TPOL GEANT MC (update)

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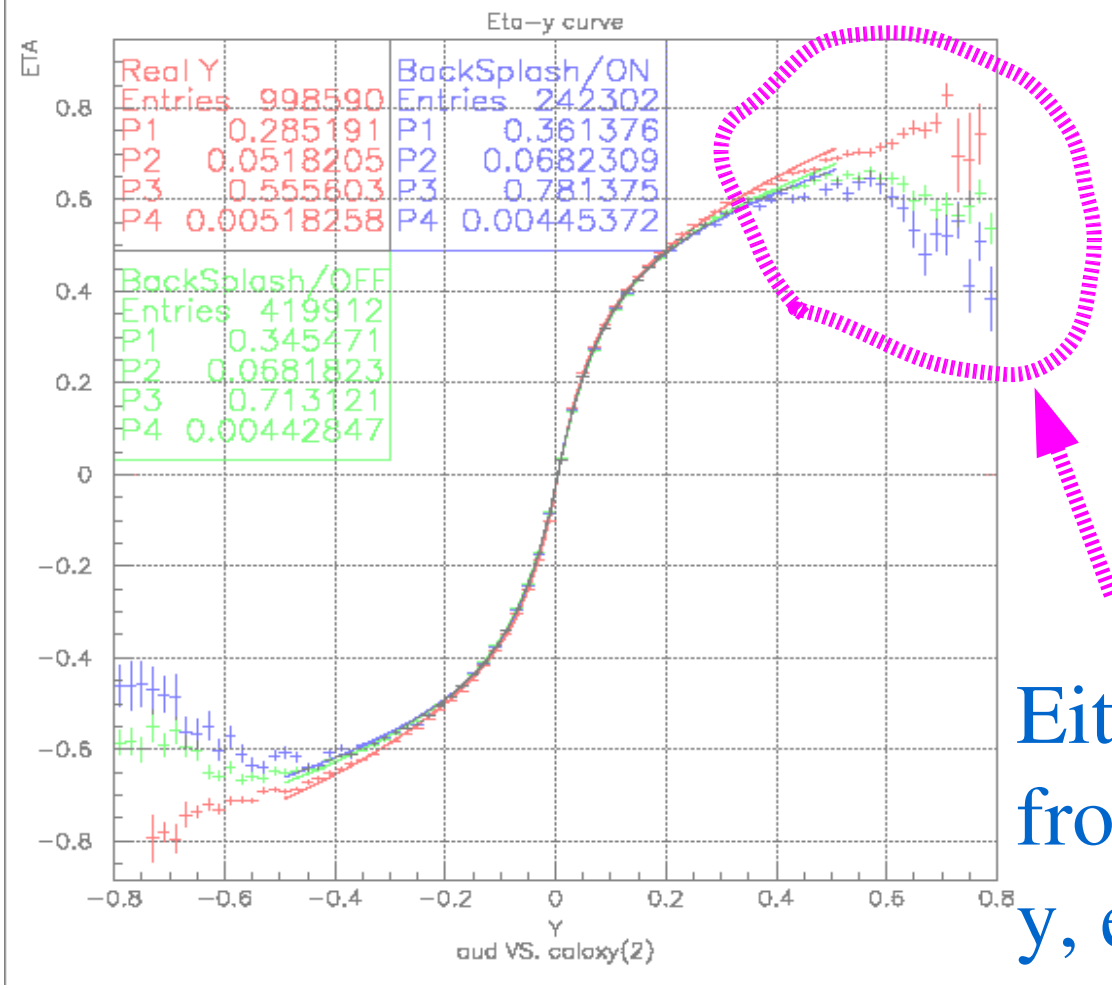
- Explanation of the Divergence in the Eta-y curves:
  - Correlation y-real and y-silicon + “resolution” of the y measured.
  - Table Scan (MC) Eta-y curve.
  - Test of some models that could explained the divergence.
  - Conclusion
- Future projects with the MC simulation

ETA-Y curve (2005/06/22)

- With cut: ncy=1, E < 16GeV (For Real Y: ncy is free)
- Fitting is done from -0.5 cm to 0.5 cm.

Function Plotted:

eta = abs(y-p(4))/ (y-p(4)) * (1. -p(1) * exp(-abs(y-p(4)) / p(2)) - (1.-p(1)) * exp(-abs(y-p(4)) / p(3)))

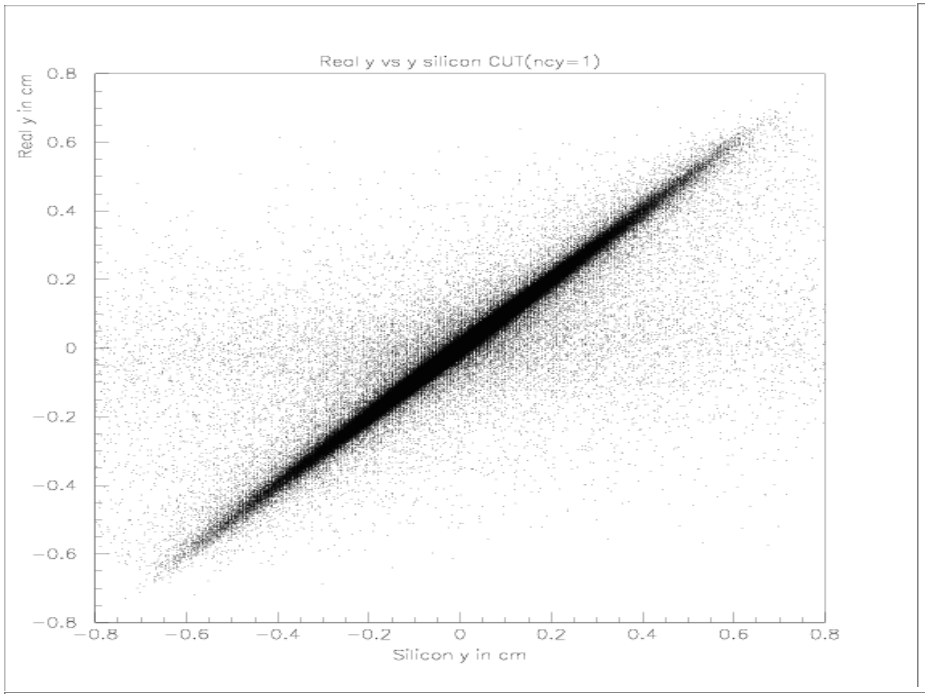


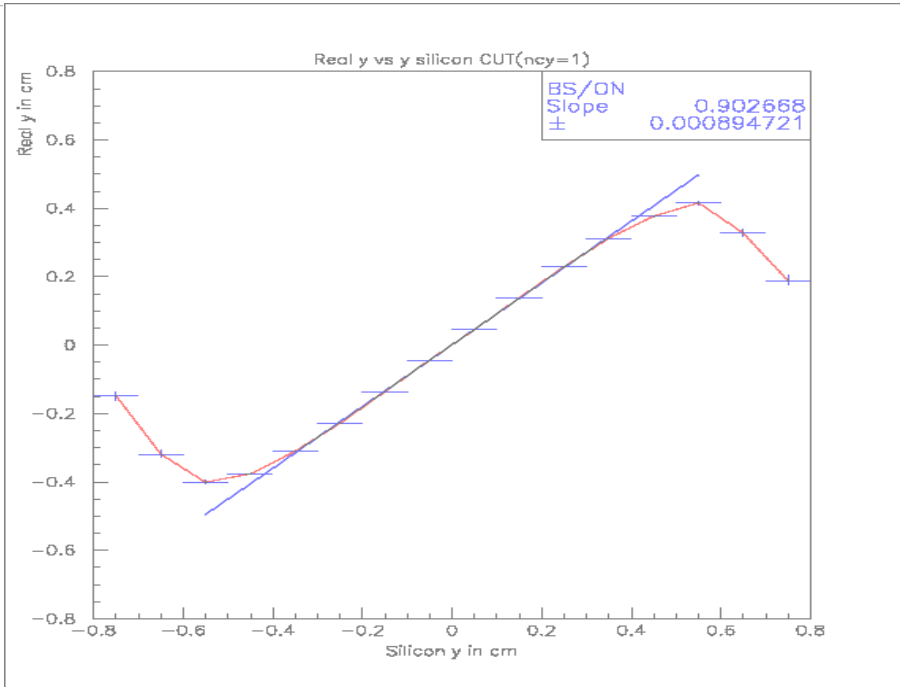
After ~0.4cm, there is a clear divergence between the silicon data and "real (MC)" data.

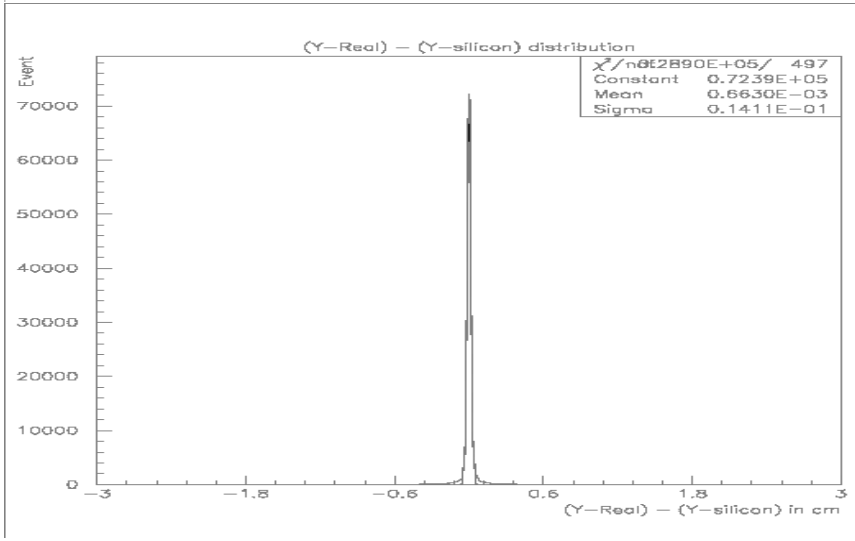
The BS/OFF has a better agreement with the "real" η-y curve than BS/ON, but both follow the same divergence... WHY?

Either the problem come from the "measurement" of y, eta, or both.

Problem come from Y?



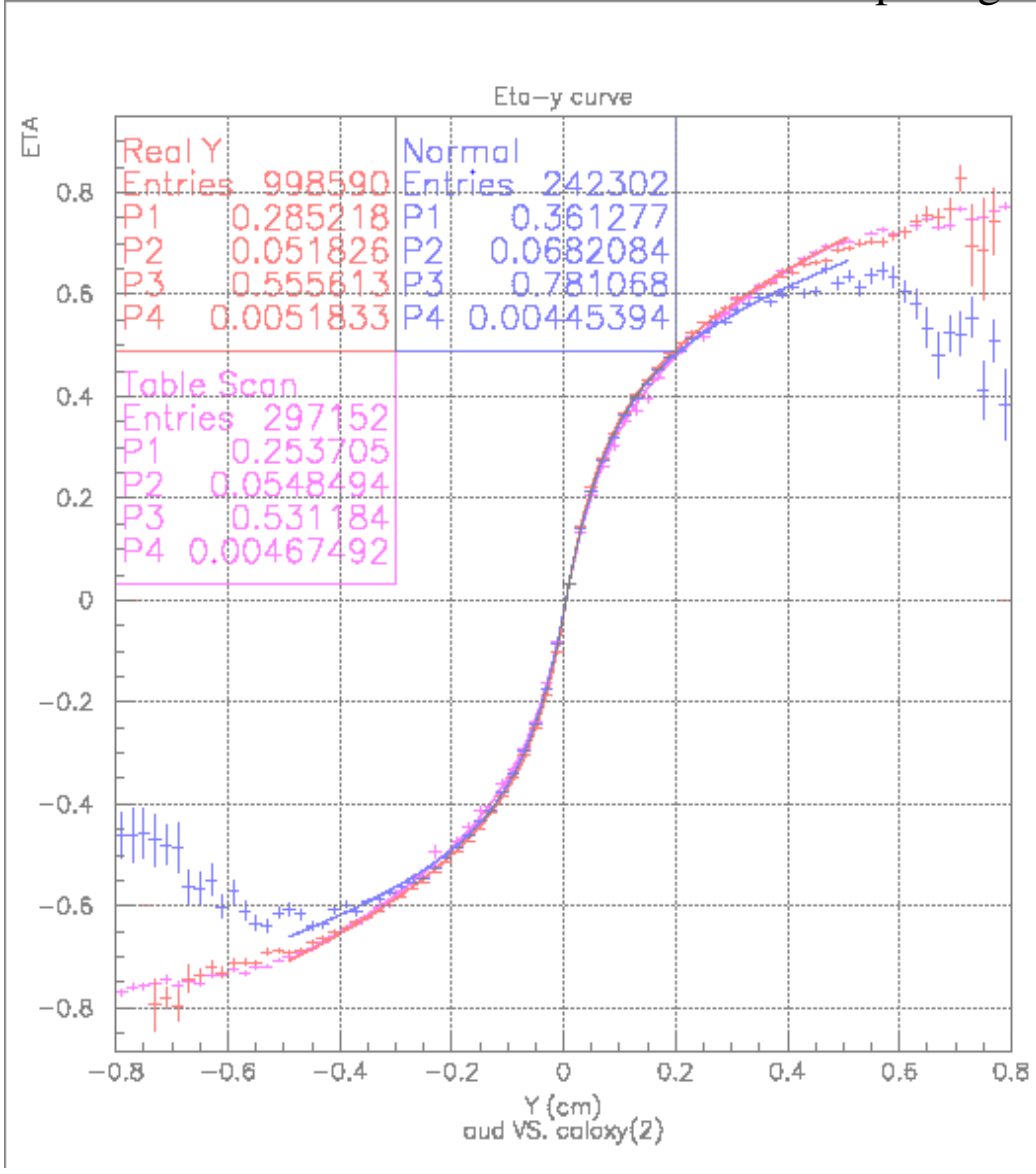


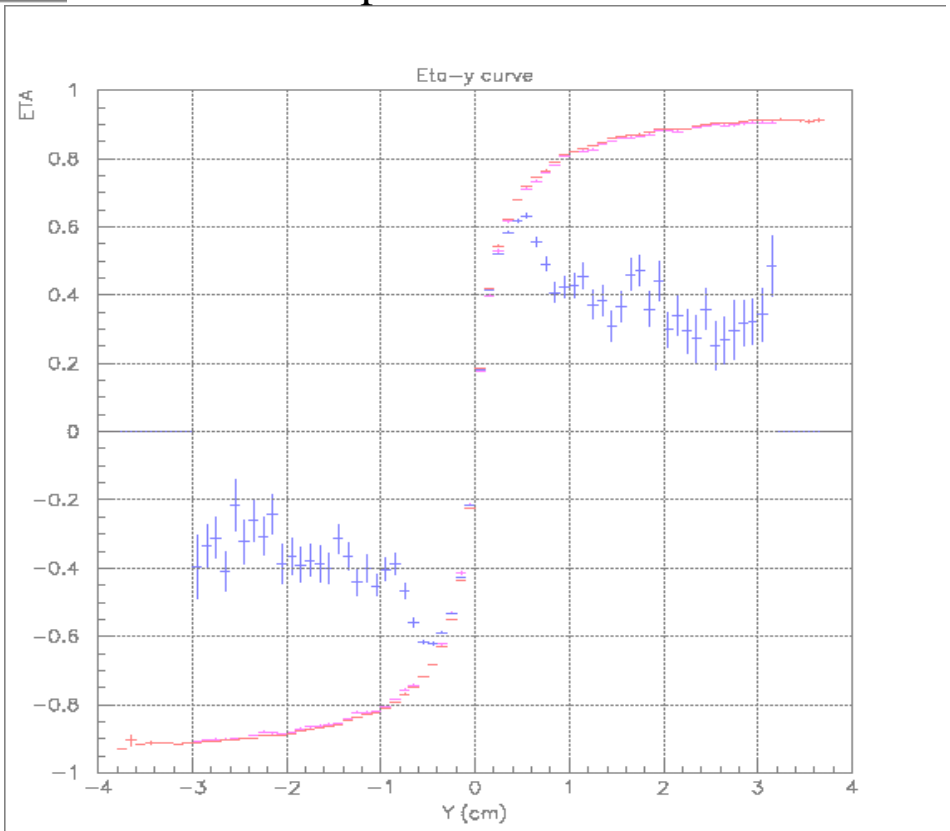


- The slope y-real vs y-silicon is (0.903 ± 0.001) instead of 1. Why?
- "Noise" too significant for the amount of statistic we have at large |y| or there is a systematic effect that cause y-silicon > y-real as y increase?
- The resolution [(y-real)-(y-silicon)] is 1.4%.

Table Scan

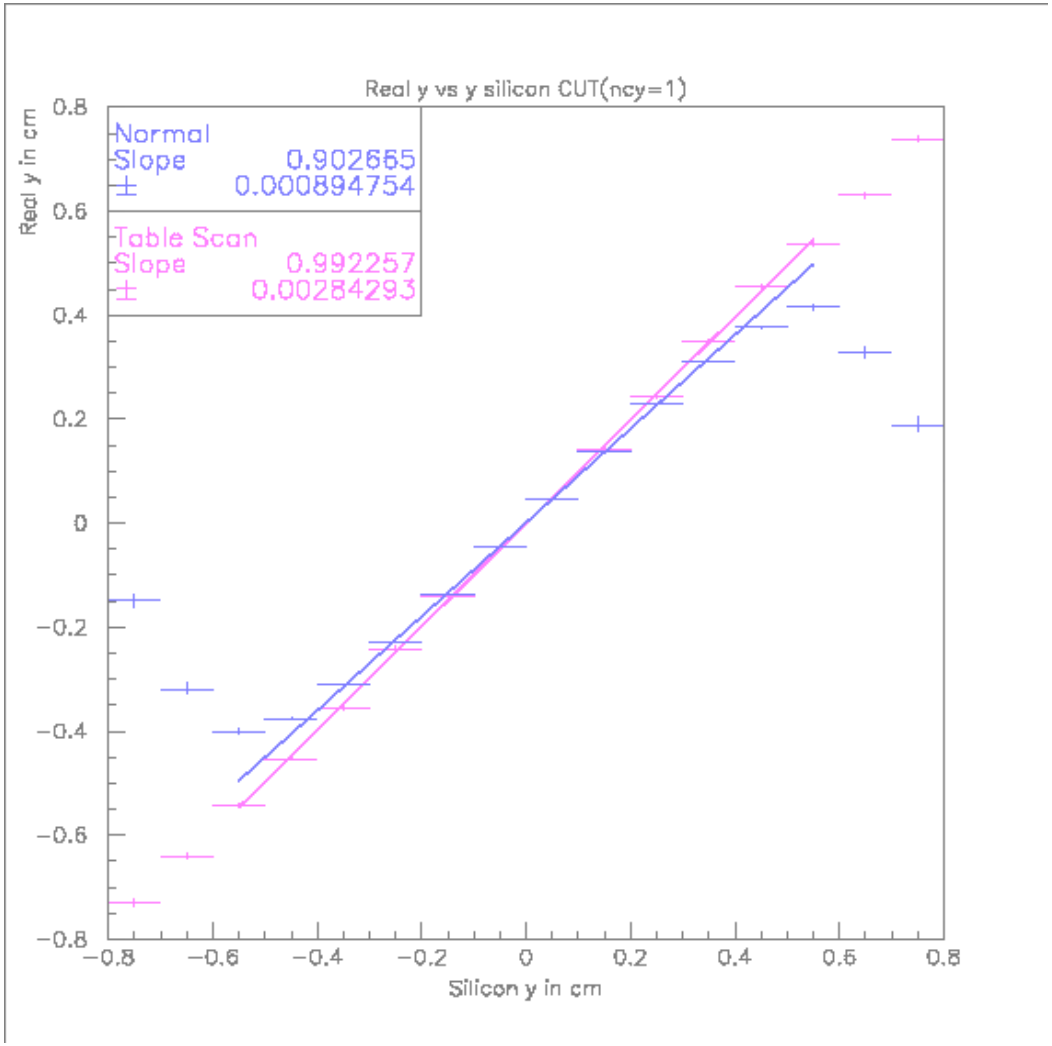
The table is moved from -3cm to 3cm with spacing of 0.5cm. At each step 100 000 events run are used.





- Table Scan agree almost perfectly with the real eta-y curve... even at large |y|.
- Note: On the left graph the y-real are taken from a normal run and on the right one they are taken from a table scan run.

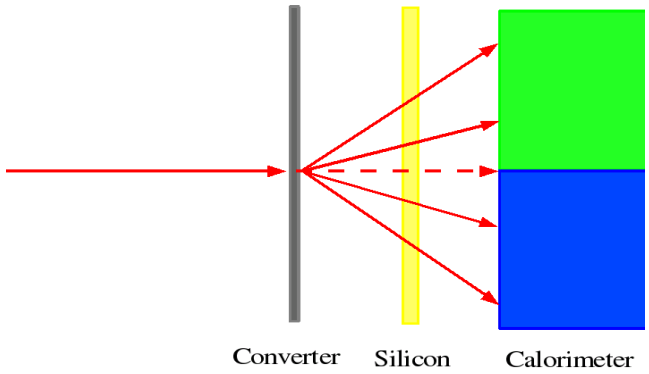
Problem come from Eta?



- The slope for the Table Scan is (0.992 ± 0.003) which is much closer too 1.
- This last graph seems to confirm that the divergence in the eta-y curves was due uniquely to the disagreement between the y-real and y-silicon.
- However, we still can't say if the divergence between the y-real and y-silicon is due to a systematic effect, or a simple lack of statistic at large |y|.

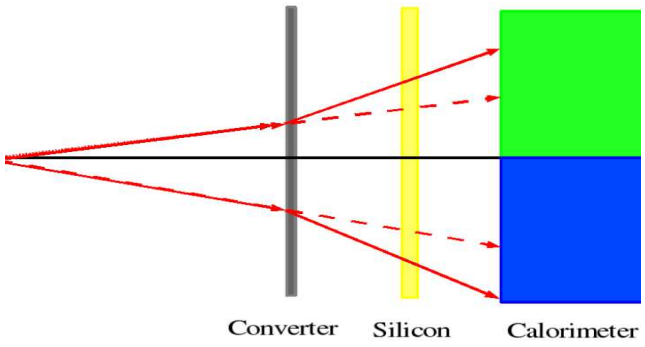
Simple models

Random effect:



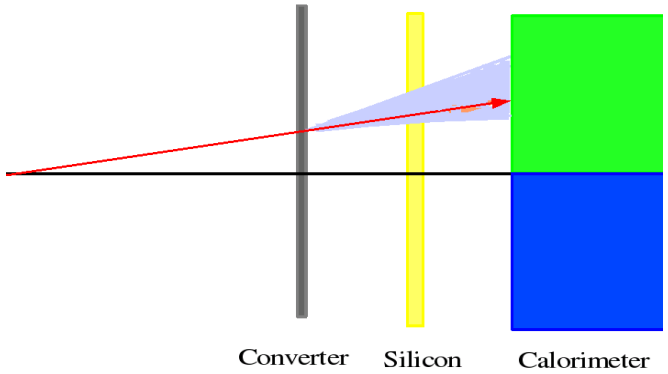
The electromagnetic shower is randomly deviated in the converter?

Systematic effect:



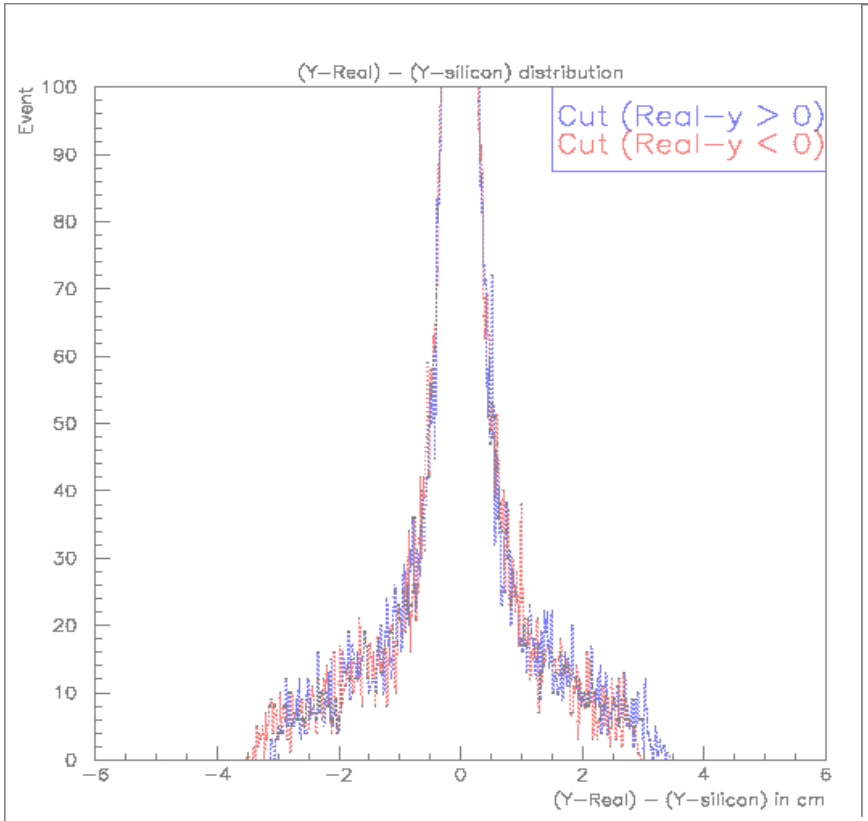
The electromagnetic shower is systematically deviated outward in the converter?

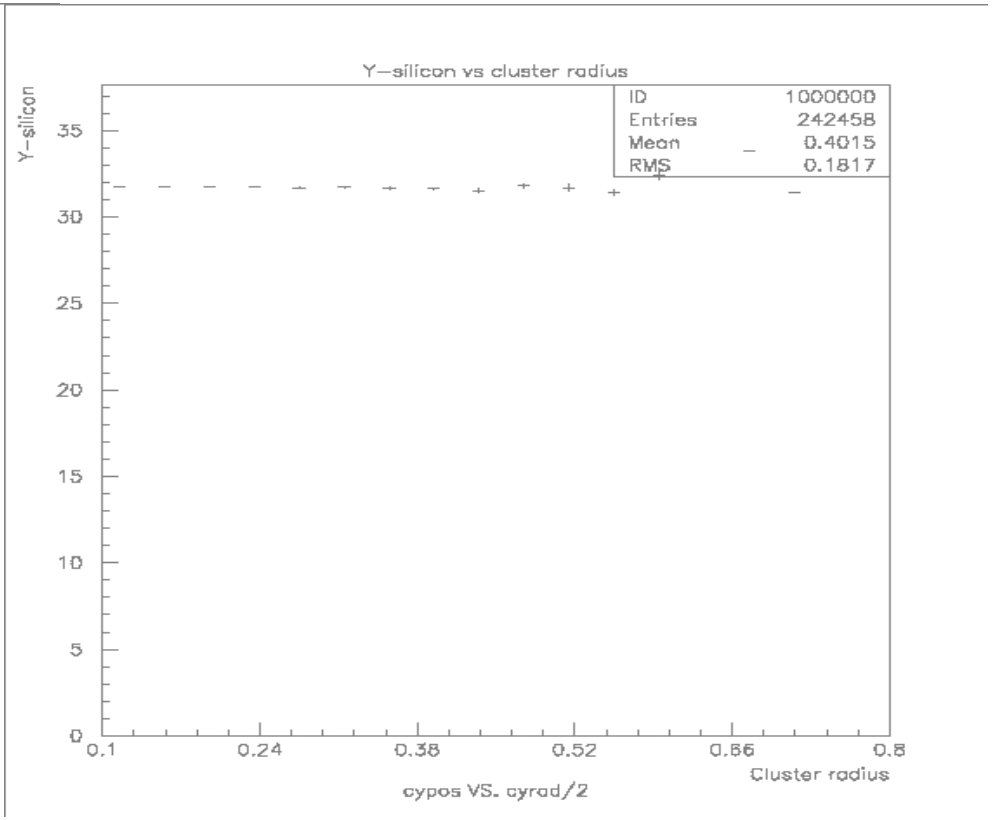
- The effect of the backsplash as already been tested and we found that this is not the cause of the divergence in the eta-y curve.
- A difference of 2 cm between y-real and y-silicon ⇒ a deviation angle of 45°, is it realistic?



There is an asymmetry in the cluster due to the incident angle?

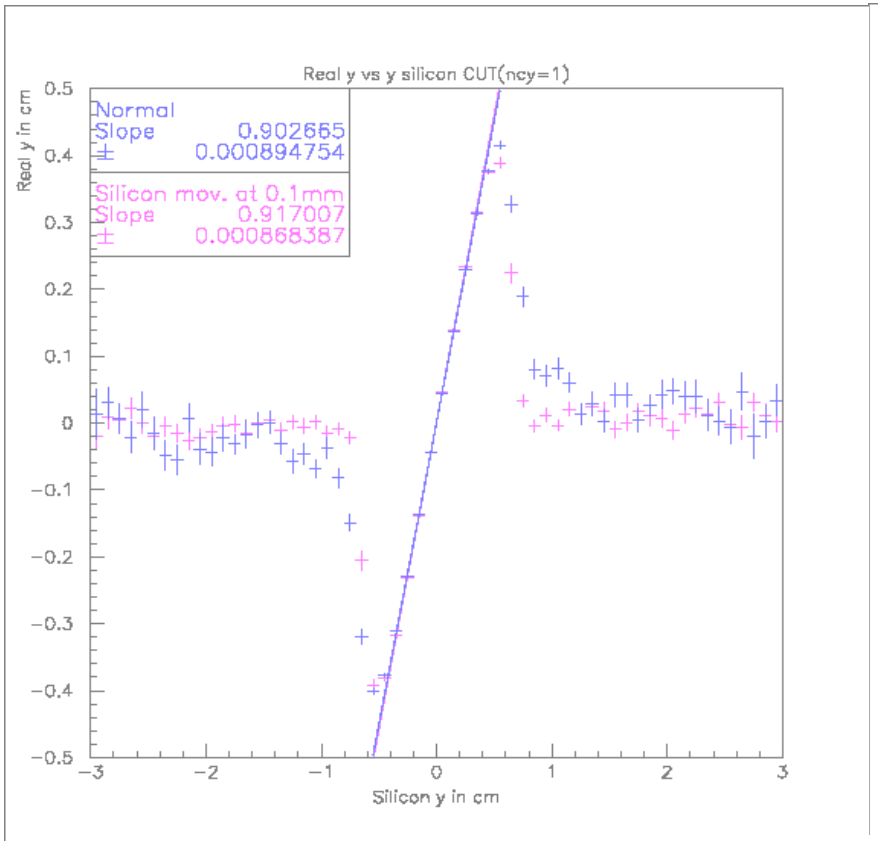
Systematic effect?

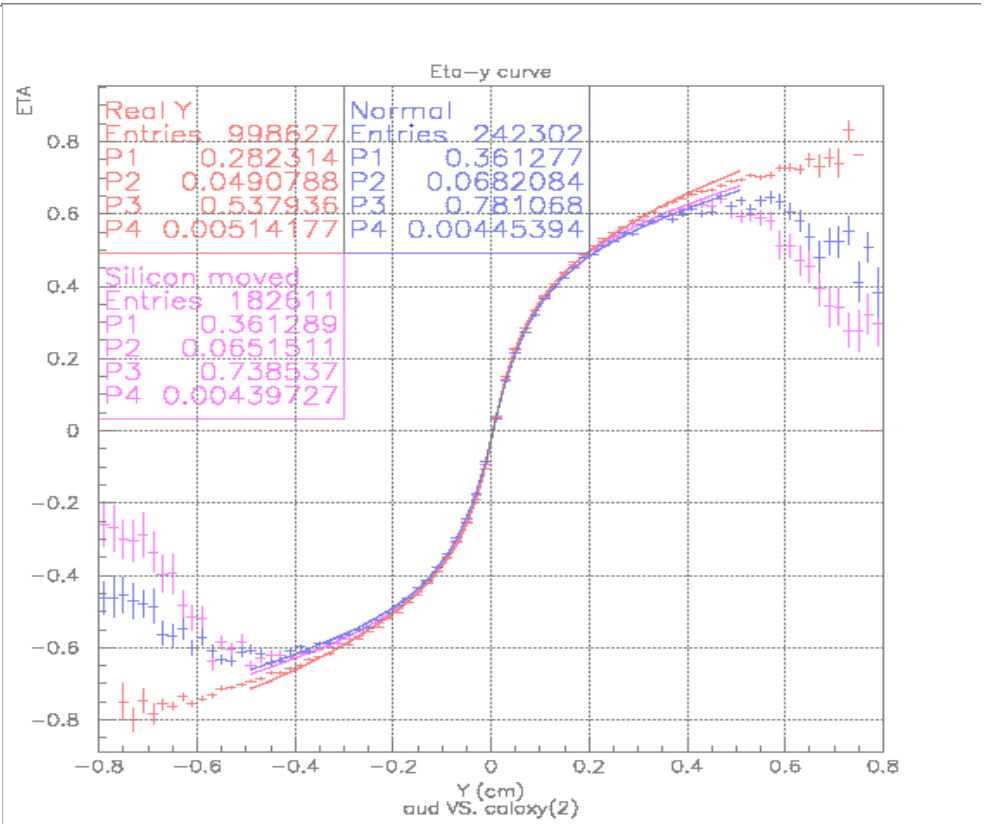




- There is no correlation (up/down) y-real and (up/down) y-silicon.
- There is no correlation between y-silicon and the cluster radius.
- ⇒ Most certainly, the disagreement between some y-real and y-silicon events is not due to a systematic effect.

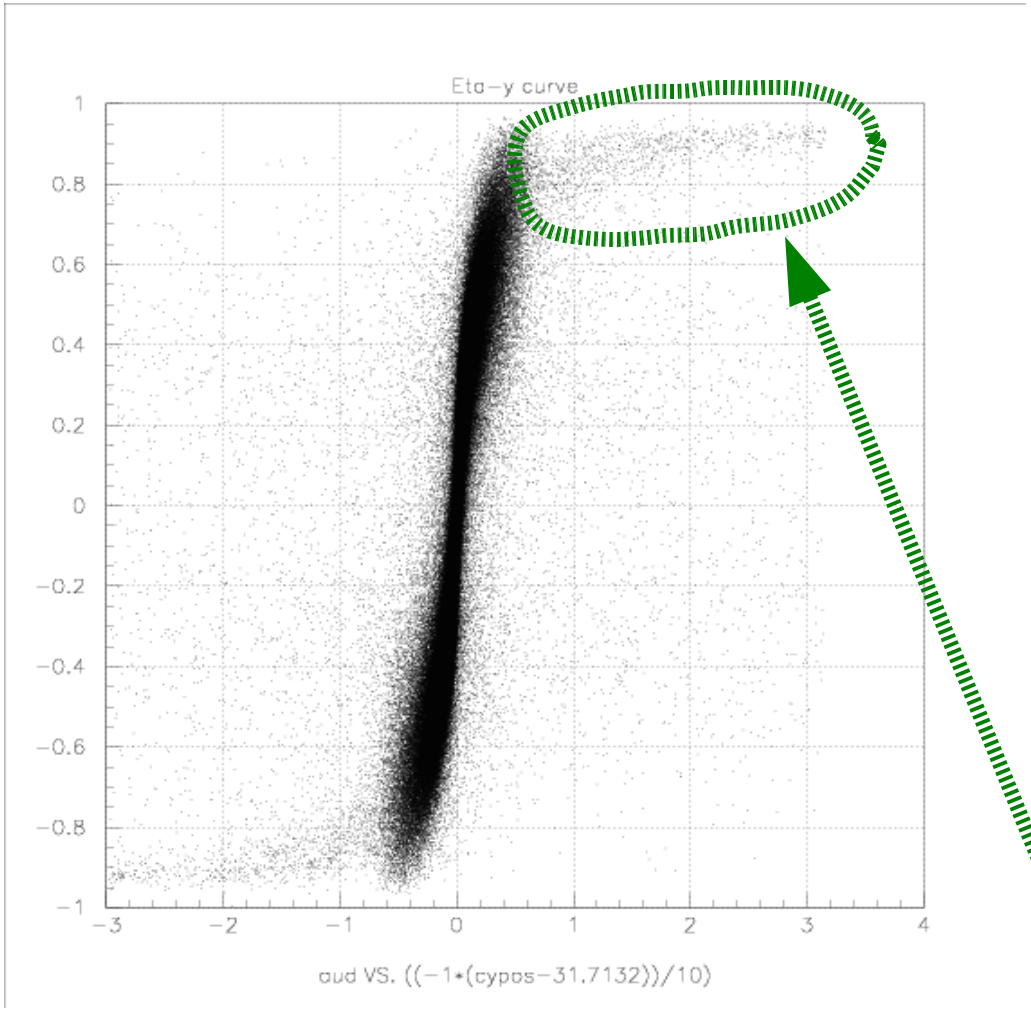
Solution, move silicon detector closer to the converter?





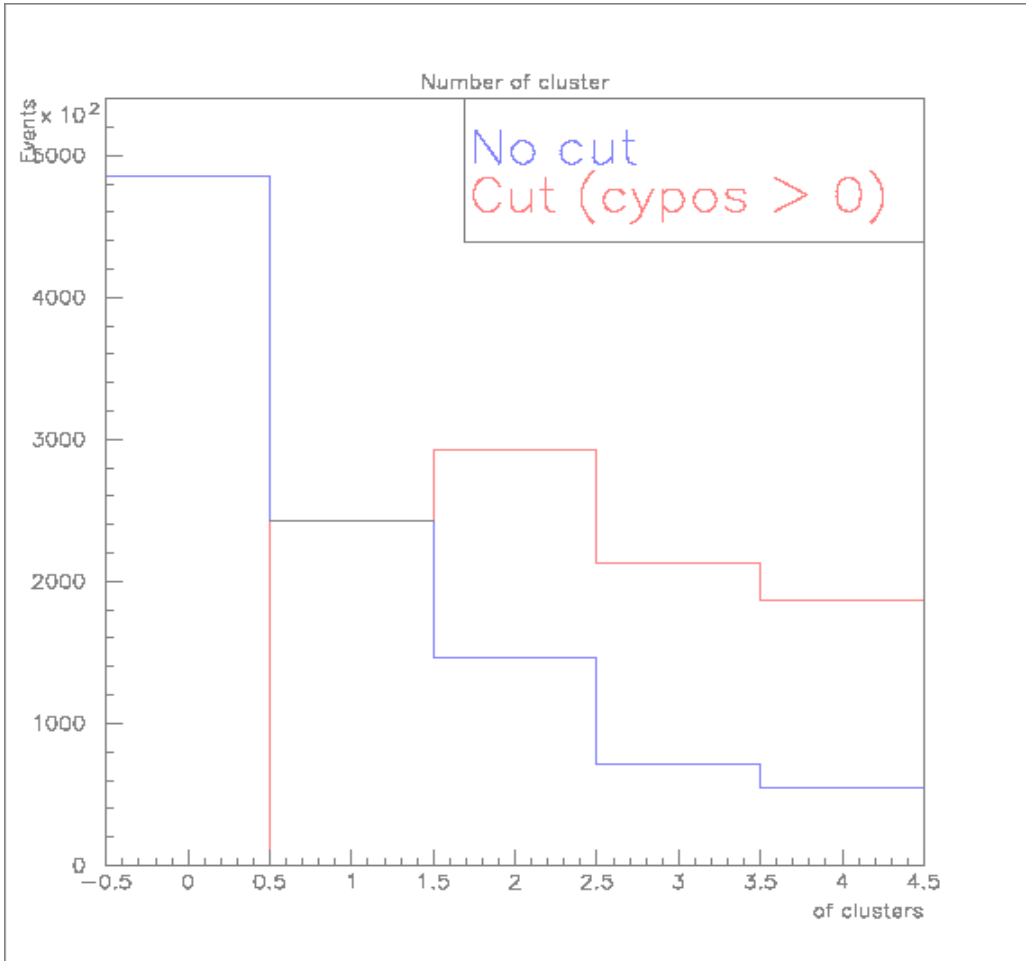
- Eta-y curve is worst when we put the silicon detector closer to the converter!
- ⇒ The inconsistence of y-real and y-silicon has probably nothing to do with a deviation of the photons in the converter.

Most probable explanation of the divergence of the eta-y curves



- It seems more and more probable that the divergence in the tail of the eta-y curves is only due to the lack of statistic at large large |y|.
- At large |y|, “noise” make move the average of each bin toward zero.
- It is still not understood where this “noise” come from.
- There seems to be “good” events that are really at |y| > 0.8 cm.

Incoherence found in the data



- This graph make absolutely no sens!!!
- Must analyze why such thing happens.
- Hopefully, this doesn't change anything when we use the cut (ncy=1).

Conclusion

- Table Scan give us the “good” eta-y curve in MC simulation.
- There is some events with big inconsistence between y-real and y-silicon. This inconsistence is not due to a systematic effect related to the position-y itself, not due to a deviation of the photons in the converter, and not due to the backsplash. Why then?
- This “noise” and the low statistic at large |y| is most certainly responsible for the “bad” results of the normal eta-y curve.
- There is a big incoherence in the way the informations about the silicon detector are store in the ntuples.

Future Projects with the MC

- If necessary, go event by event to see where come from the “noise”.
- Find what cause the incoherence in the way the MC data are store in the ntuples.
- Compare the real silicon detector with the MC (cluster charge, cluster radius, etc.)
- Do the optimization of the parameter Dilu and Difu.
- Simulate the effect of the exist window.