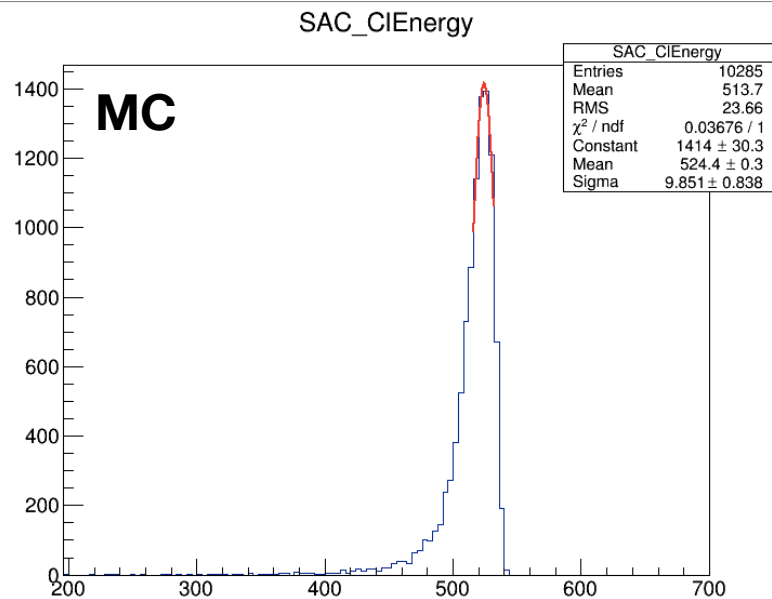
MC

Try to fire 10k photons on SAC, to evaluate the scale energy factor

Evaluation of the response with energy **Linear response**
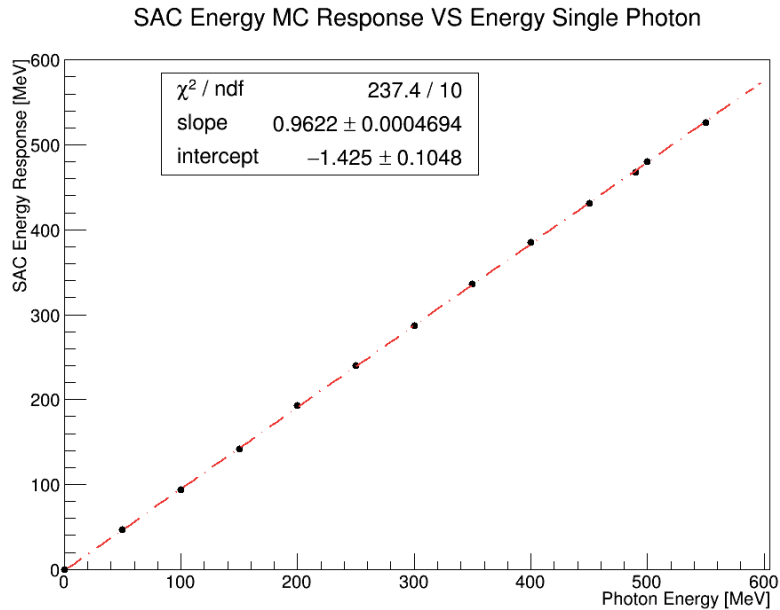
SAC MC simulation

SAC_ClEnergy

SAC_ClEnergy	
Entries	10285
Mean	513.7
RMS	23.66
χ^2 / ndf	0.03676 / 1
Constant	1414 ± 30.3
Mean	524.4 ± 0.3
Sigma	9.851 ± 0.838

MC

MC production 10k photons on SAC

Gaussian Fit Mean (524.4 ± 0.3) MeV

E = 545 MeV

Scale E factor =545/524.4~1.039

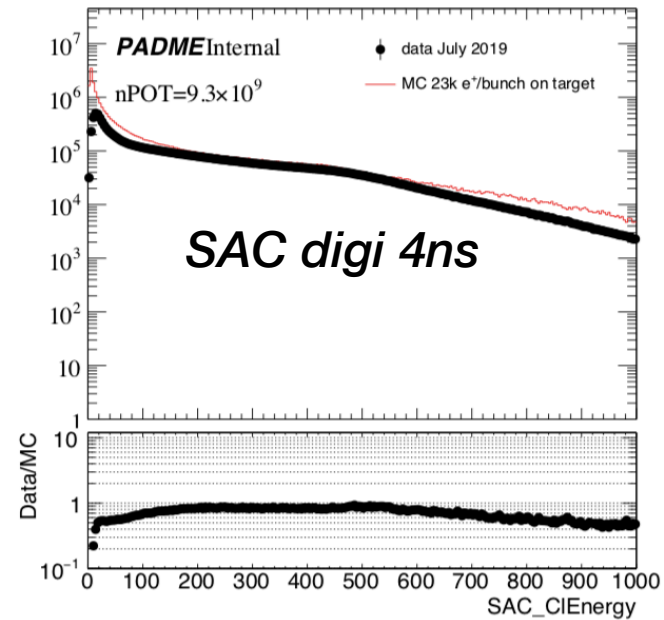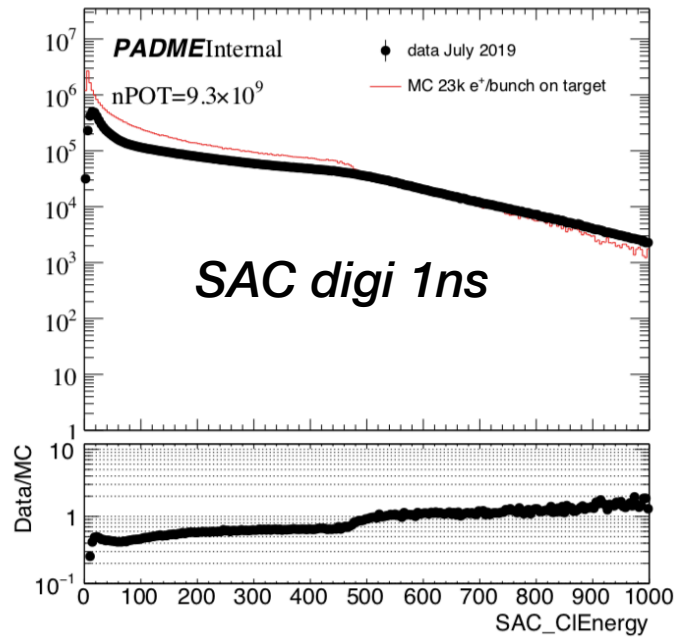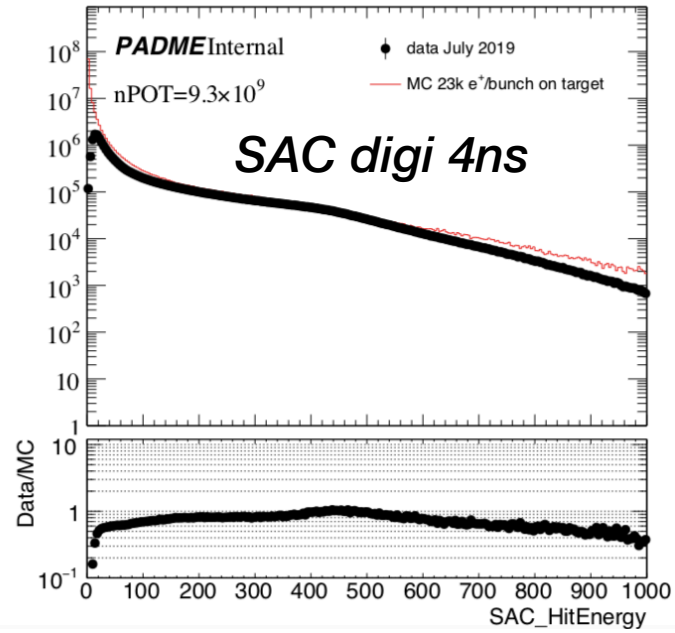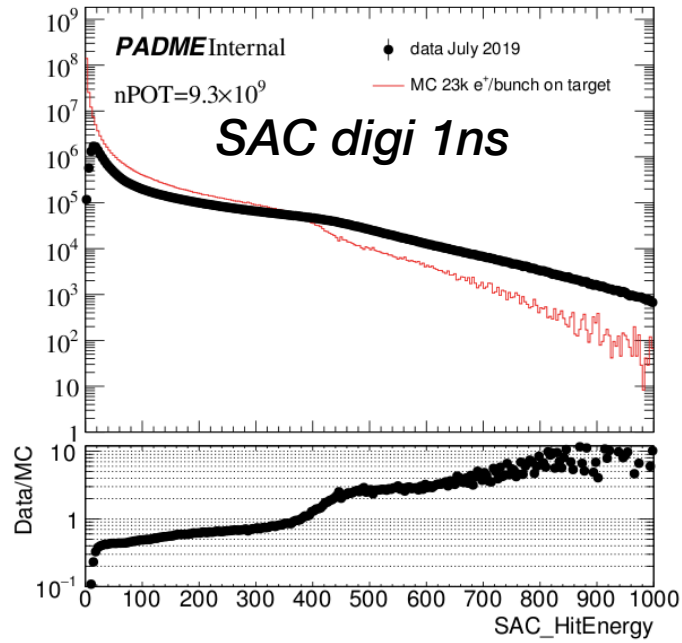All the following studies have been performed both for MC and MC rescaling SAC energy

SAC Energy MC Response VS Energy Single Photon

χ^2 / ndf	237.4 / 10
slope	0.9622 ± 0.0004694
intercept	−1.425 ± 0.1048

SAC Response = PhEn*0.9622 -1.425 MeV
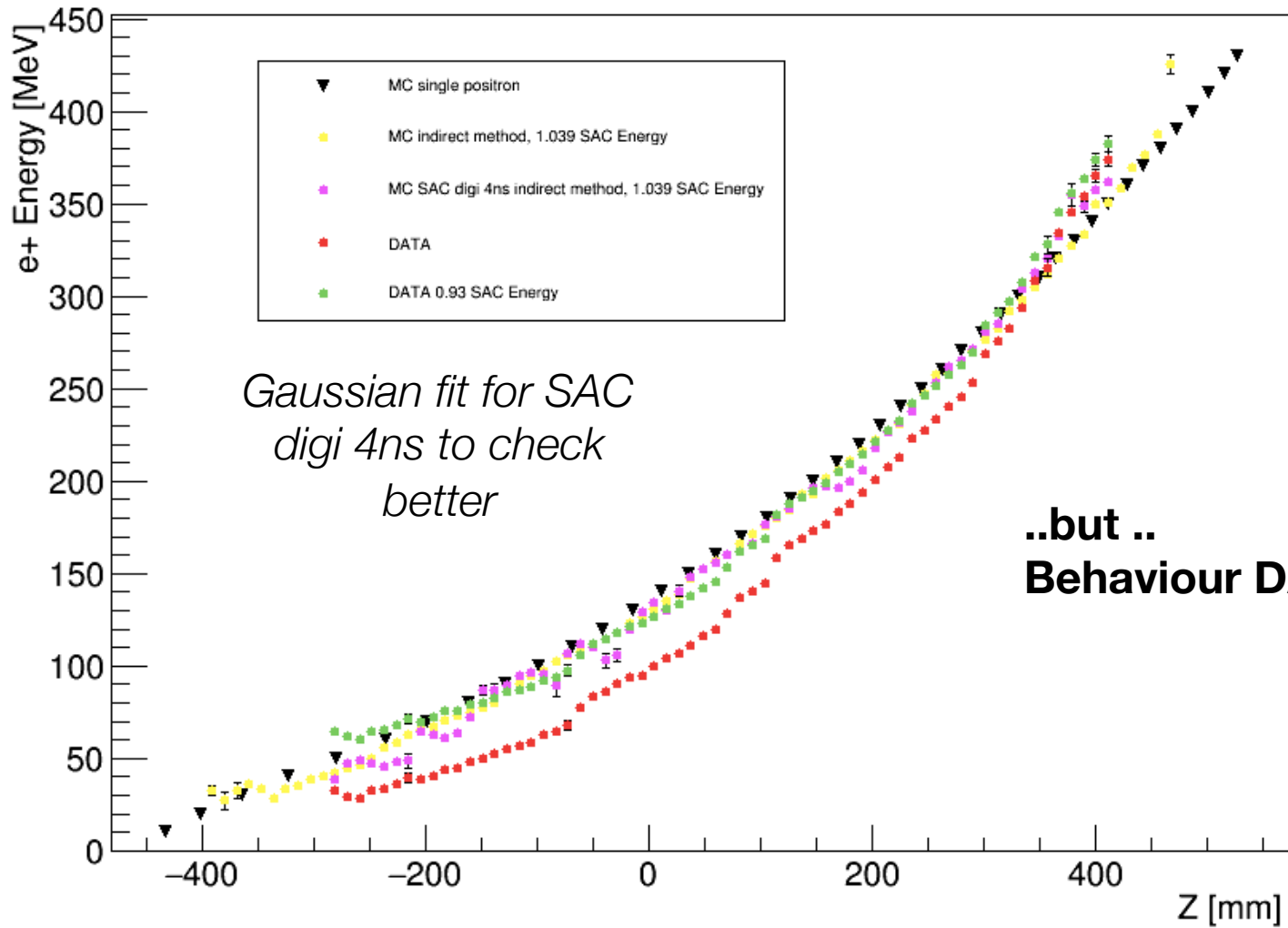
EnScale~1/0.9622 ~1.039

It seems to be linear

And also..from a SAC preliminary tuning..

Indirect method works for MC, in agreement with Single Positron simulation

Gaussian fit for SAC digi 4ns to check better

**..but ..
Behaviour DATA still different from MC**

Fit good for
5<ChId<88
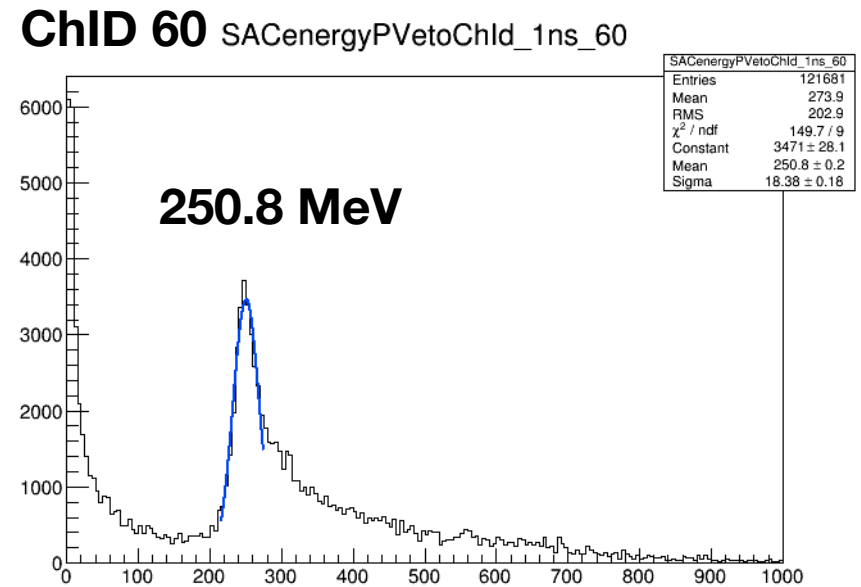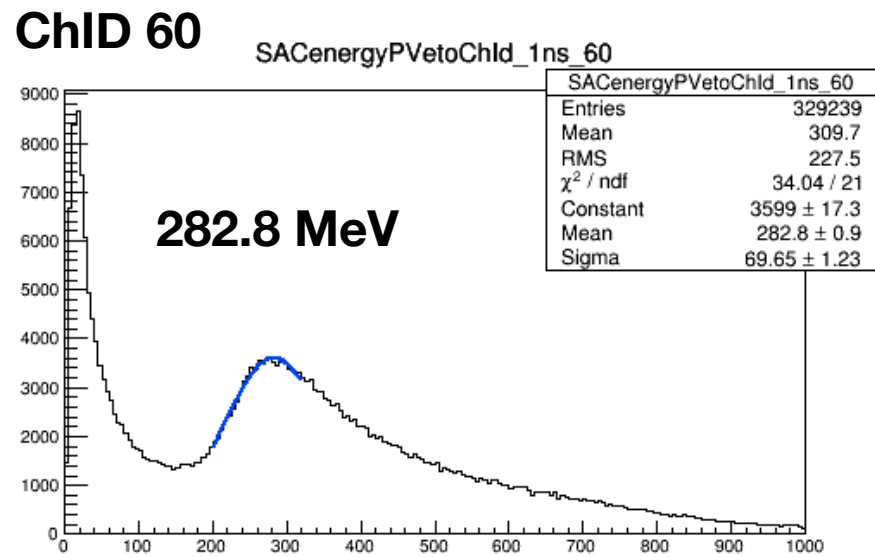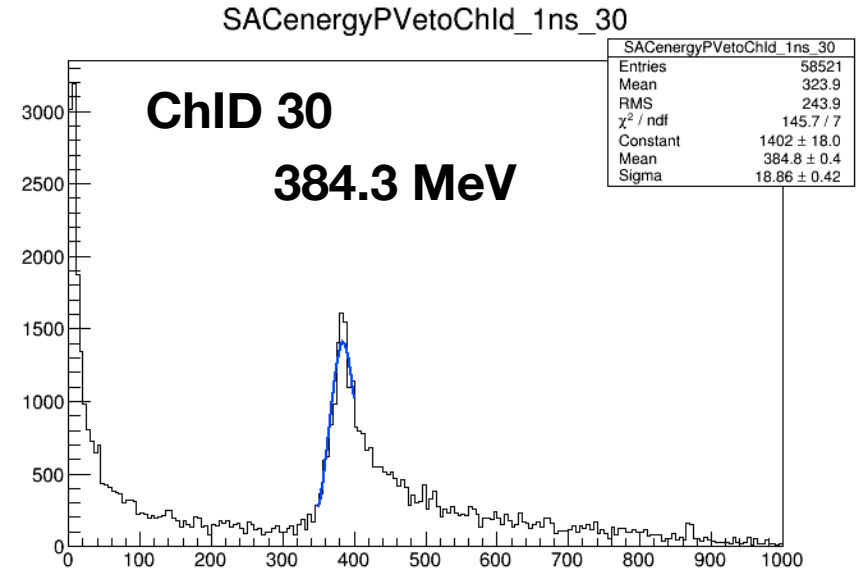*14<ChId<79*

**MC SAC digi 1ns
DATA/MC SAC digi 4ns**

Behaviour DATA scaled more similar with SAC dig 4ns for high ChId

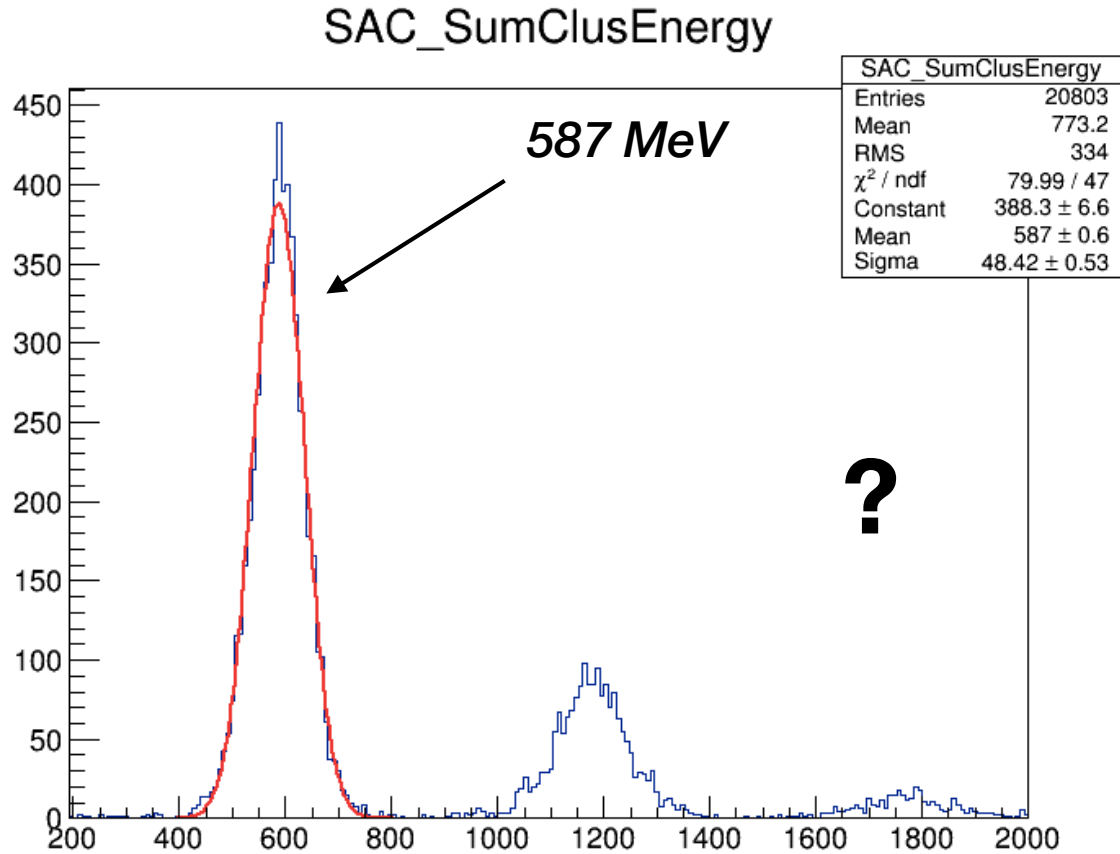# ChId 30 Z=-116.55 mm   ChId 60 Z=213.45 mm

DATA

SAC digi 1ns
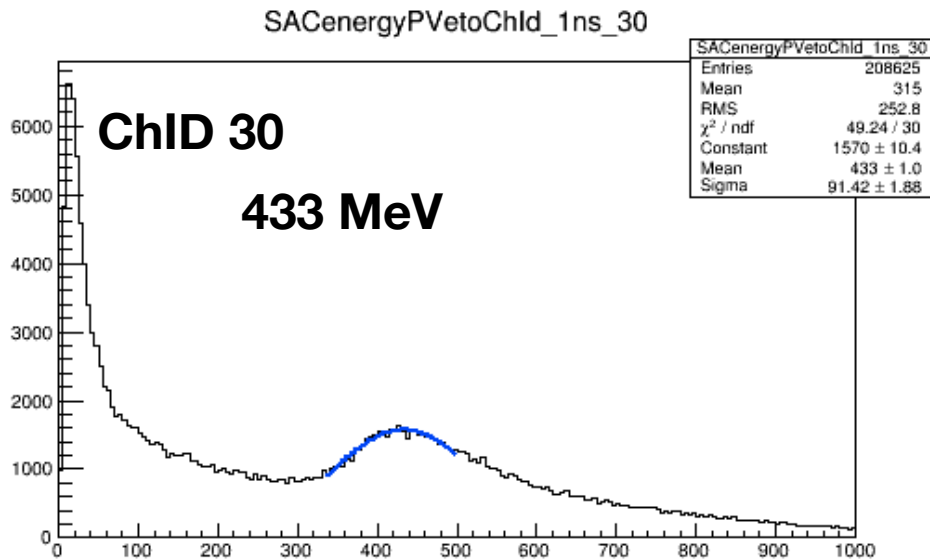
Going back to some results..

Firing the central crystal (ChId 22)

587 MeV

Sigle Positron energy 545 MeV

545/DATAPeakEnergy=0.92845 **~0.93**

?

The energy of the first peak is overestimated