Shower study for 1-5 GeV energy electron beam with ASIC$_{SKIROC}$ readout

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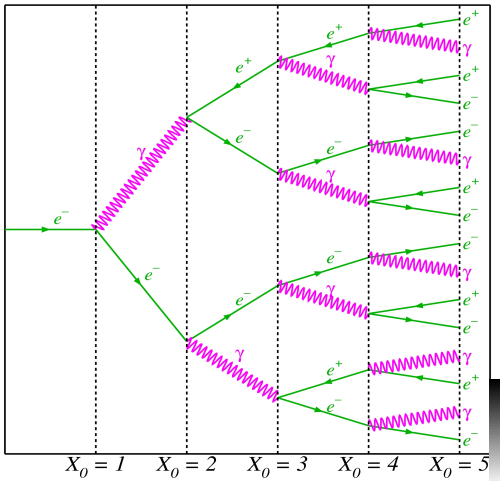
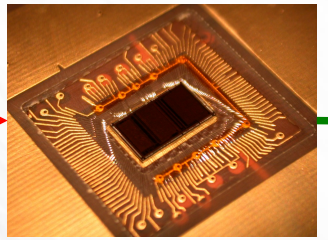
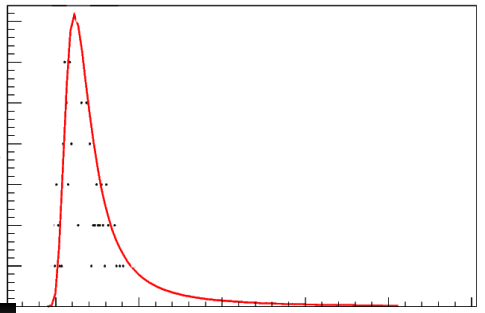
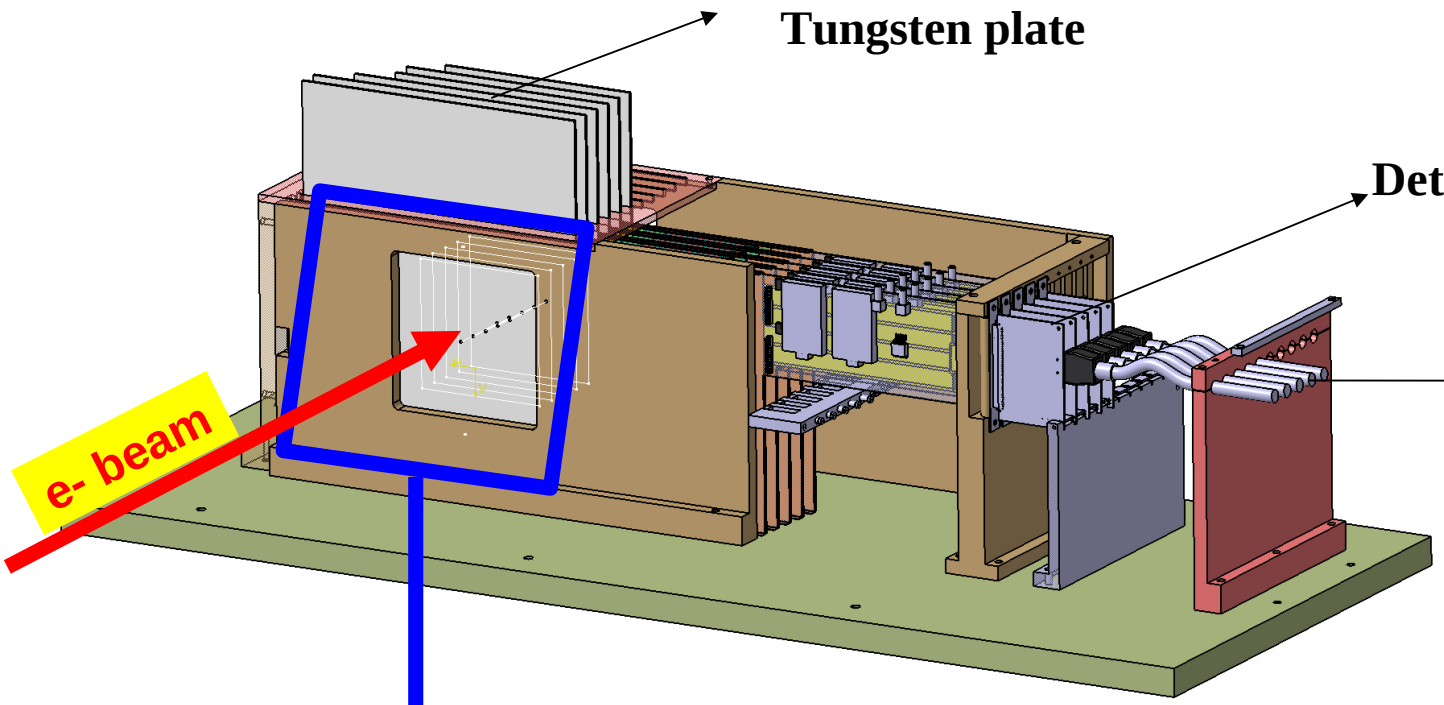


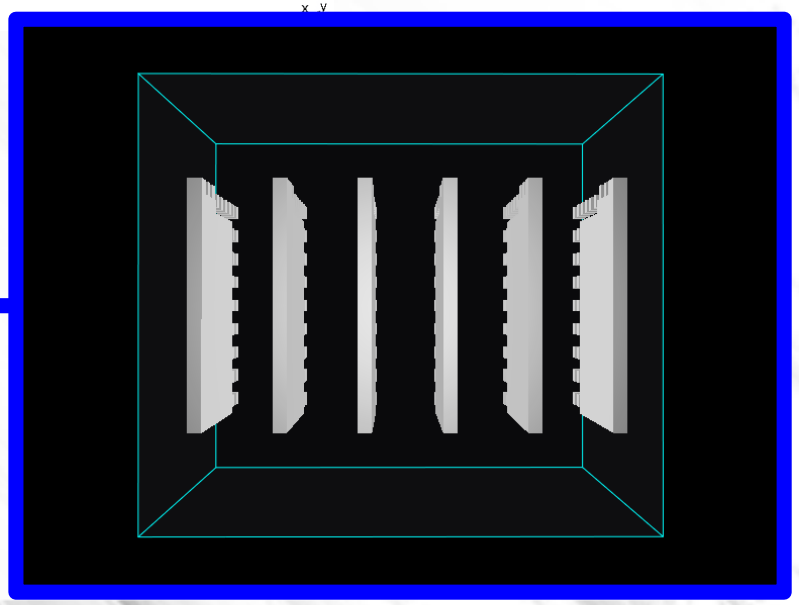




26.09.2012- Analysis meeting

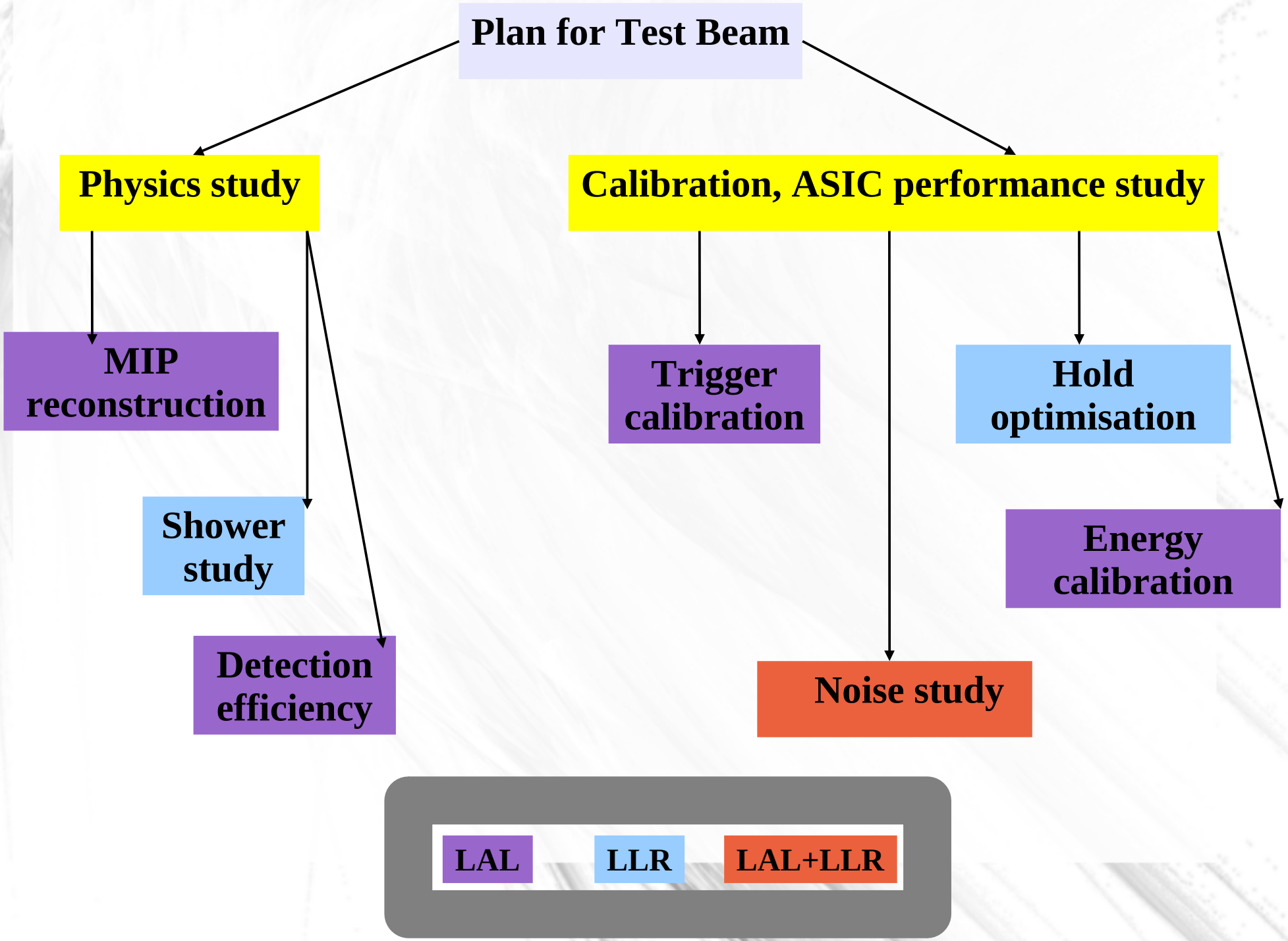


Very front-electronics (FVE8)
ASIC+Si wafer

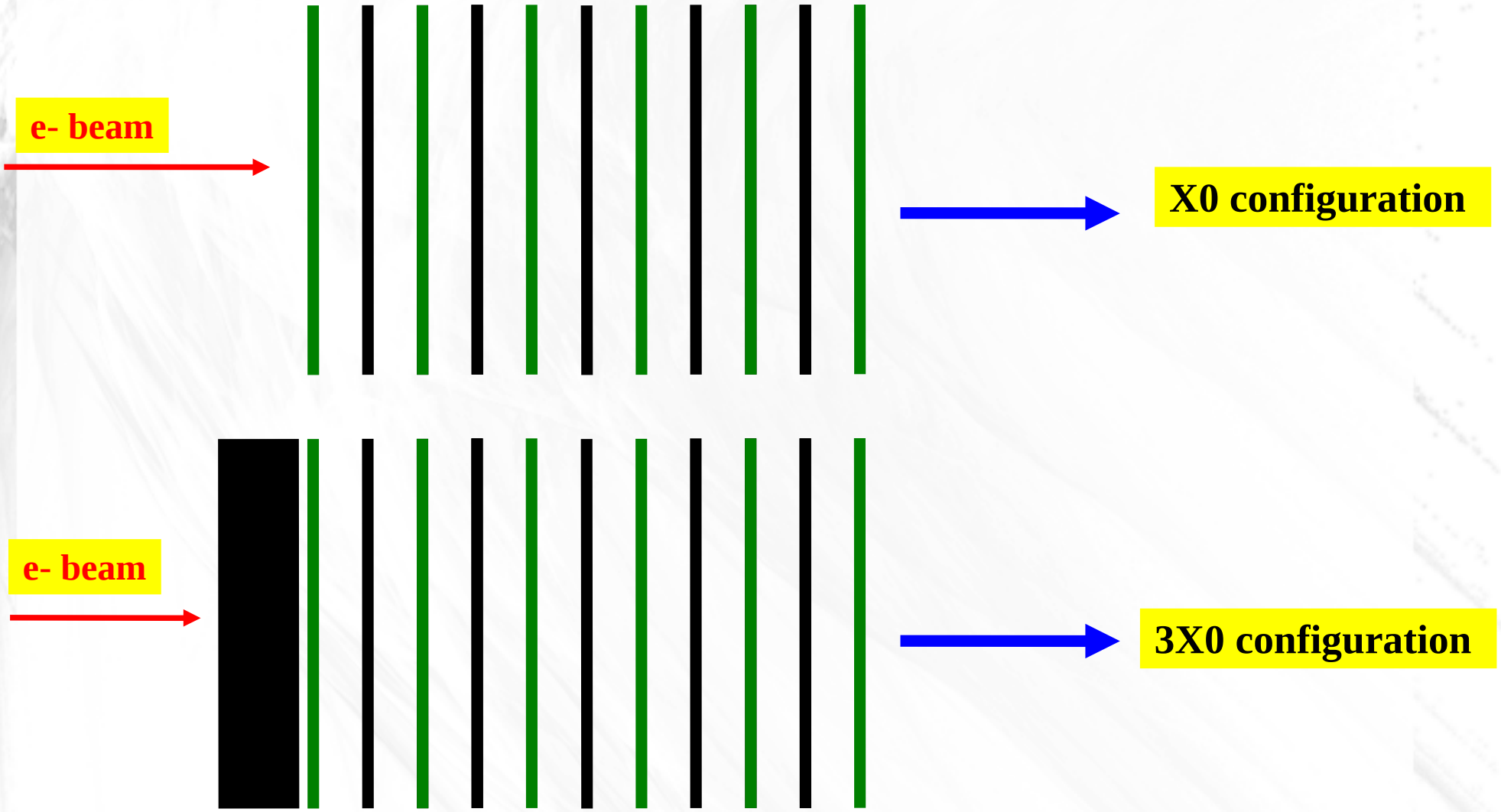


e^- beam energy: 1-5 GeV
Rate: 1 kHz – 5 Hz

6 layer of detector=6*(Si wafer+4ASIC+DIF)
Noisy channels are masked!

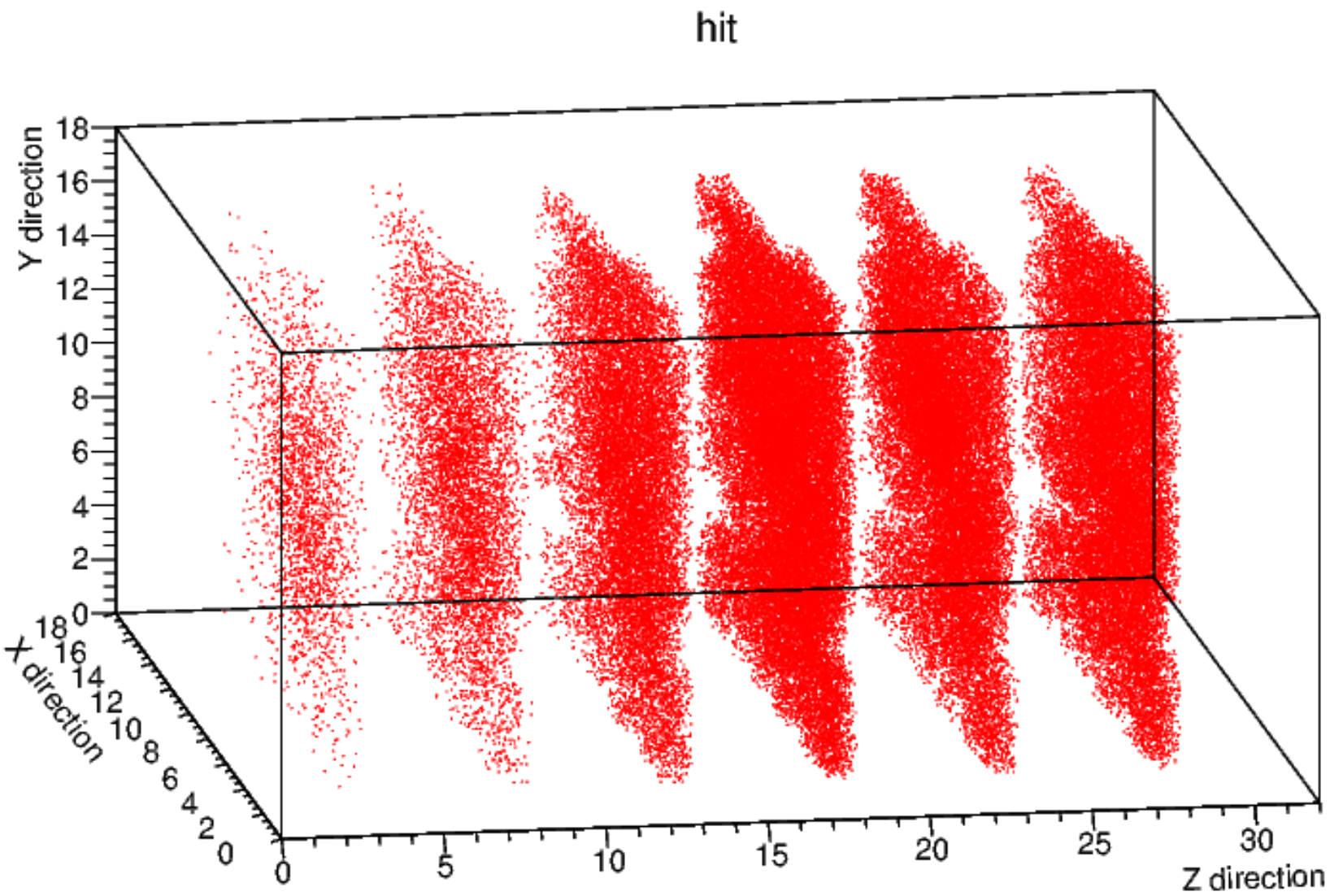

Plan for Test Beam
Physics study
Calibration, ASIC performance study
MIP reconstruction
Shower study
Detection efficiency
Trigger calibration
Noise study
Hold optimisation
Energy calibration
LAL
LLR
LAL+LLR

Configuration



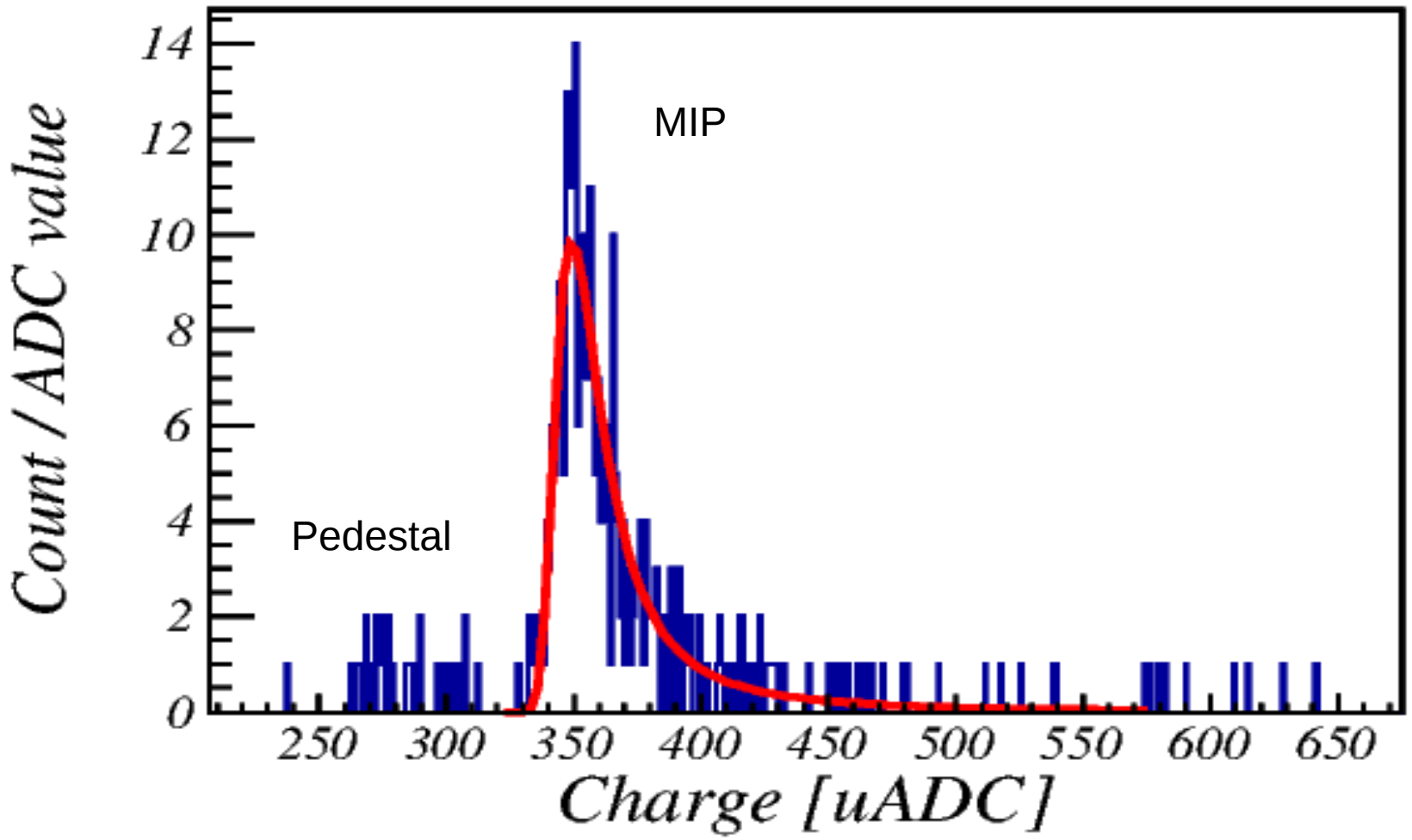
6 x [silicon wafer + FEV8 + 4xSKIROC+DIF] W plate

1 GeV e^- hit with 6 layer of detector: between the layers W plate placed/X0

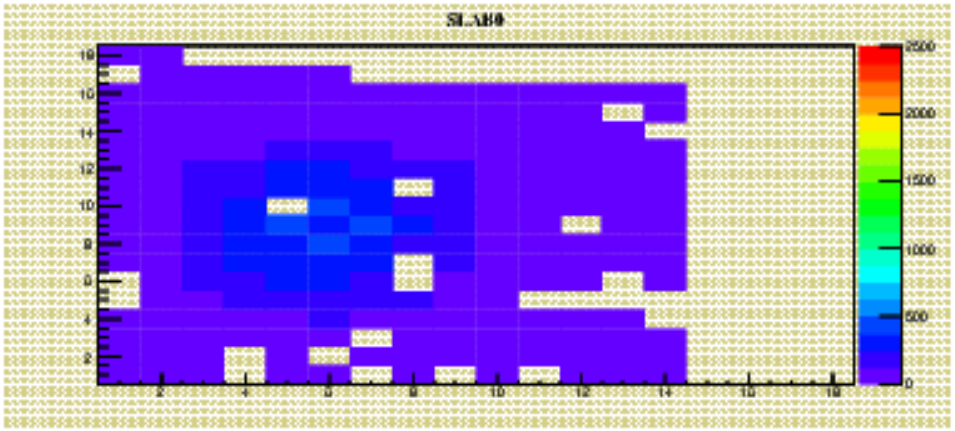


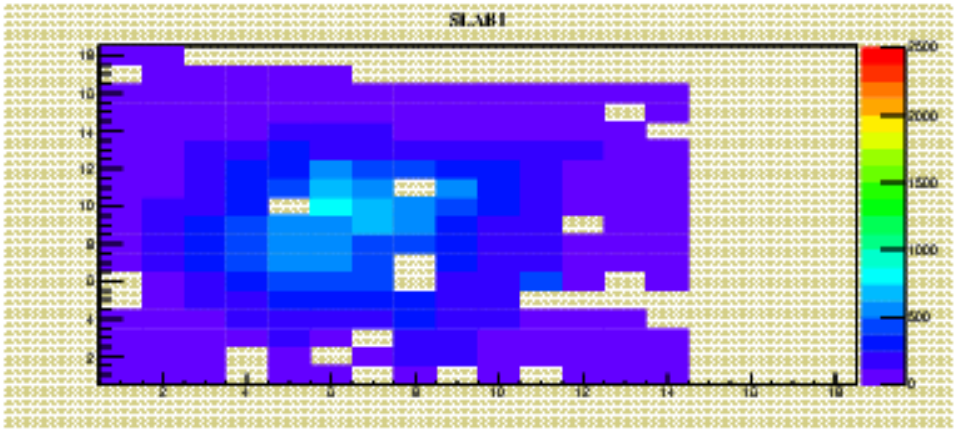
All the run was same: 3600 sec.

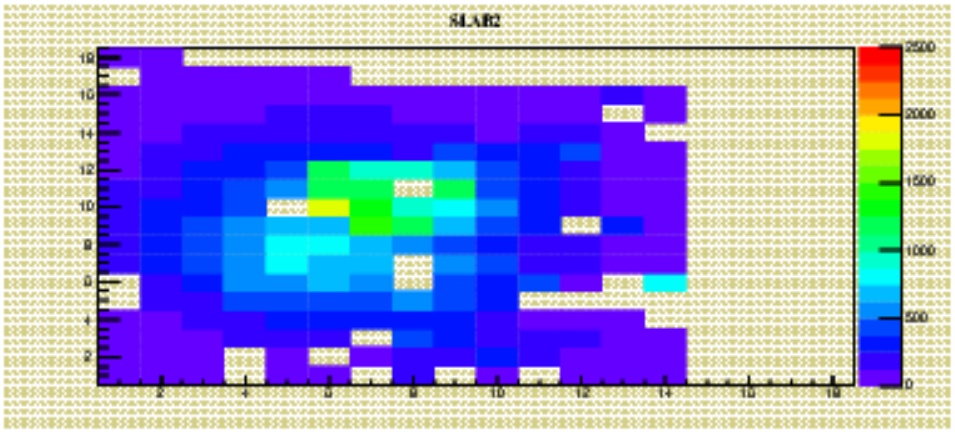
Example of MIP for one chip, channel,column

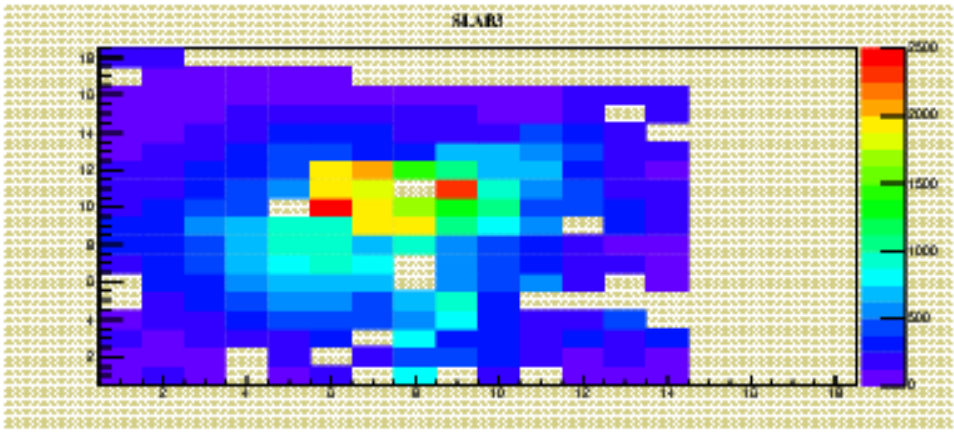


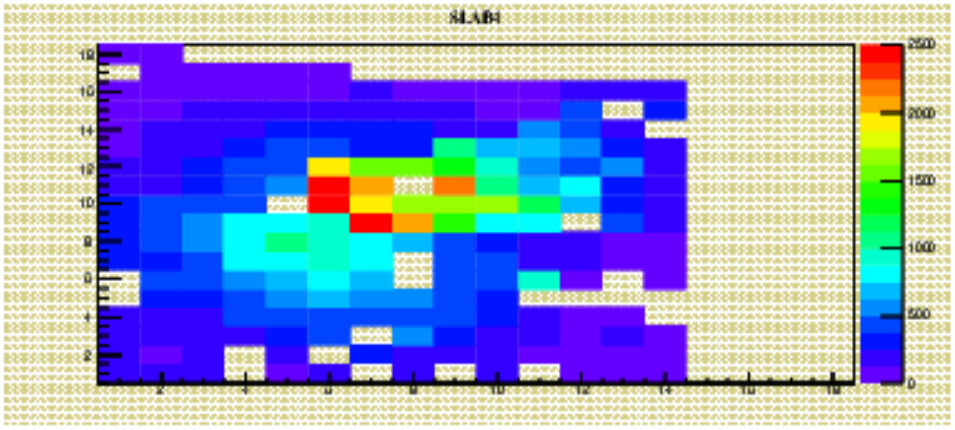
Shower profile for 6 layer/detector for 1 GeV electron / X0

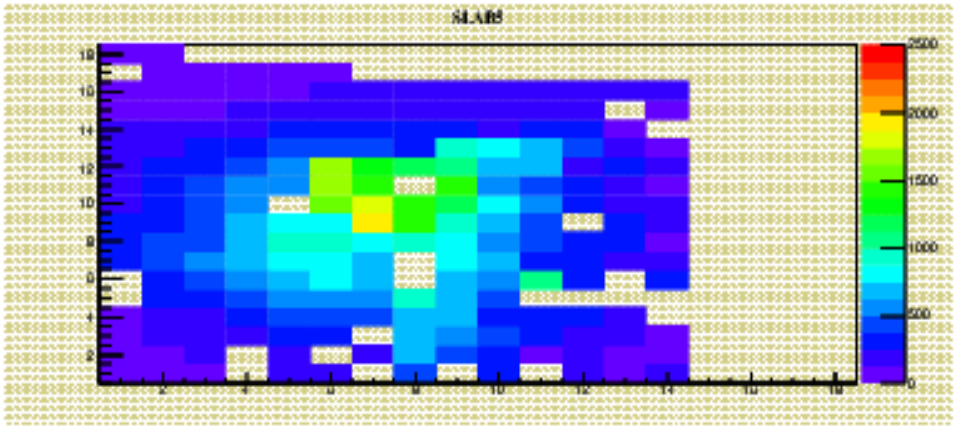




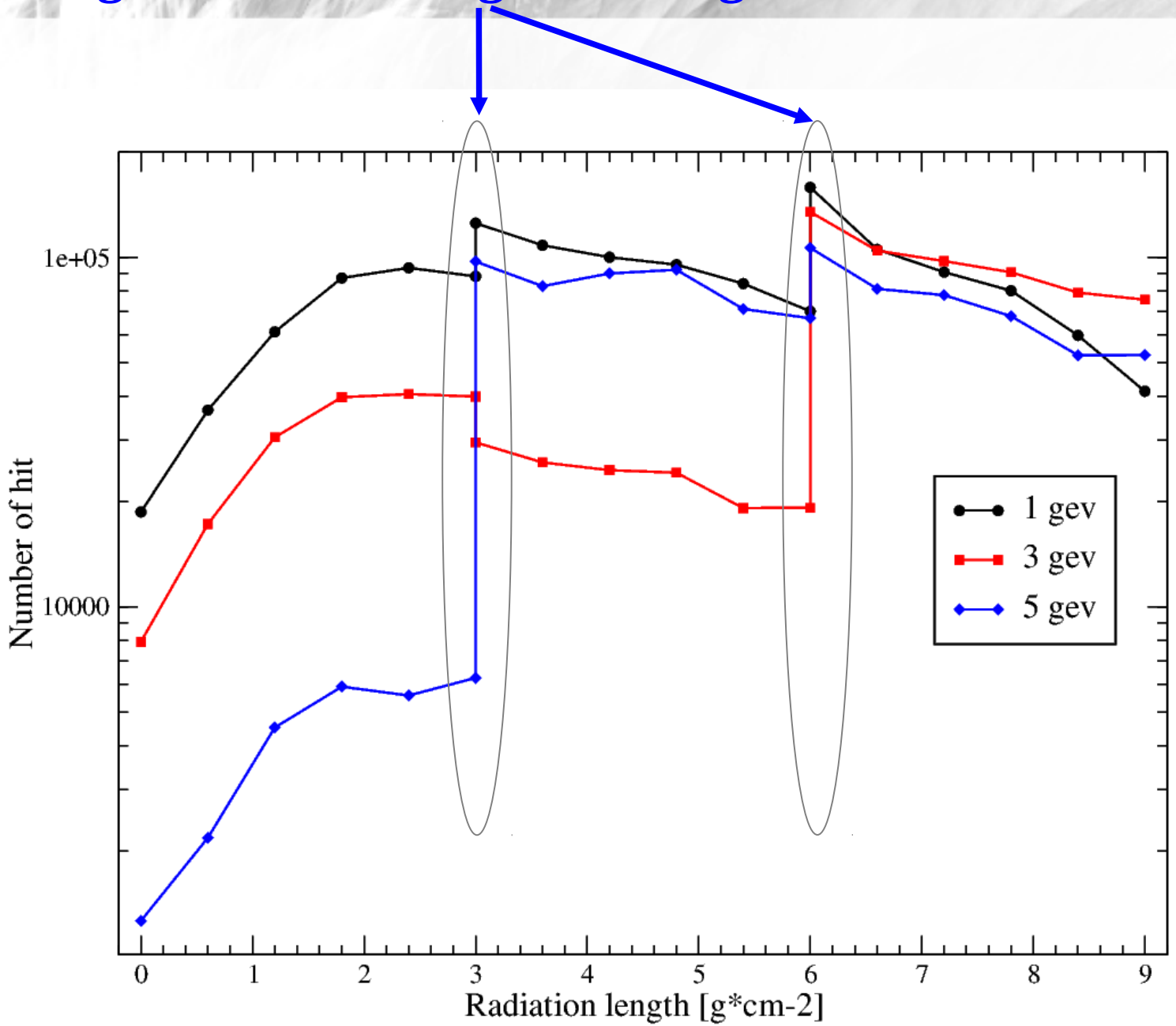




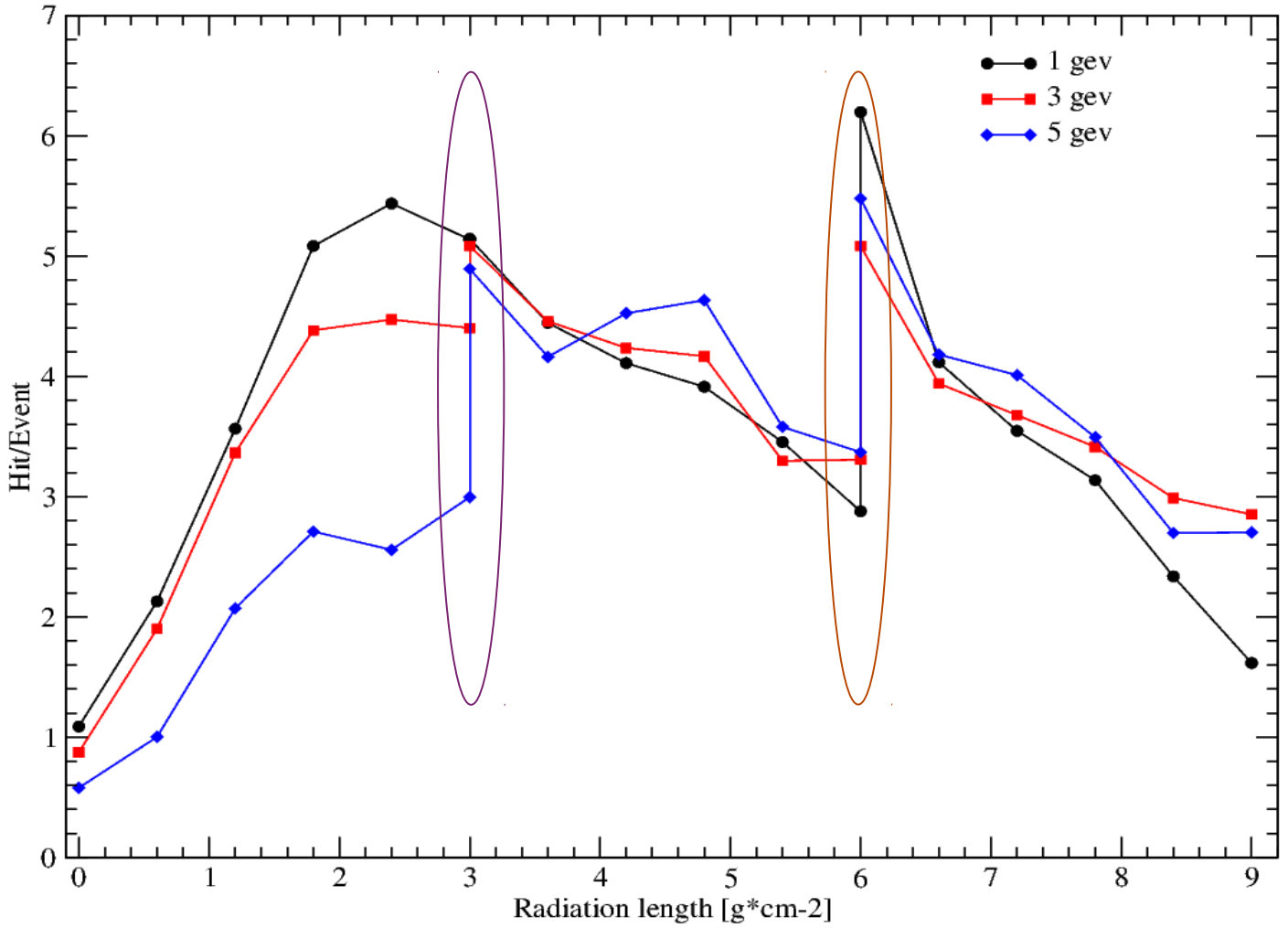




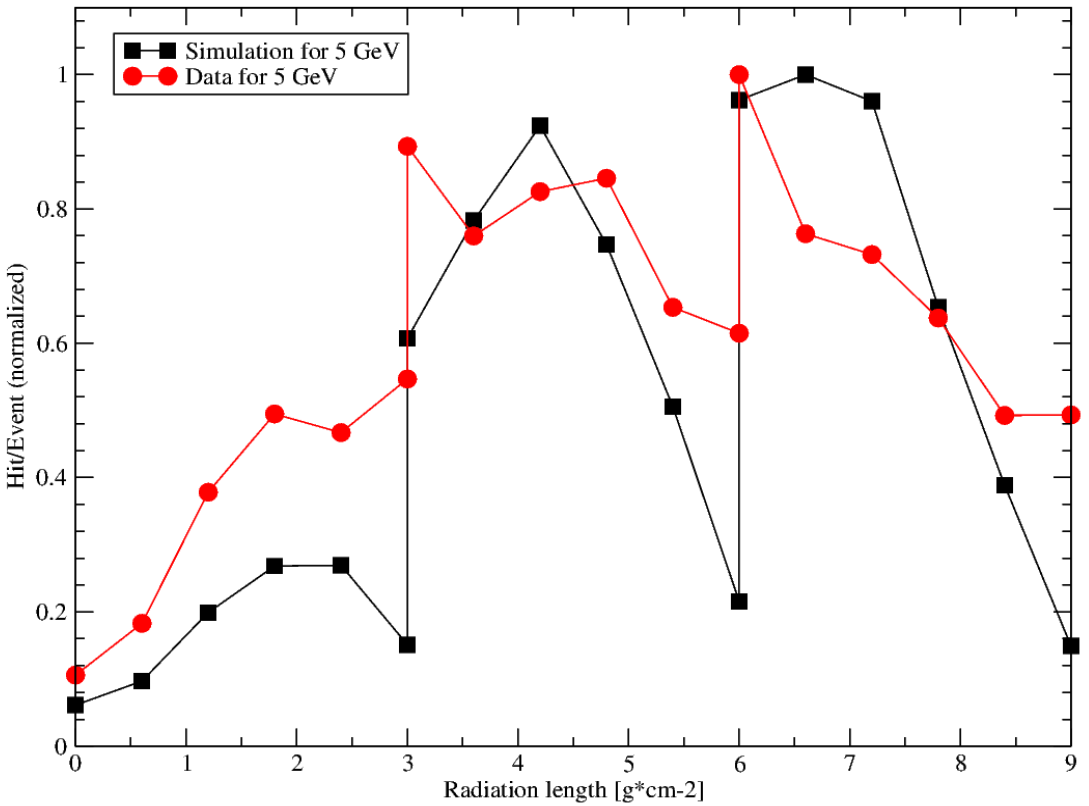
Beam alignment or leakage in configuration????



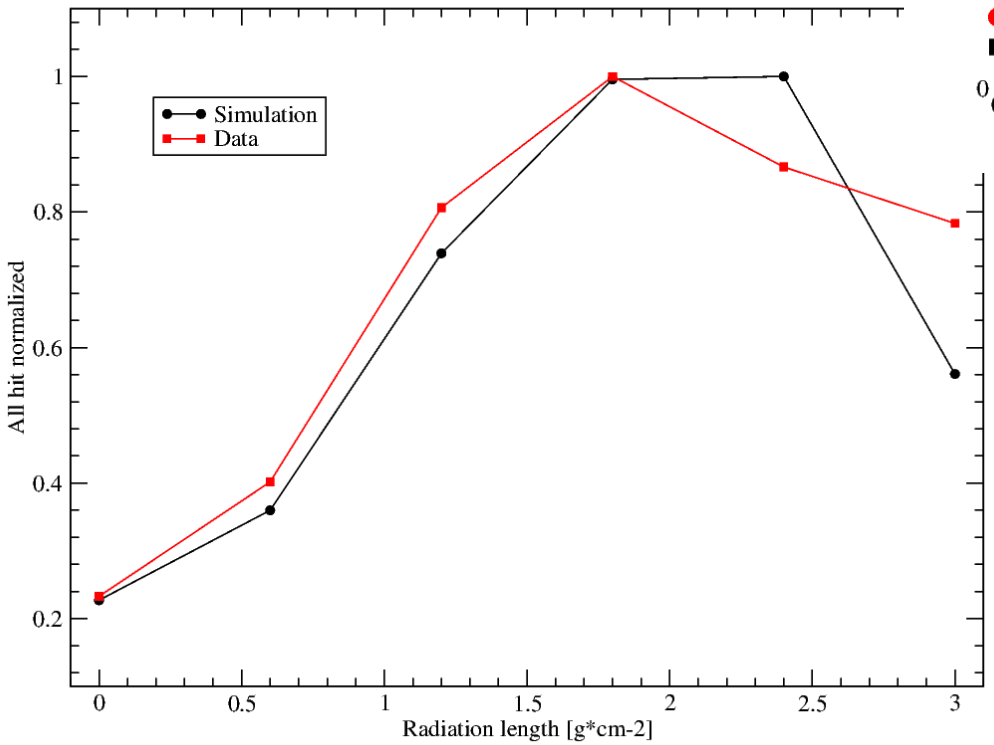
Hit per event for different radiation length



Simulation vs Data for 5 GeV

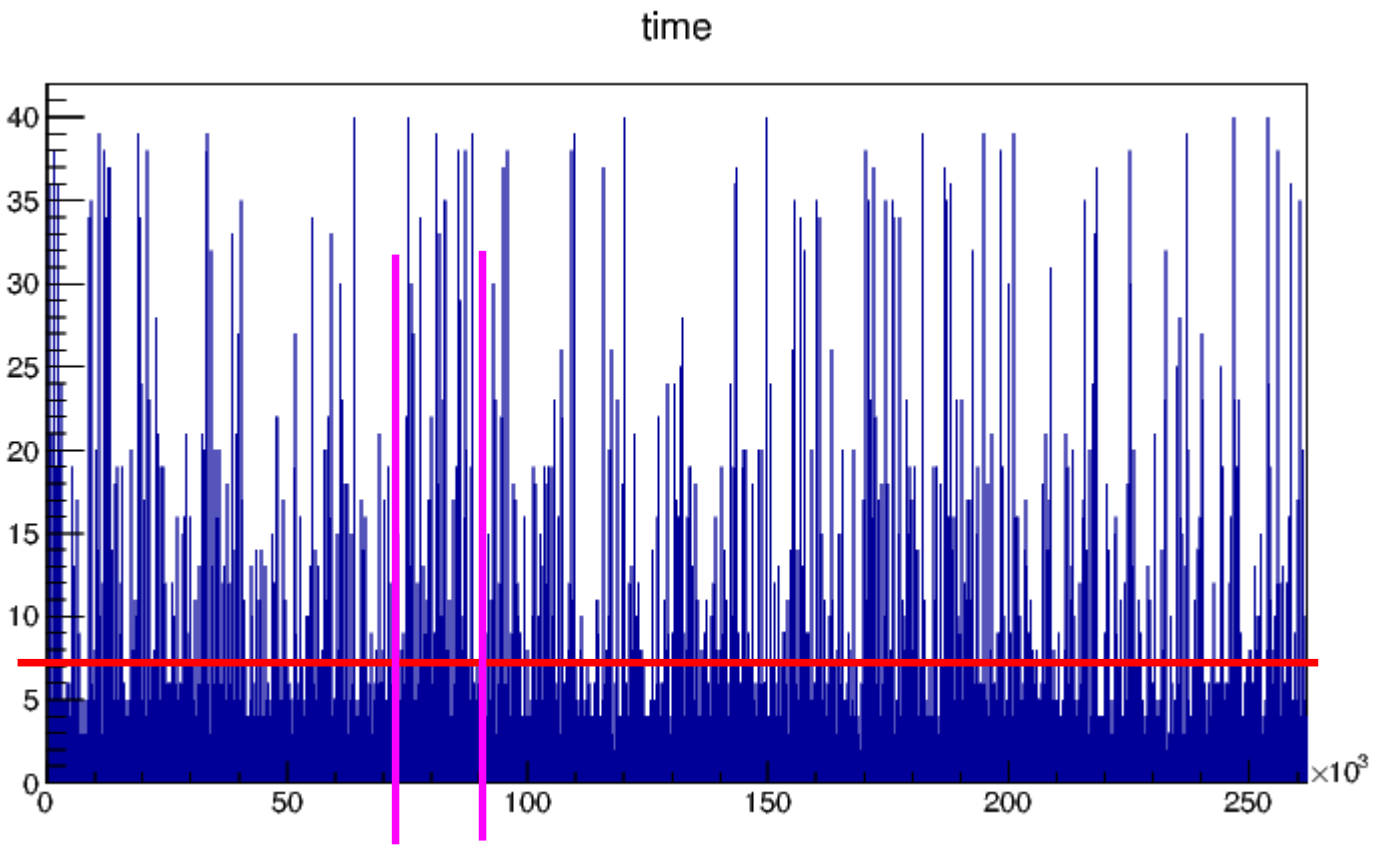


X0 for 5 GeV



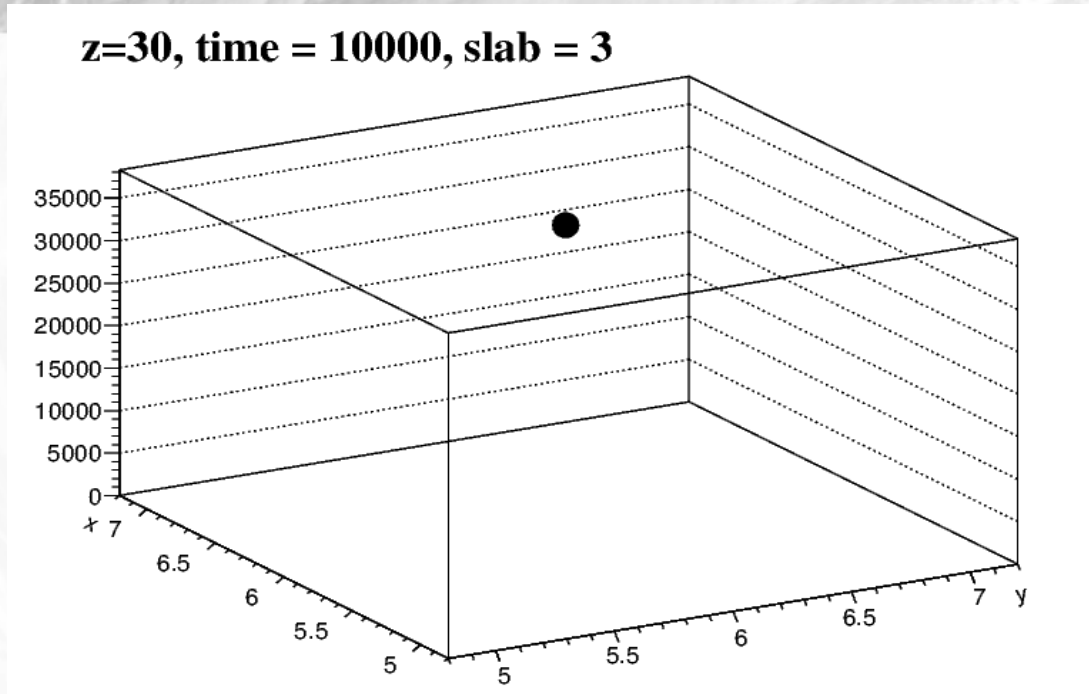
{simulation done by Tibo}

Time cut:

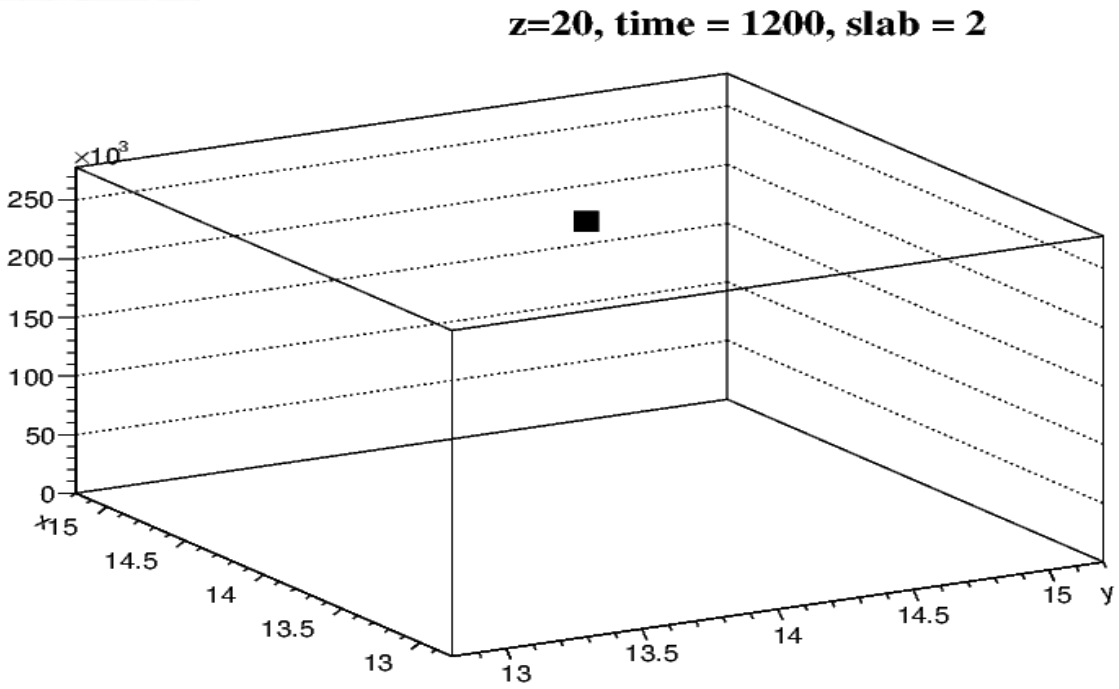


Time cut

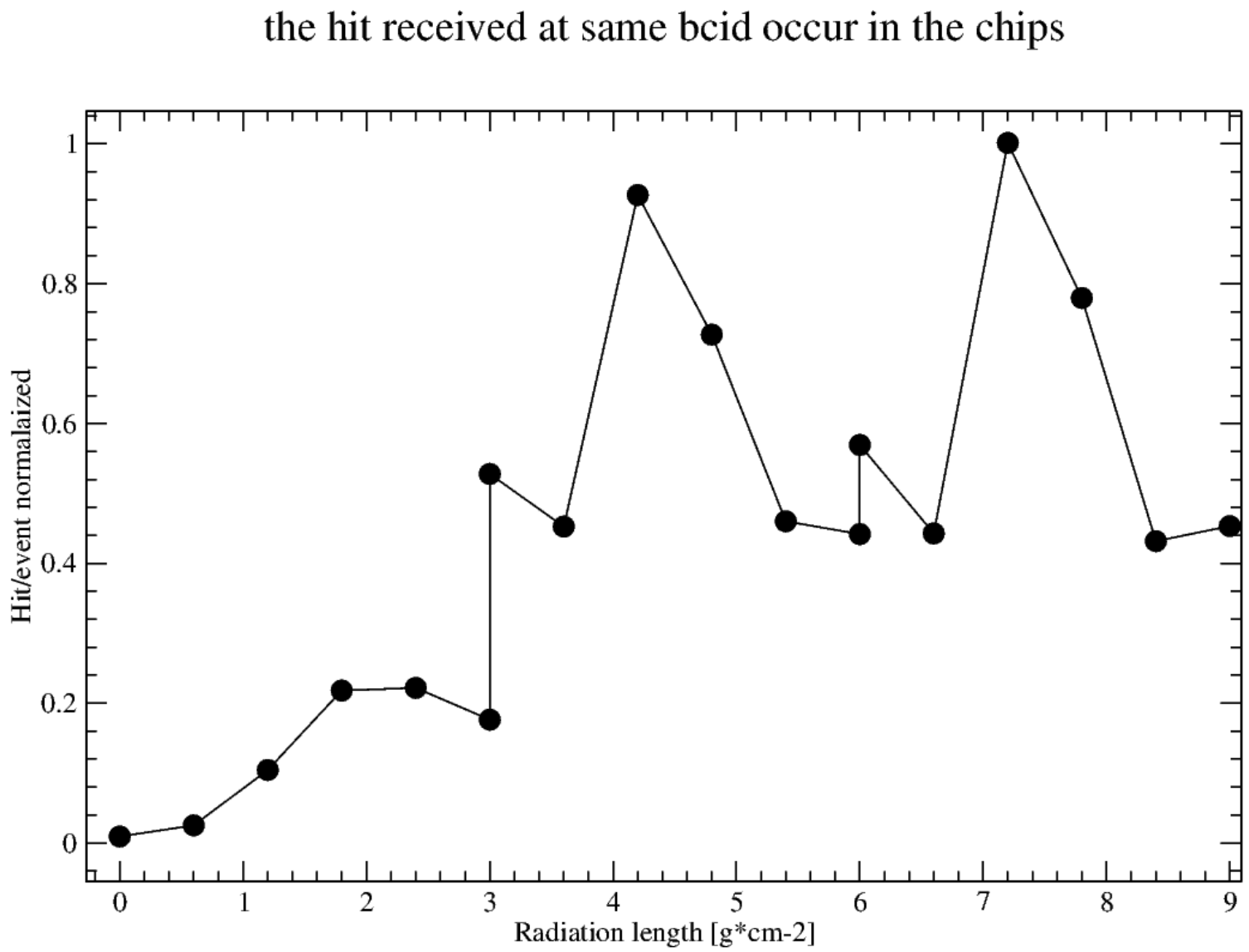
1) Hit = 36257

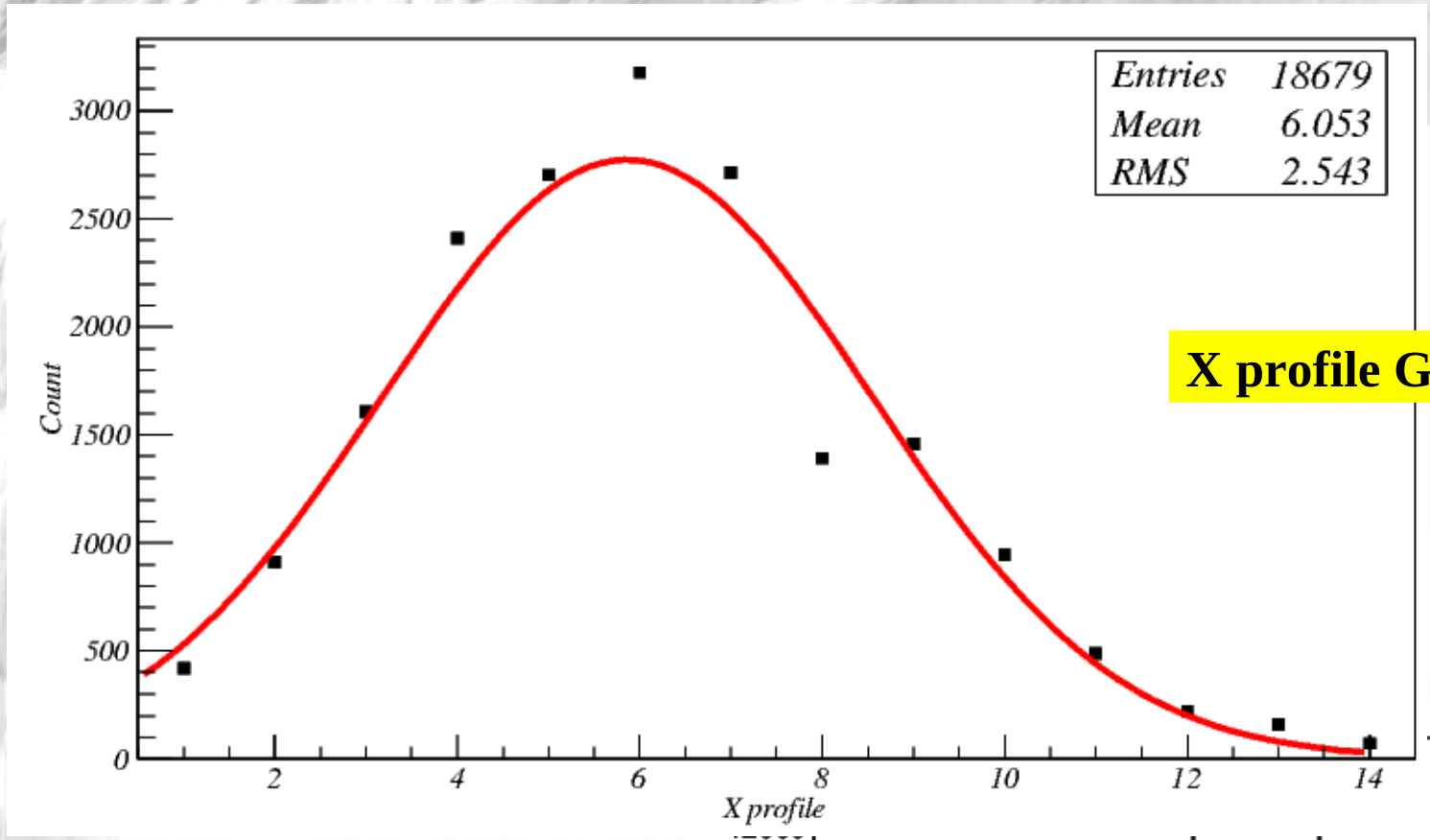


2) Hit = 263994

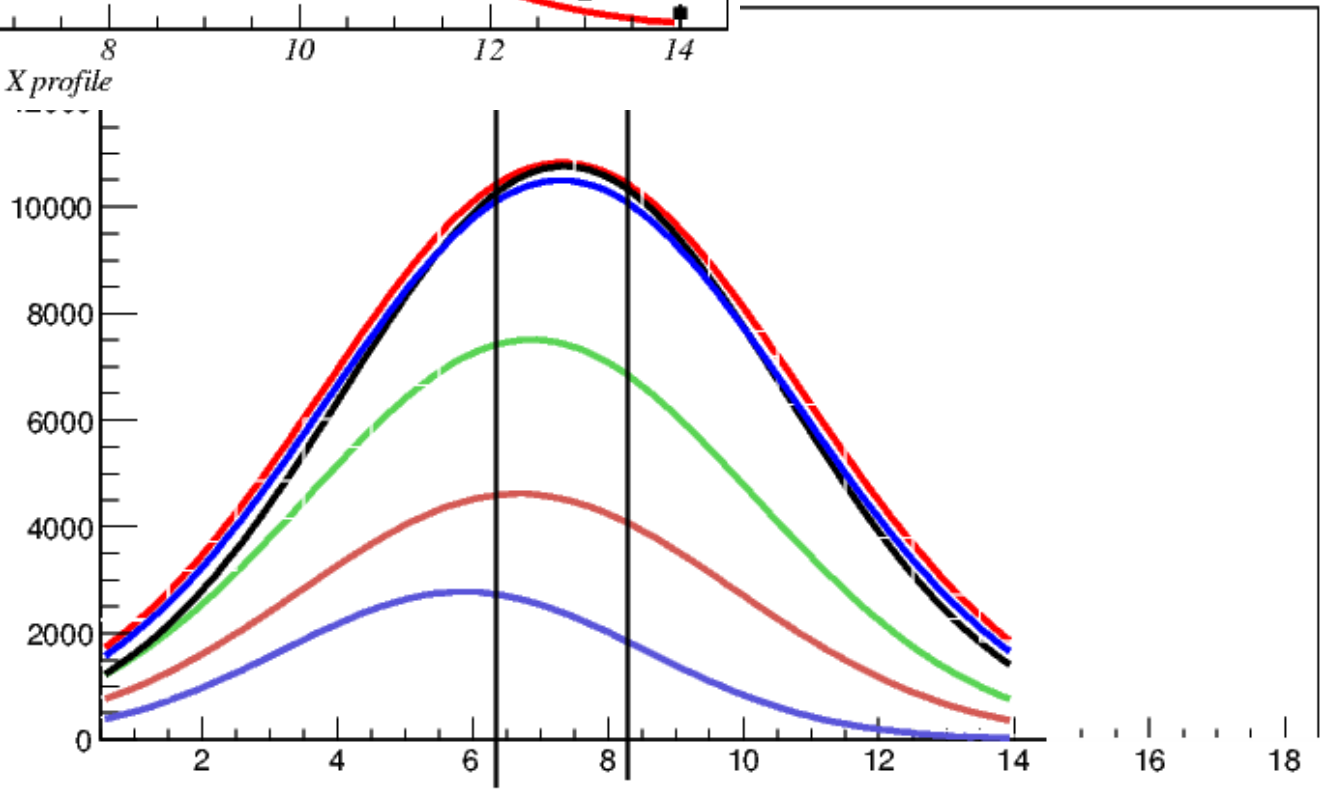


Shower profile for 5 GeV: the received hits in same BCID



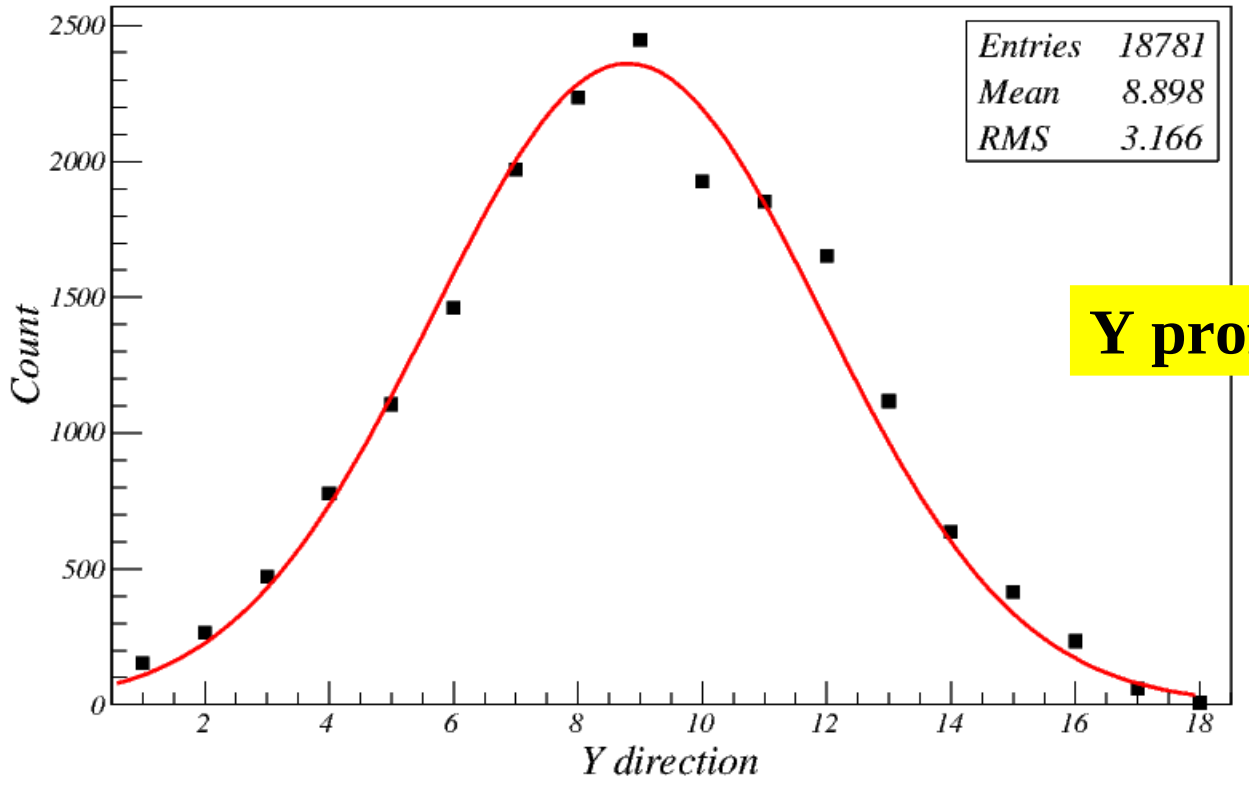


X profile GAUS fit



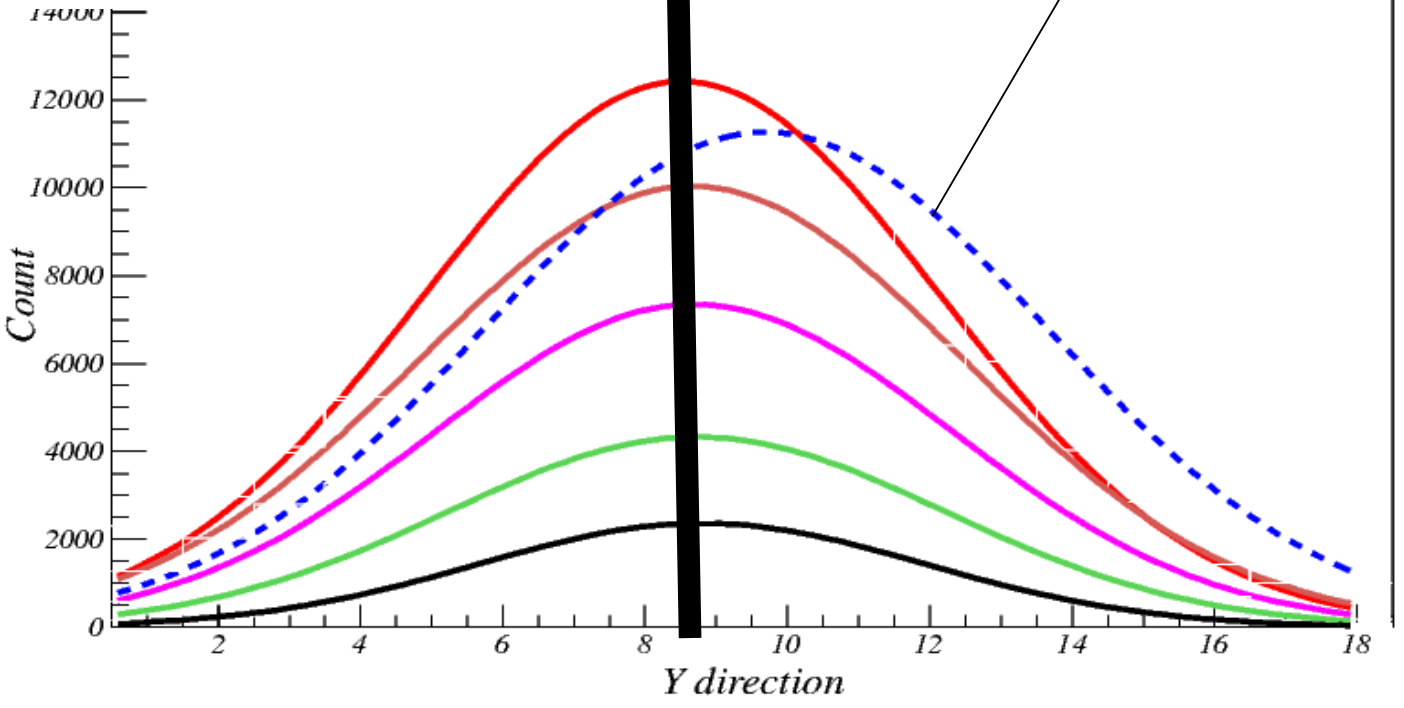
Use to estimate:

Shower size-sigma from gaus
Beam alignment-mean from gaus

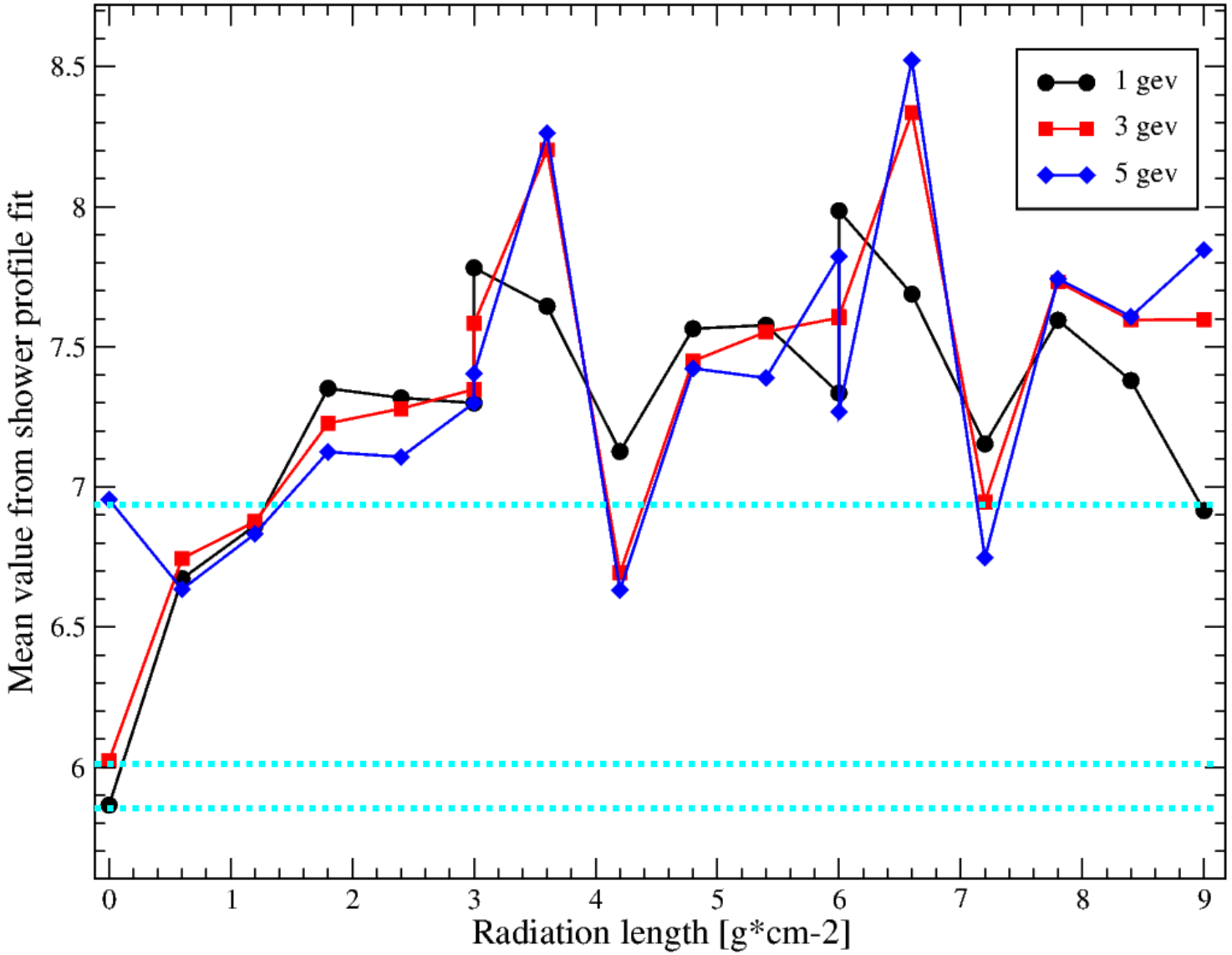


Y profile Gaus fit

DIF behaviour???
Noise ???



Mean value of Gaus fit of shower on X profile

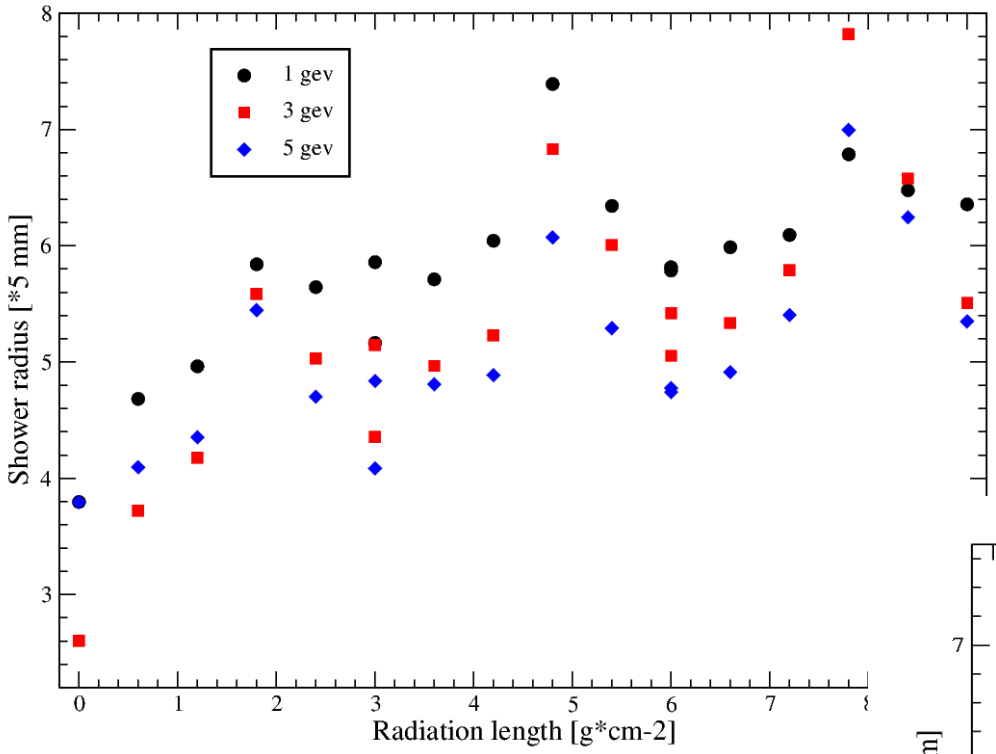


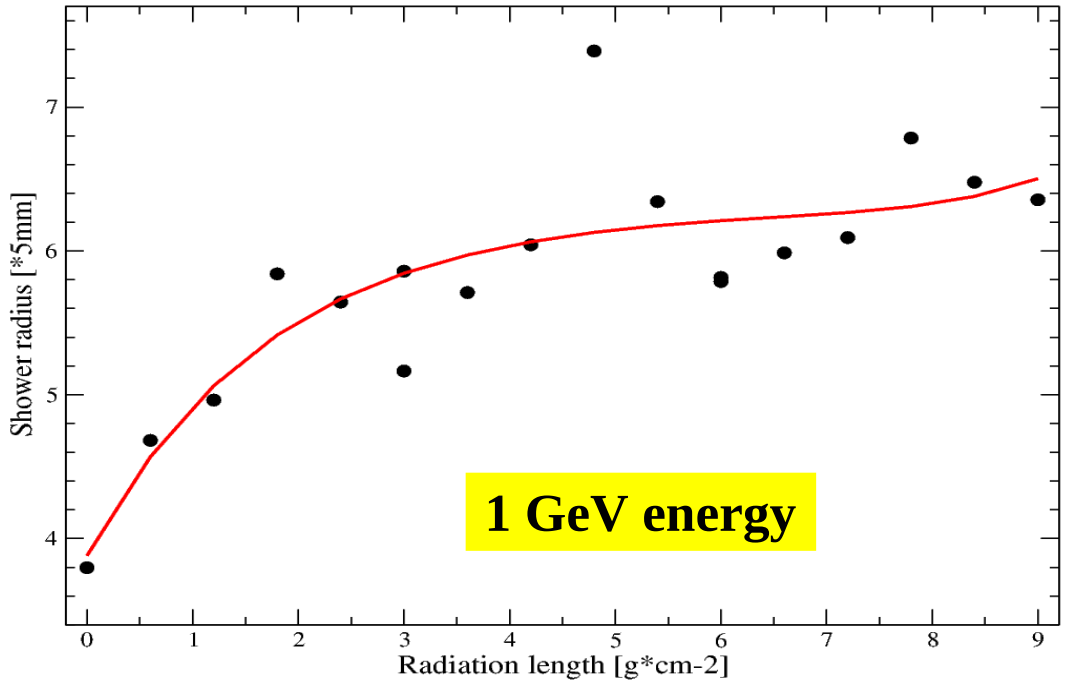
Deviation ==> beam alignment ==>on X axis

Shower size for different radiation length:

Size of shower determined from sigma of Gaus fit of shower profile.

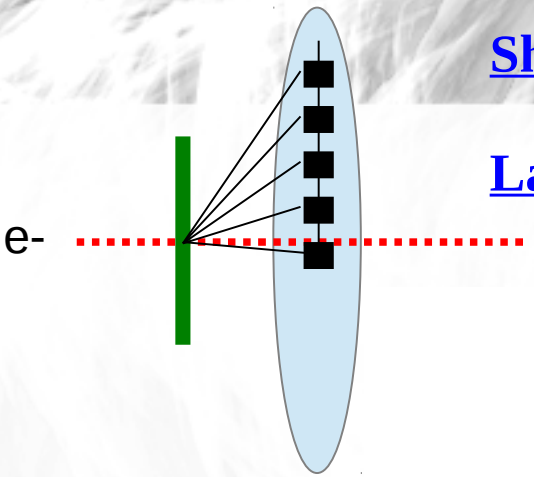
Shower radius = $\sqrt{(\sigma_x^2+\sigma_y^2)}$

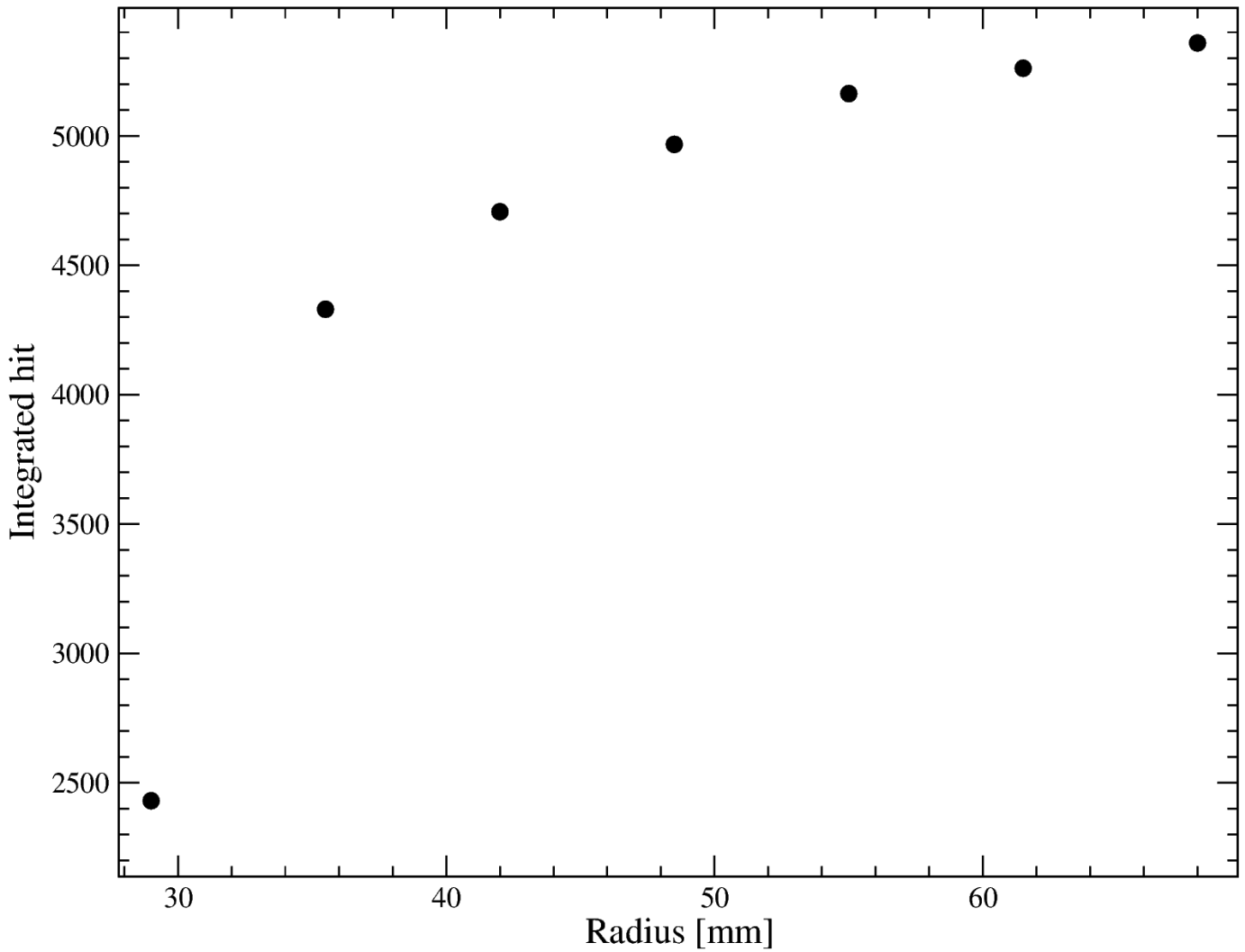




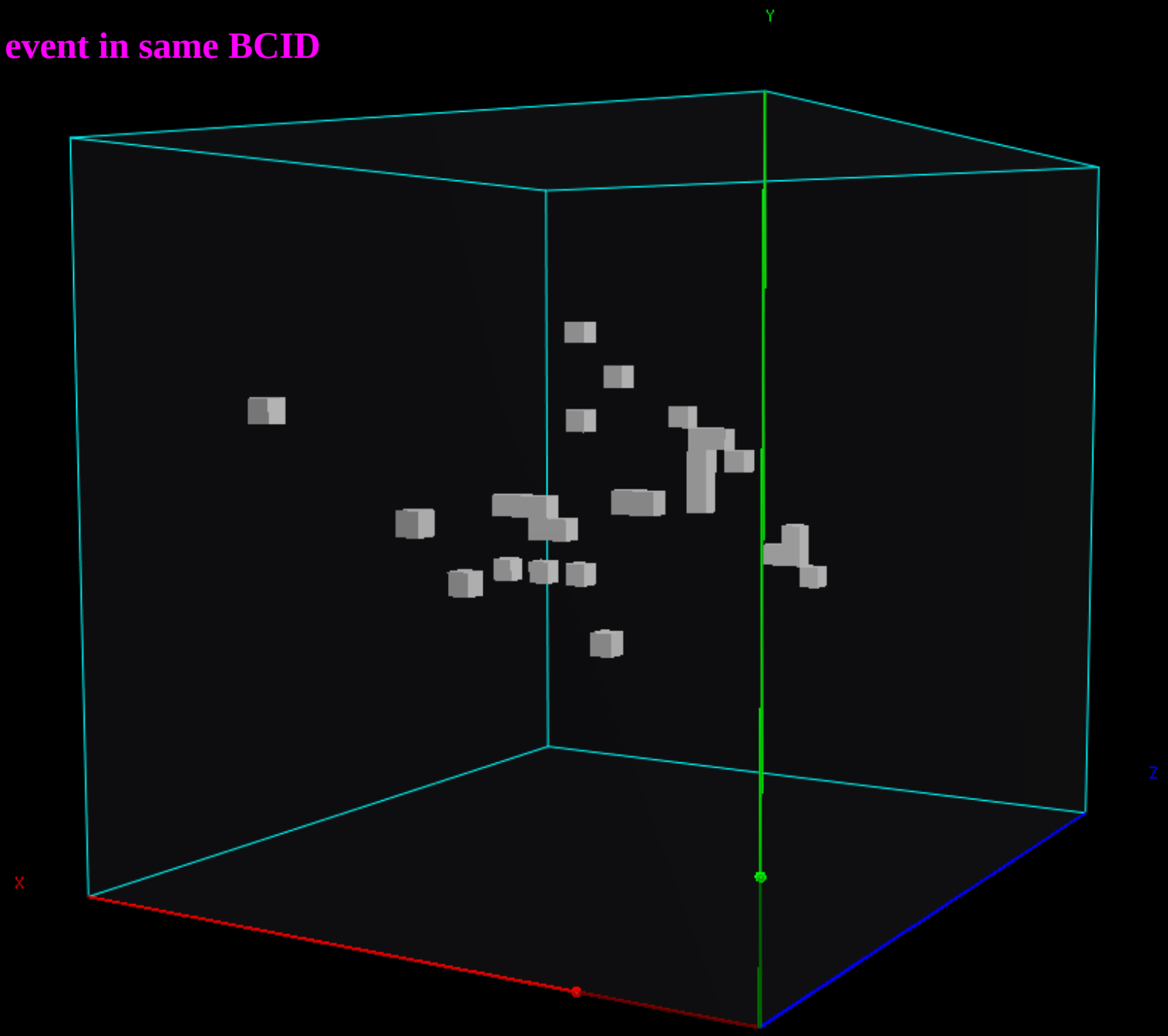
Shower study in radial direction for different radiation length.

Laterial shower distribution





Hit for one event in same BCID

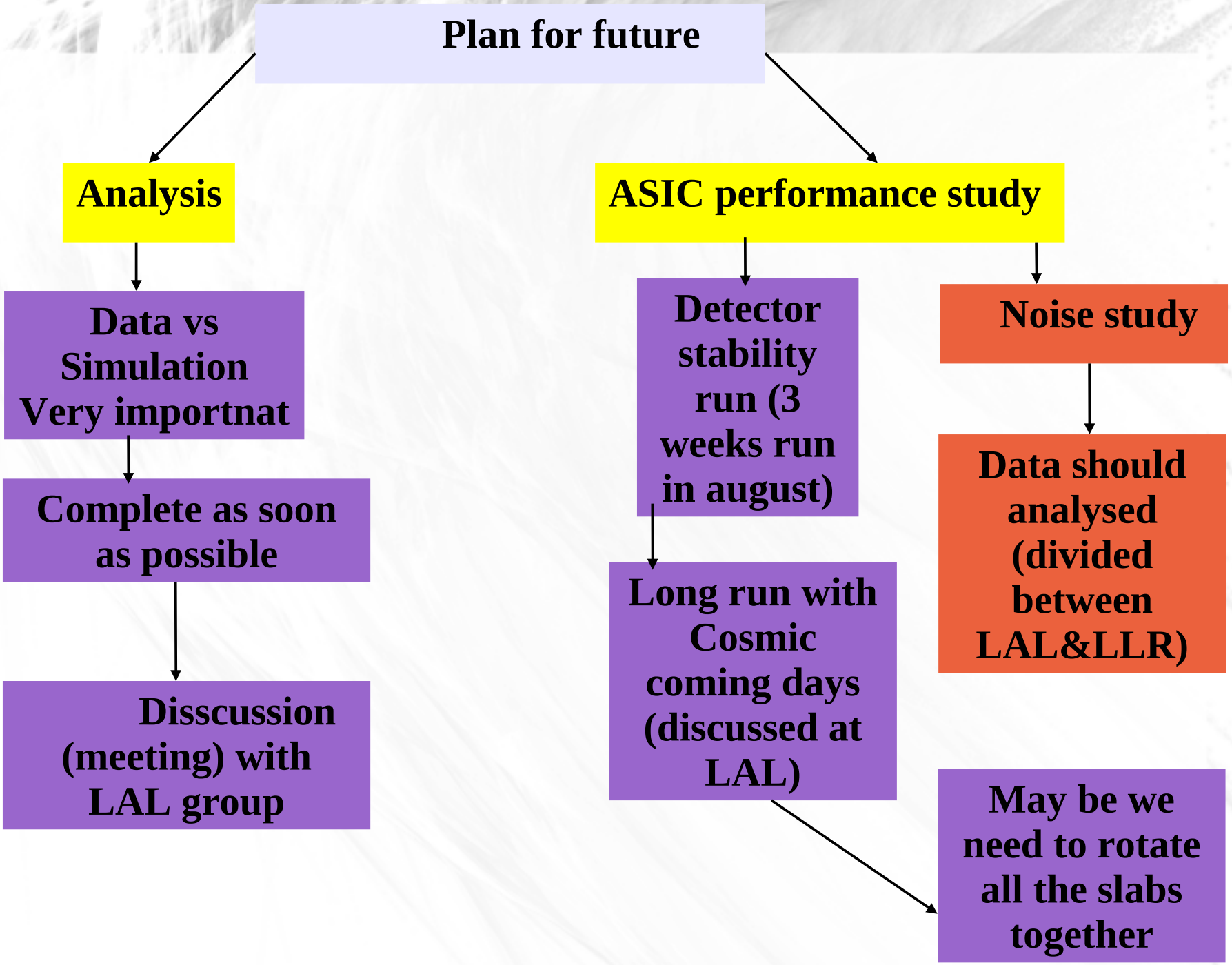


Summary:

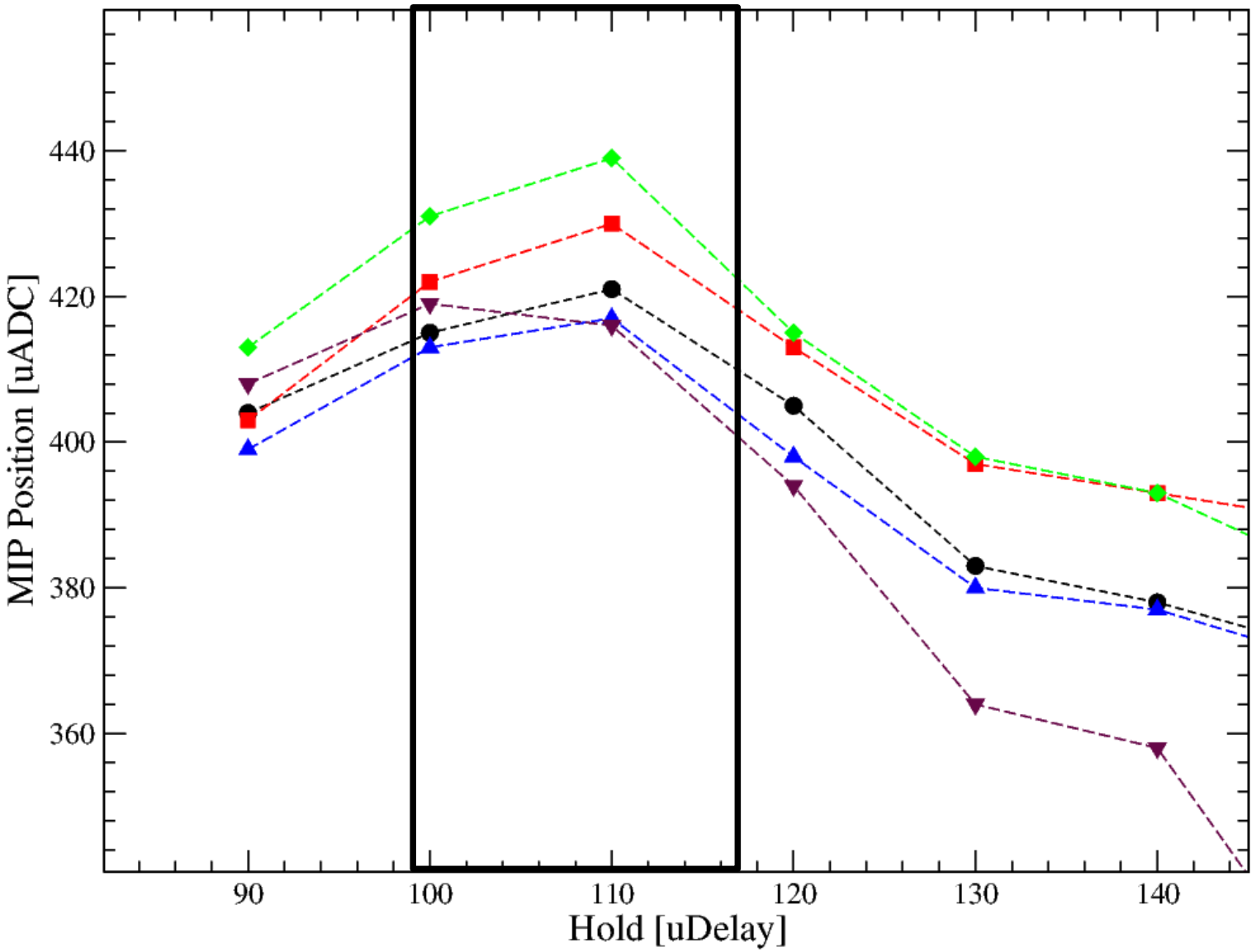
Hit distribution for different radiation length analysed.
The size of shower estimated for different radiation length.

It seems beam not aligned proper or we had a shower leakage
due to particle loose, which gives the discrepancy in end of X0 and beginning of 3X0 configuration (same for 3X0 and 6X0).

Need to verify it with same geometry with simulation!


Plan for future
Analysis
Data vs Simulation Very importnat
Complete as soon as possible
Disscussion (meeting) with LAL group
ASIC performance study
Detector stability run (3 weeks run in august)
Long run with Cosmic coming days (discussed at LAL)
Noise study
Data should analysed (divided between LAL&LLR)
May be we need to rotate all the slabs together

Hold calibration



Optimized value: 100-110 uDelay

Shower study with using 2D fit parameters