

# Scintillator SCECAL

## Beam Test results

DESY March 2007

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for Daniel Jeans, Satoru Uozumi, KK and TT

DESY beam test results

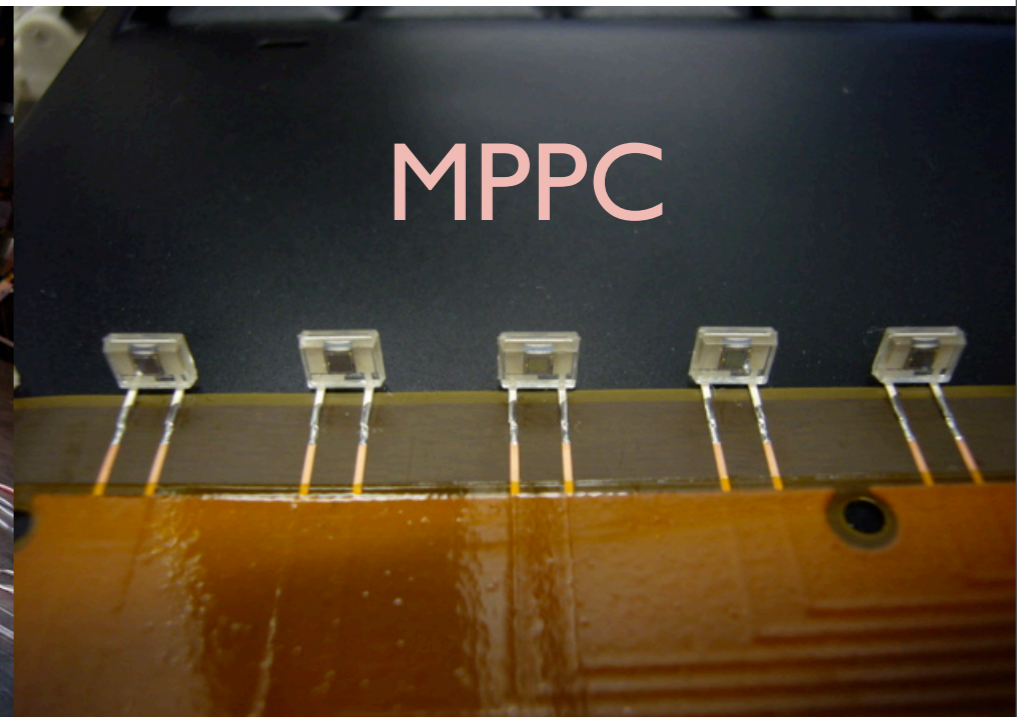
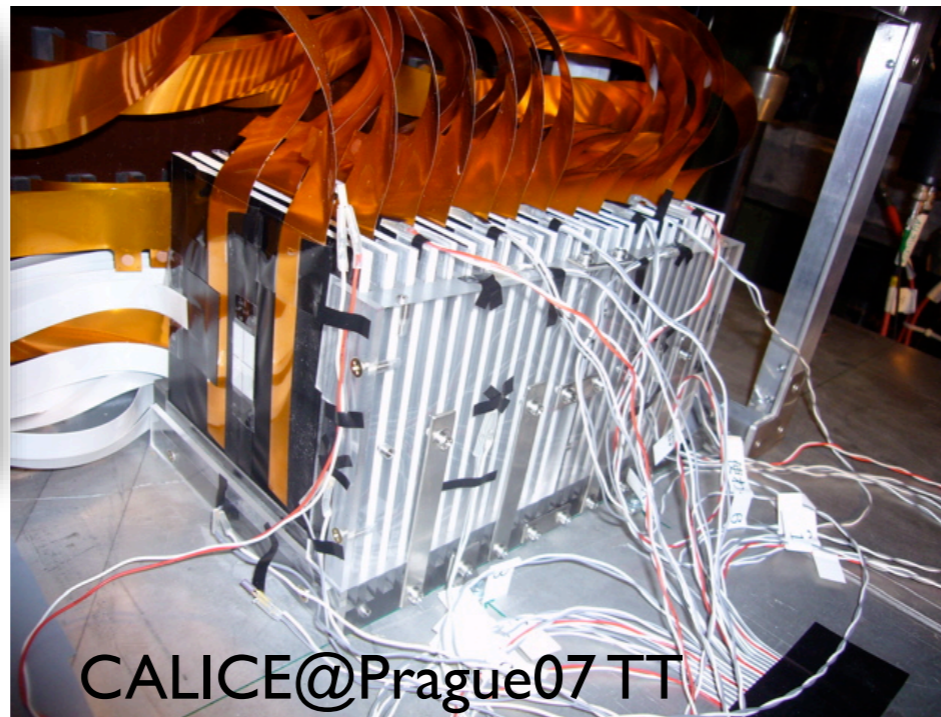
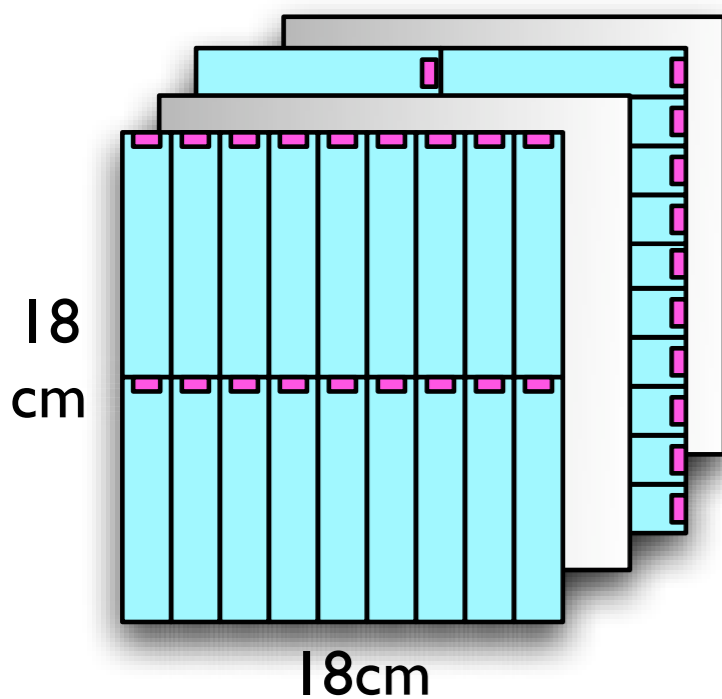
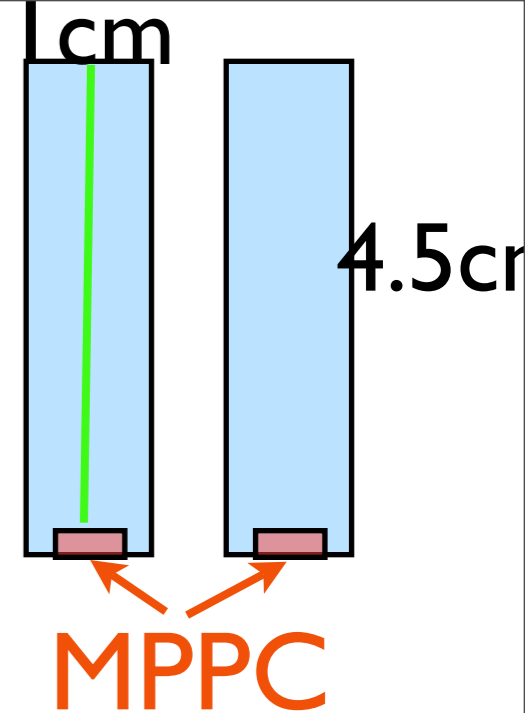
monitoring system

calibration

preparation for the Fermi-BT

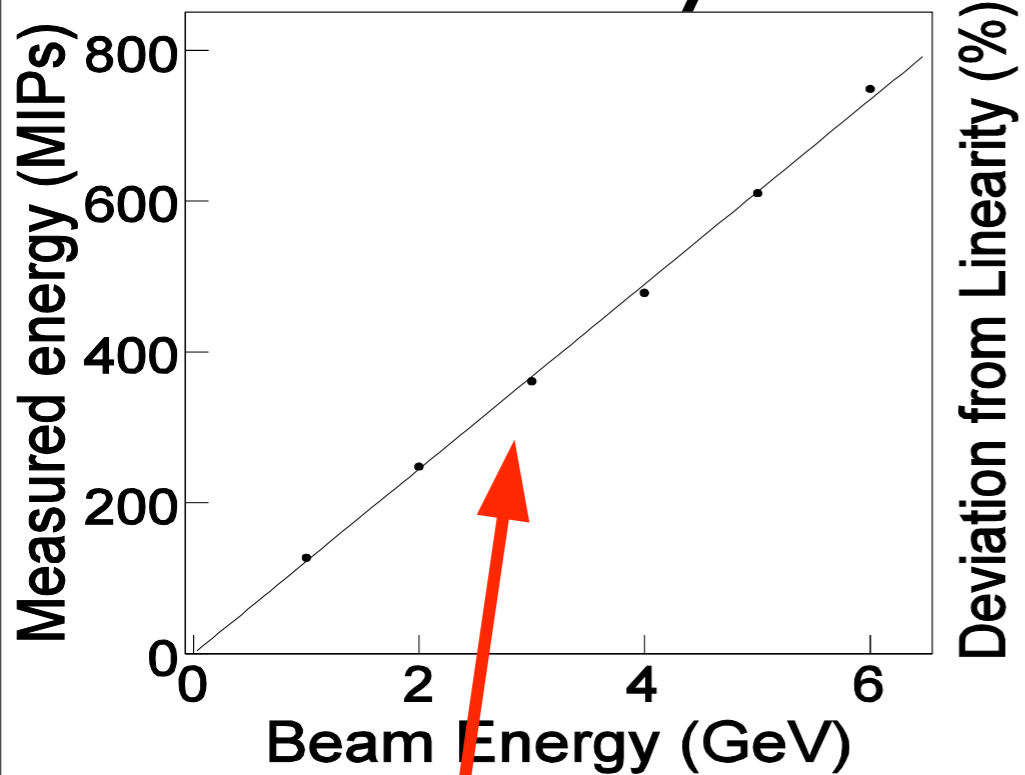
# DESY Beam Test

- scintillator : 1 cm x 4.5 cm x 0.3 cm
- 468ch (18 x 26) scintillator + MPPC
- 26 layers with Tungsten 3.5mm thick
- with / without WLSF
- Kuraray (cast) or KNU (extruded) scintillator

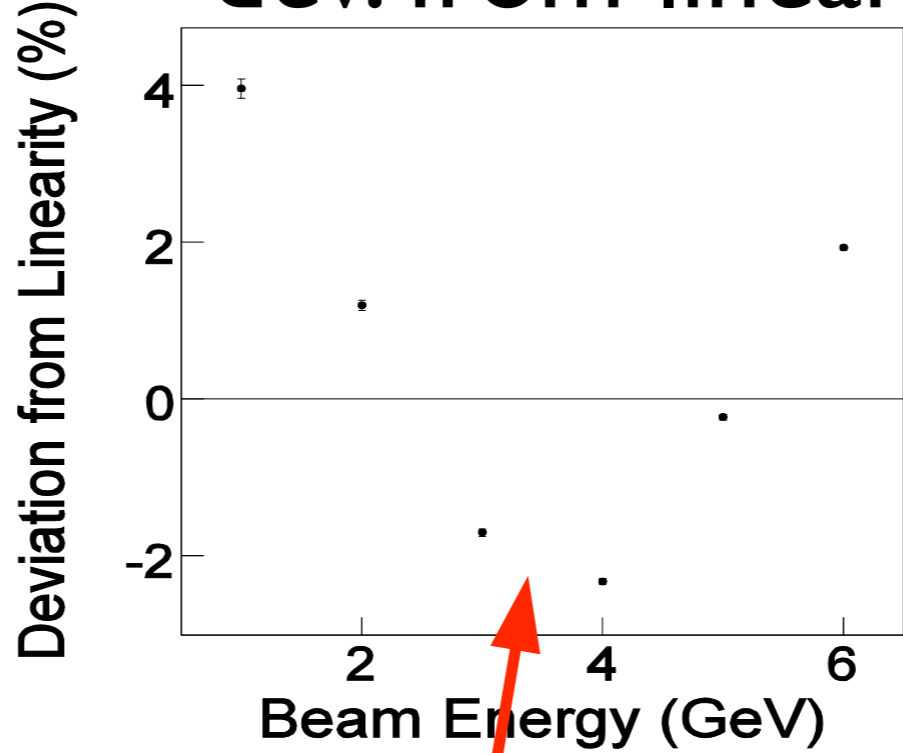


# SCECAL@LCWS07

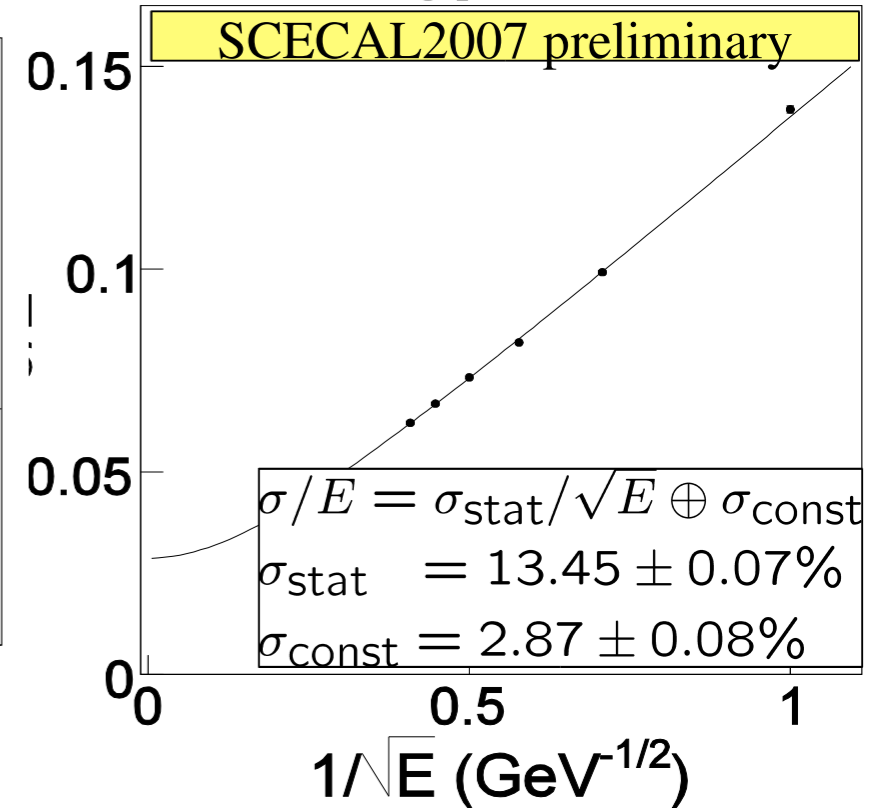
linearity



dev. from linear



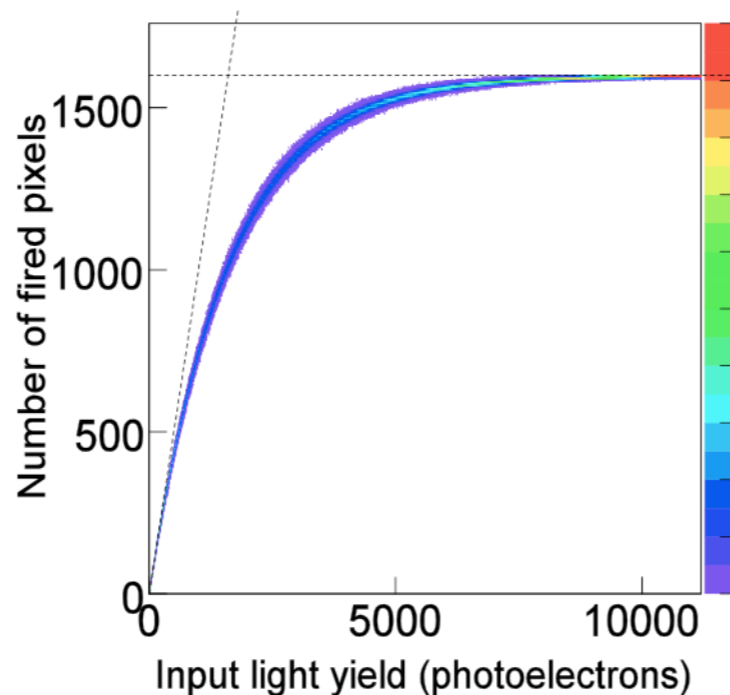
energy resol.



fairly linear  
response

non linearity ~4%

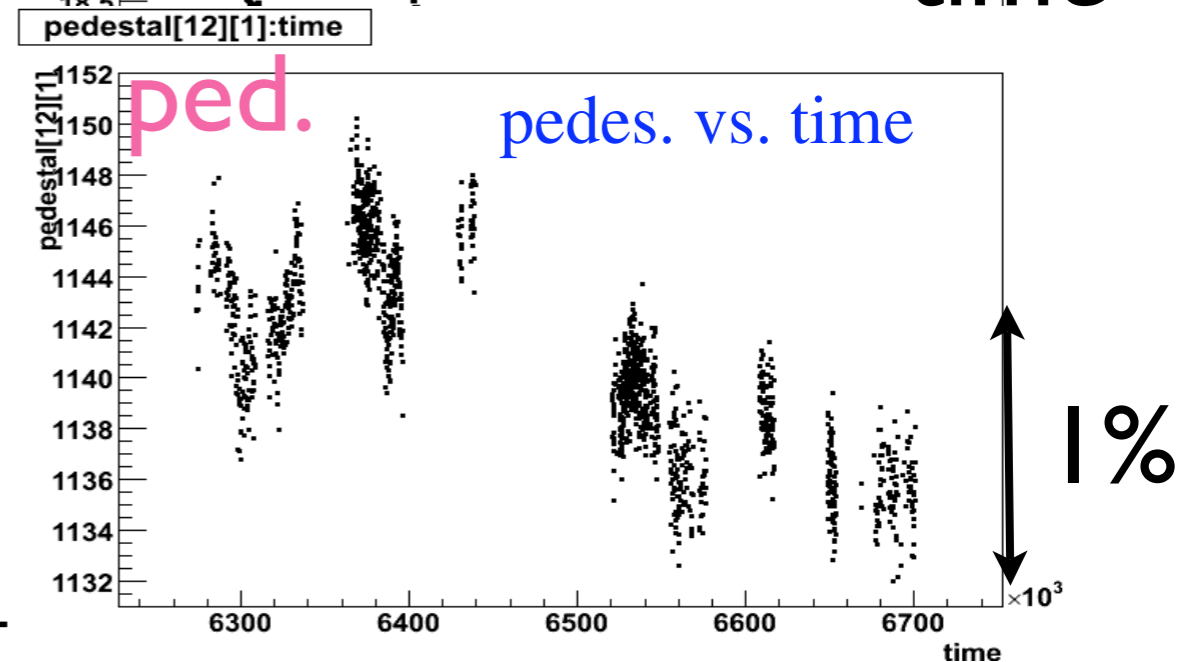
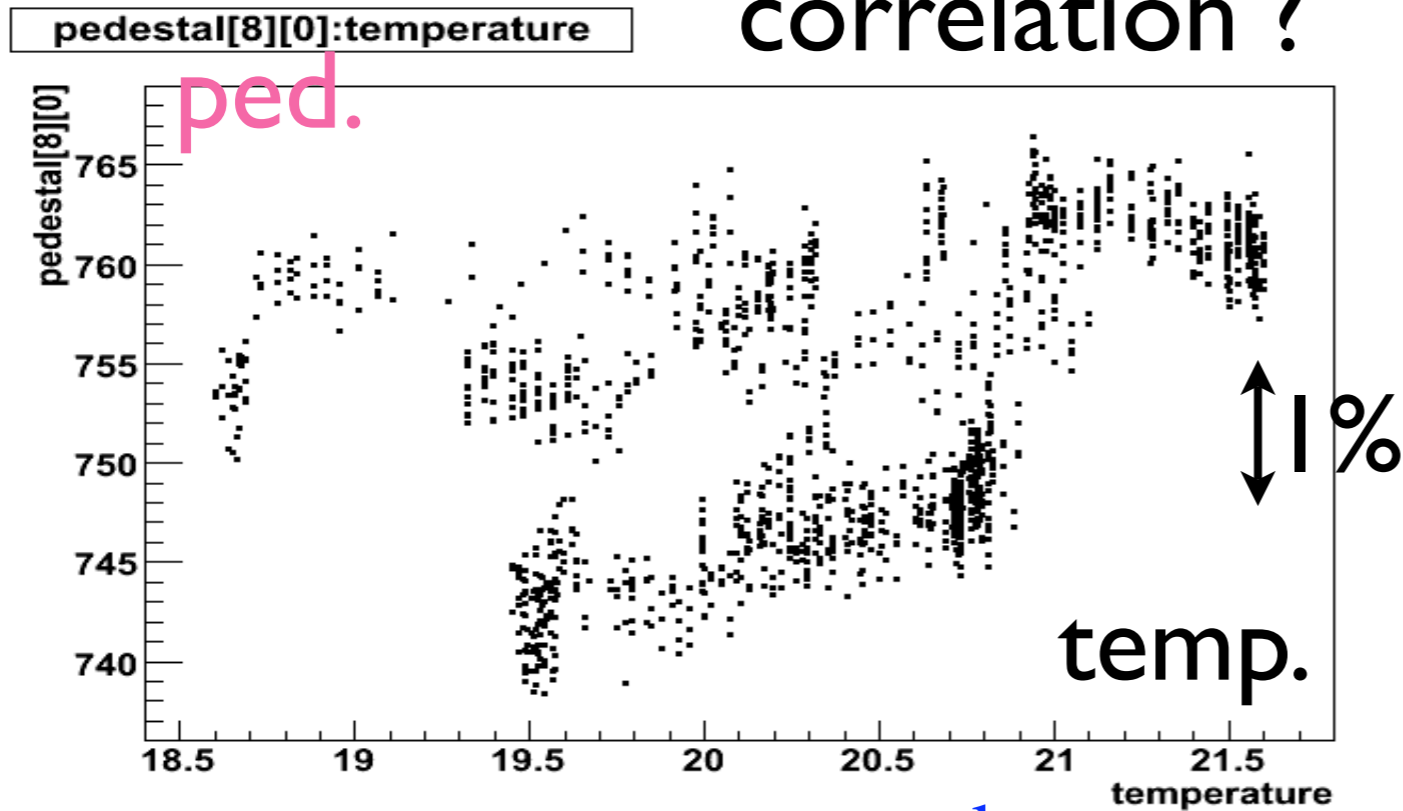
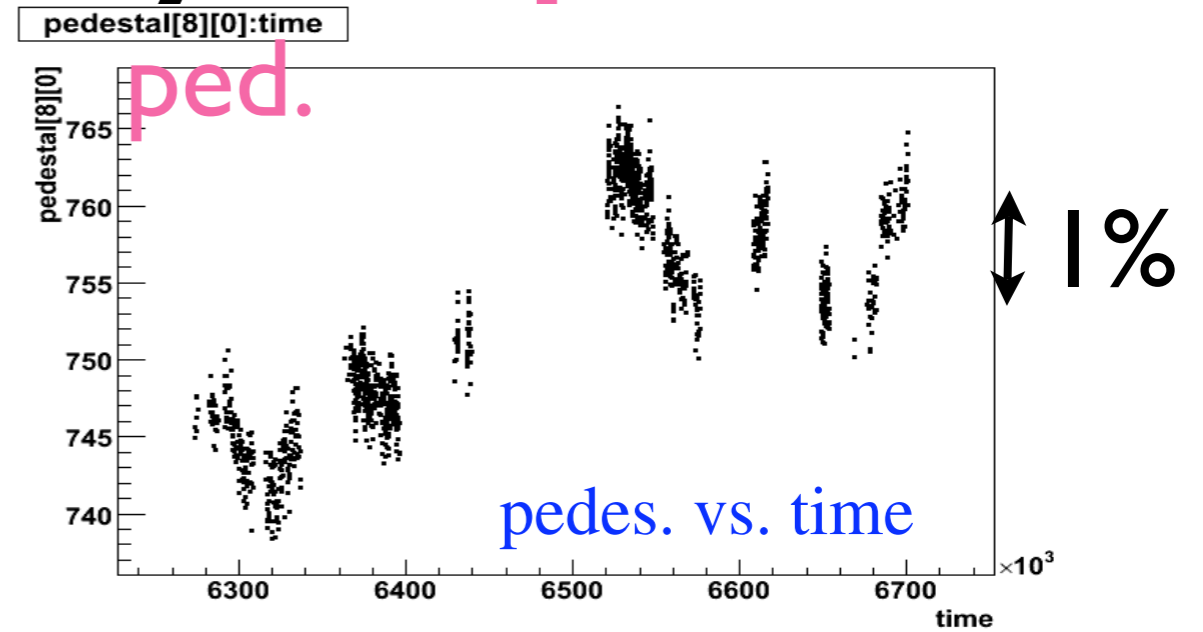
resol. ~13.5%  
const. ~3%



response curve expects  
-13% at 6GeV

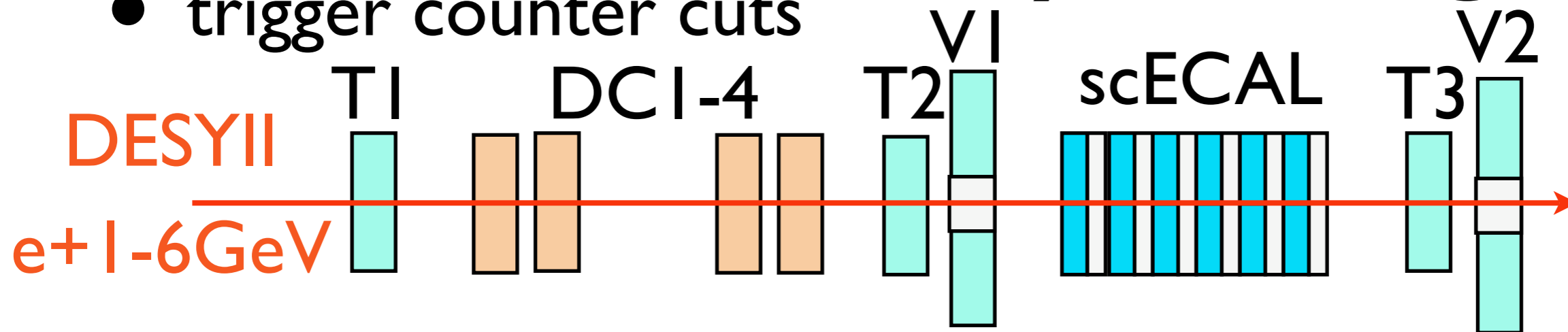
# DESY BT analysis **ped.**

- pedestal test
- with respect to the temperature



# DESY BT analysis trig.

- trigger counter cuts

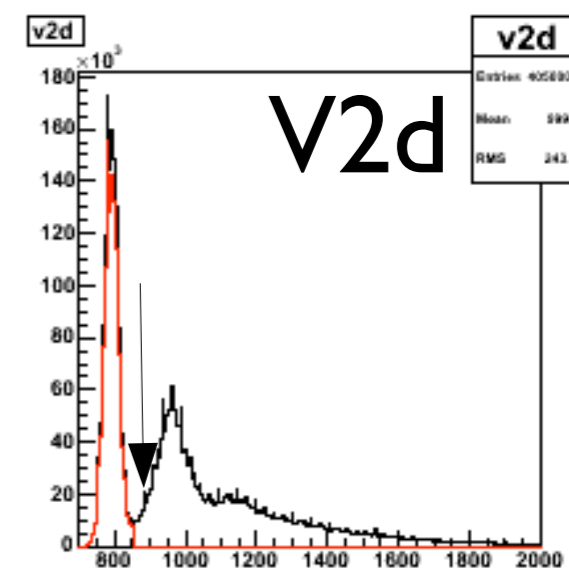
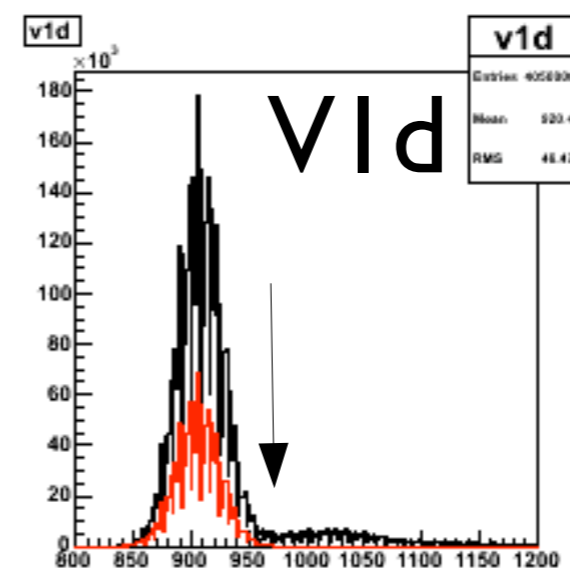
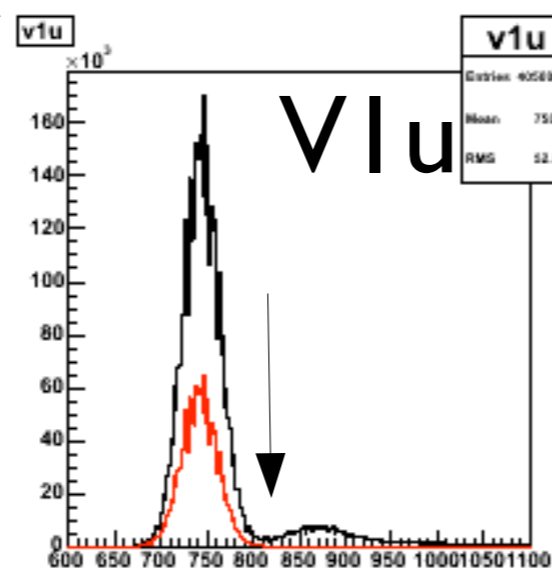
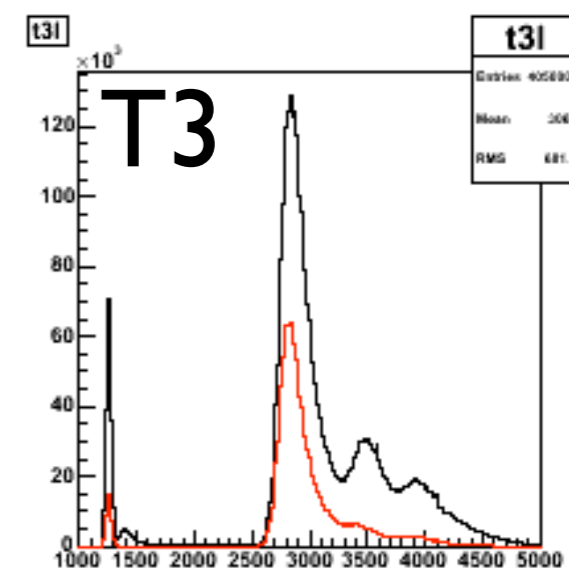
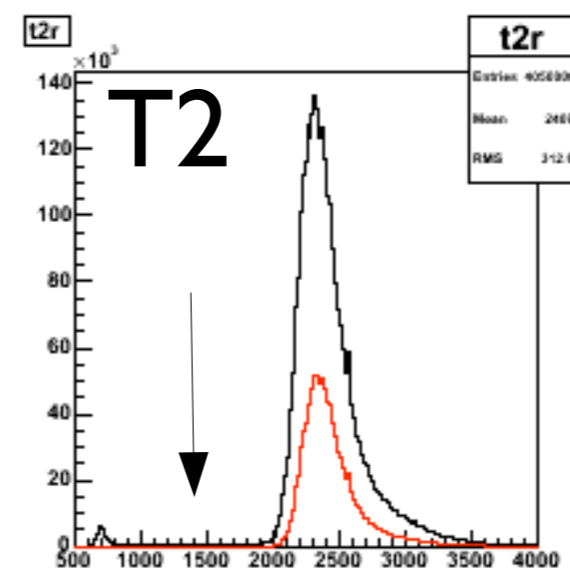
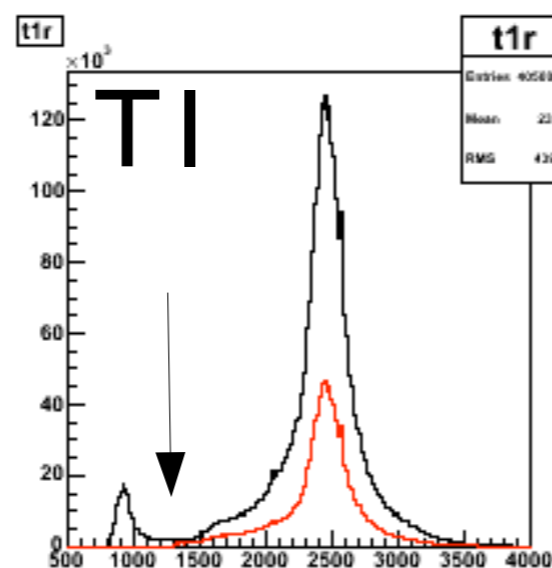


Another analysis

trigger counters

before (after) selection

veto counters

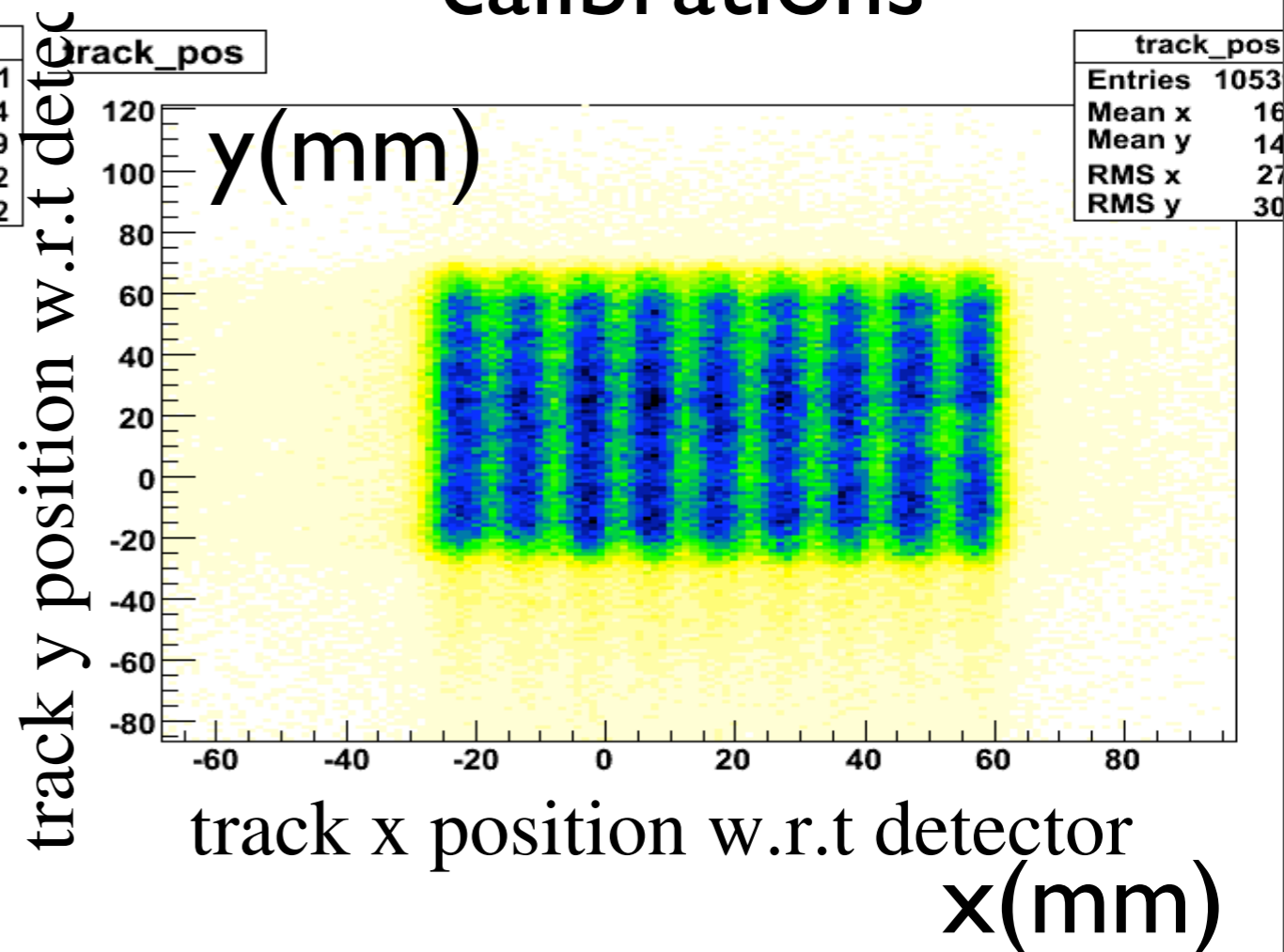
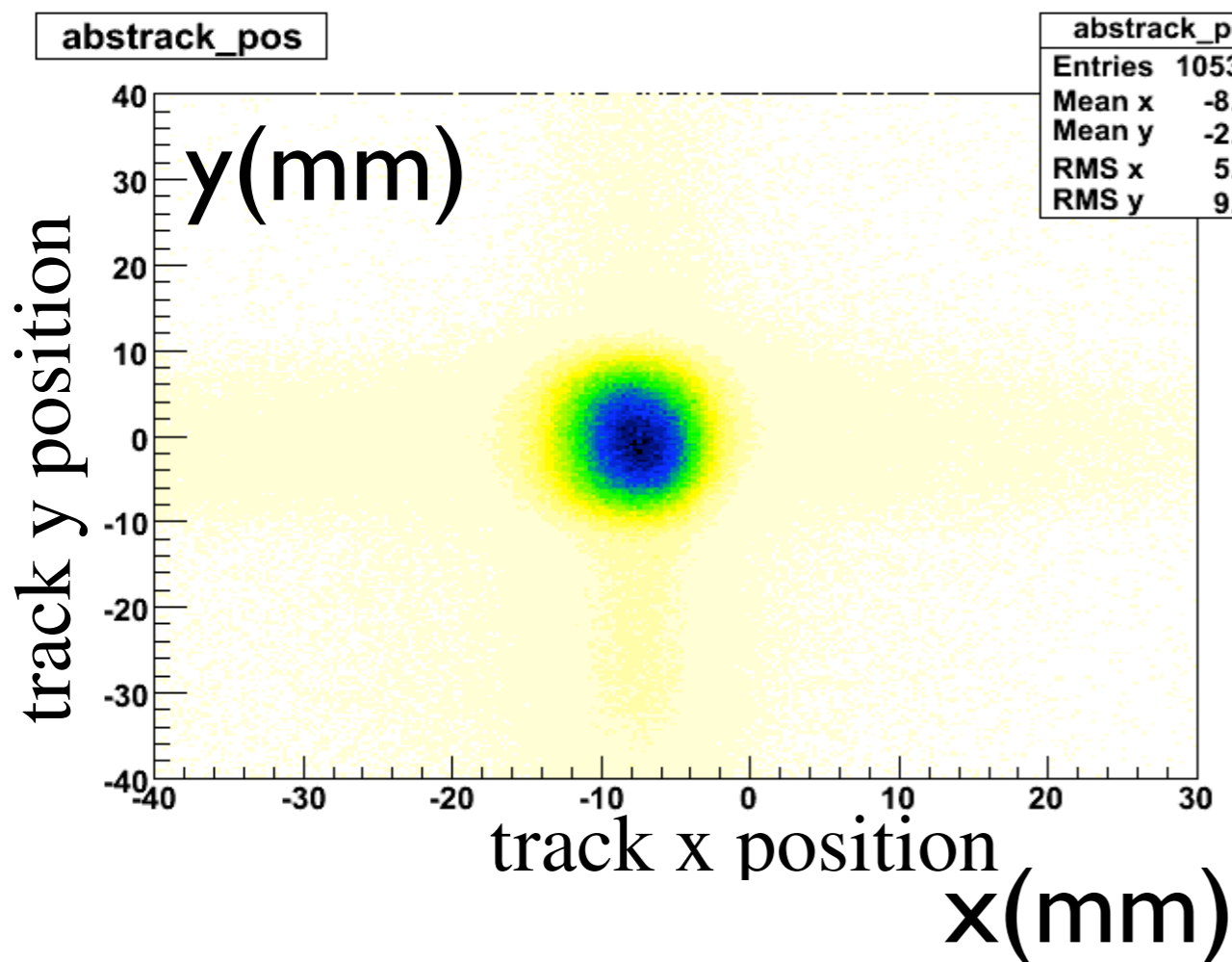


# DESY BT analysis DC

- DC's are calibrated
- DC info. for the calibration runs

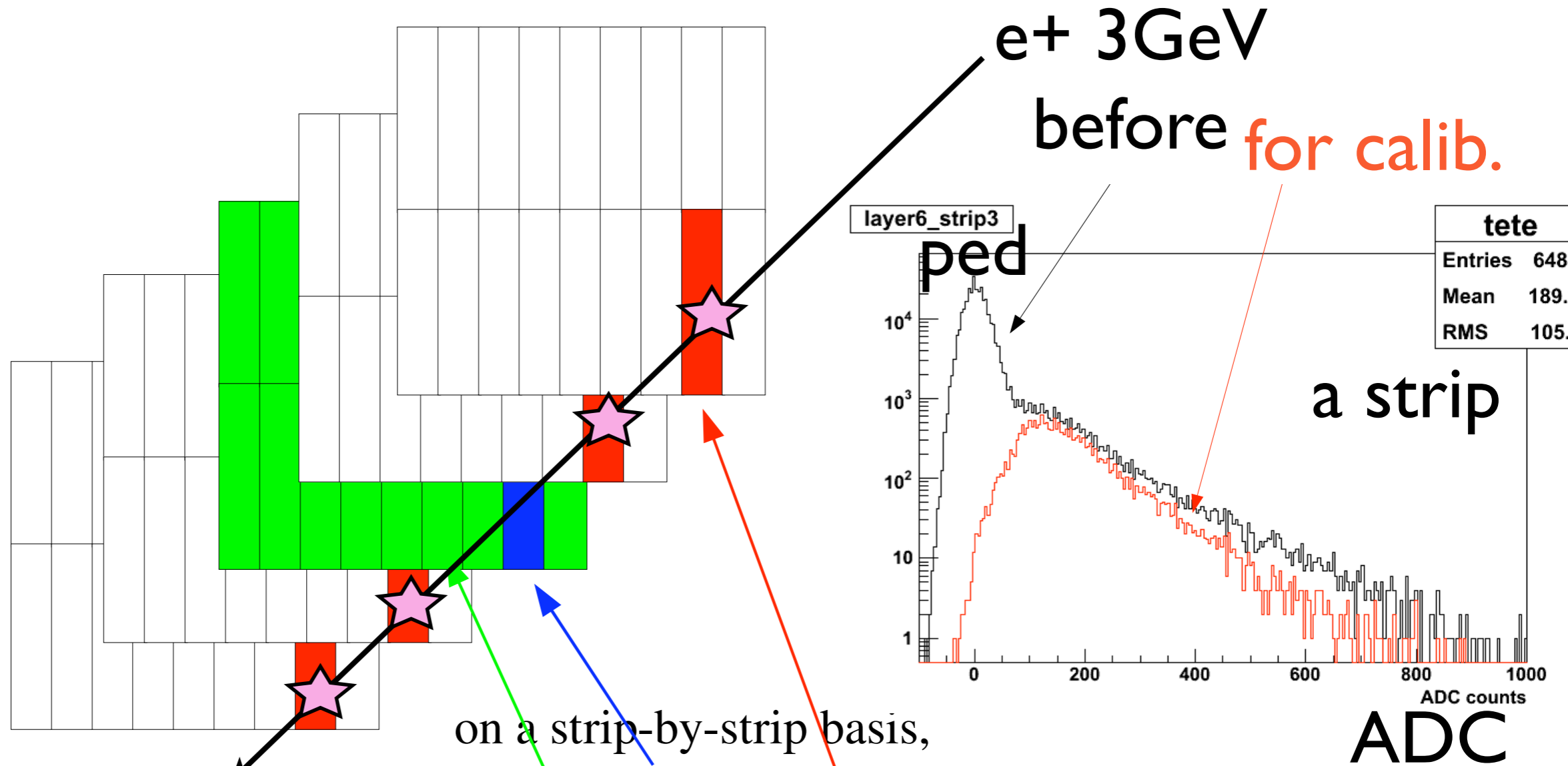
beam positions in a run

beam positions in calibrations



# DESY BT analysis **calib.**

- strip calibration with the sc-ECAL



e+ 3GeV  
before **for calib.**

on a strip-by-strip basis,  
for **a given strip**, require that  
almost all **similar strips on other layers** are hit  
no **other strips in same layer** are hit

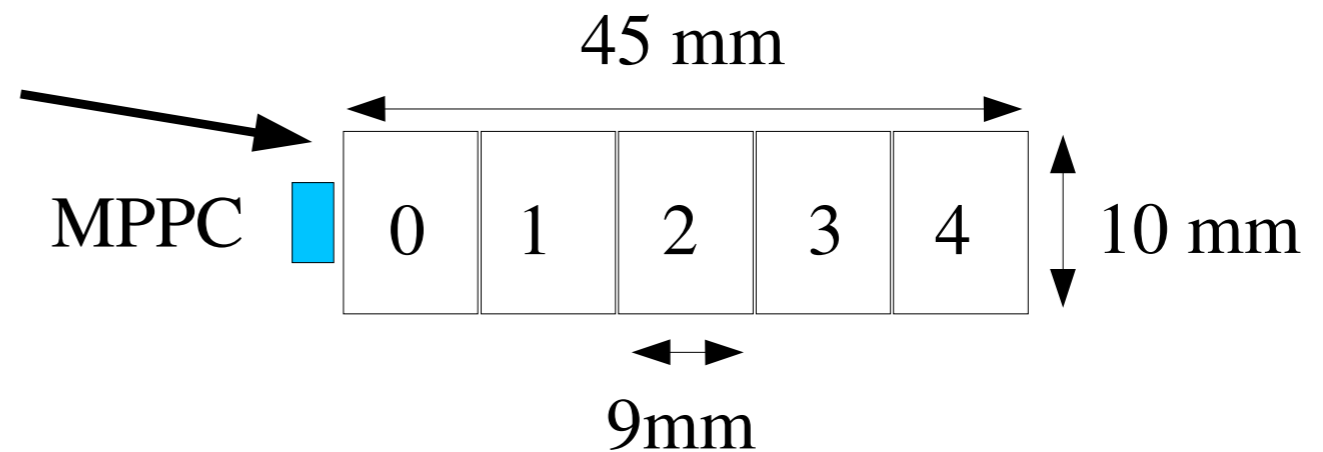
# DESY BT analysis **calib.**

- test of calibration : position dependence

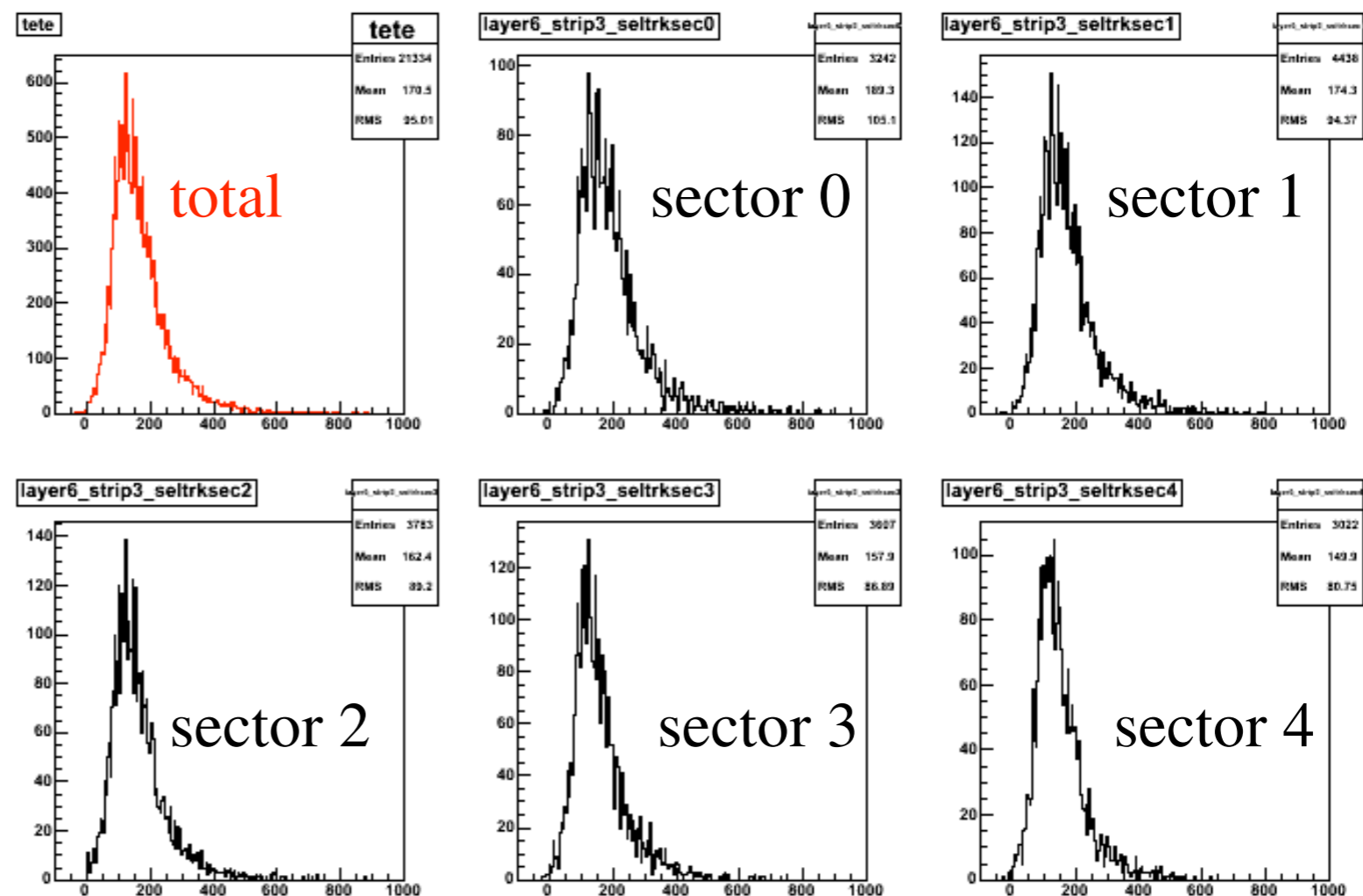
use tracking info to

see where positron hits strip:

split into 5 sectors



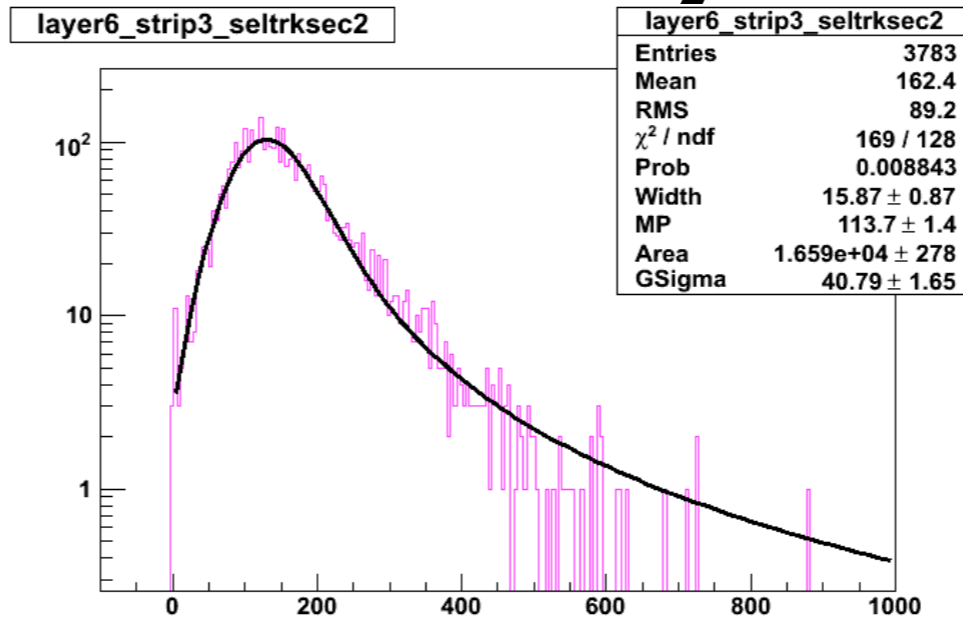
example of ADC  
distributions in  
5 sectors of one  
particular strip:





# DESY BT analysis **calib.**

- fit with Landau convoluted with Gaussian



landau M.P.V.

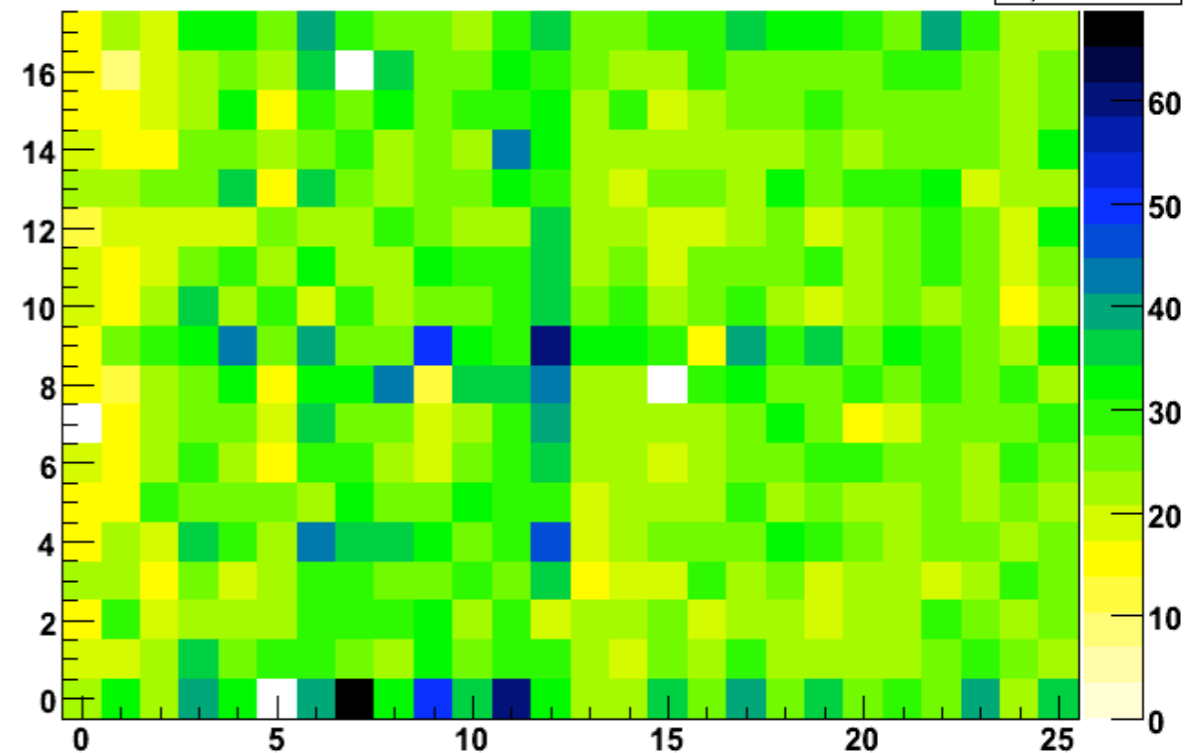
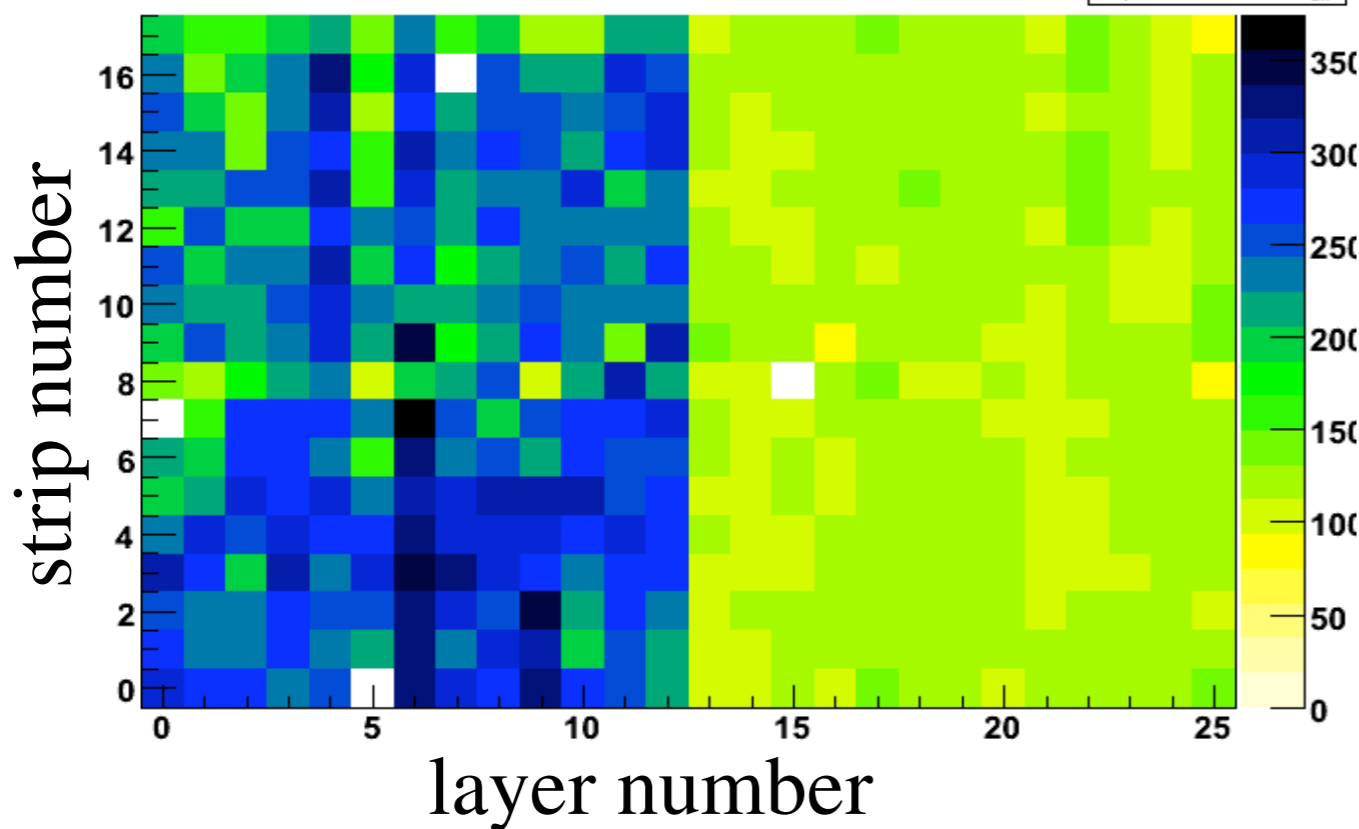
lan\_mpv

lan_mpv	
Gaussian	96
Mean x	13.38
Mean y	8.285
RMS x	7.683
RMS y	5.17

lan\_wid

landau width

lan_wid	
Entries	464
Mean x	32.7
Mean y	8.419
RMS x	7.242
RMS y	5.251



w WLSF

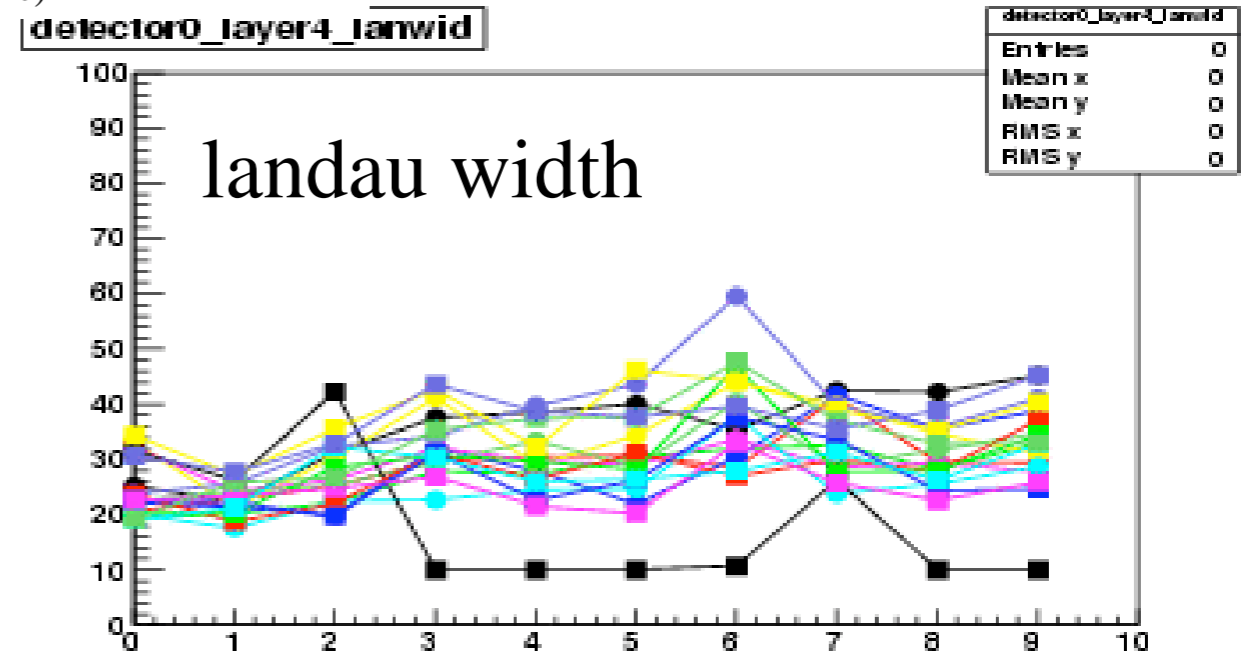
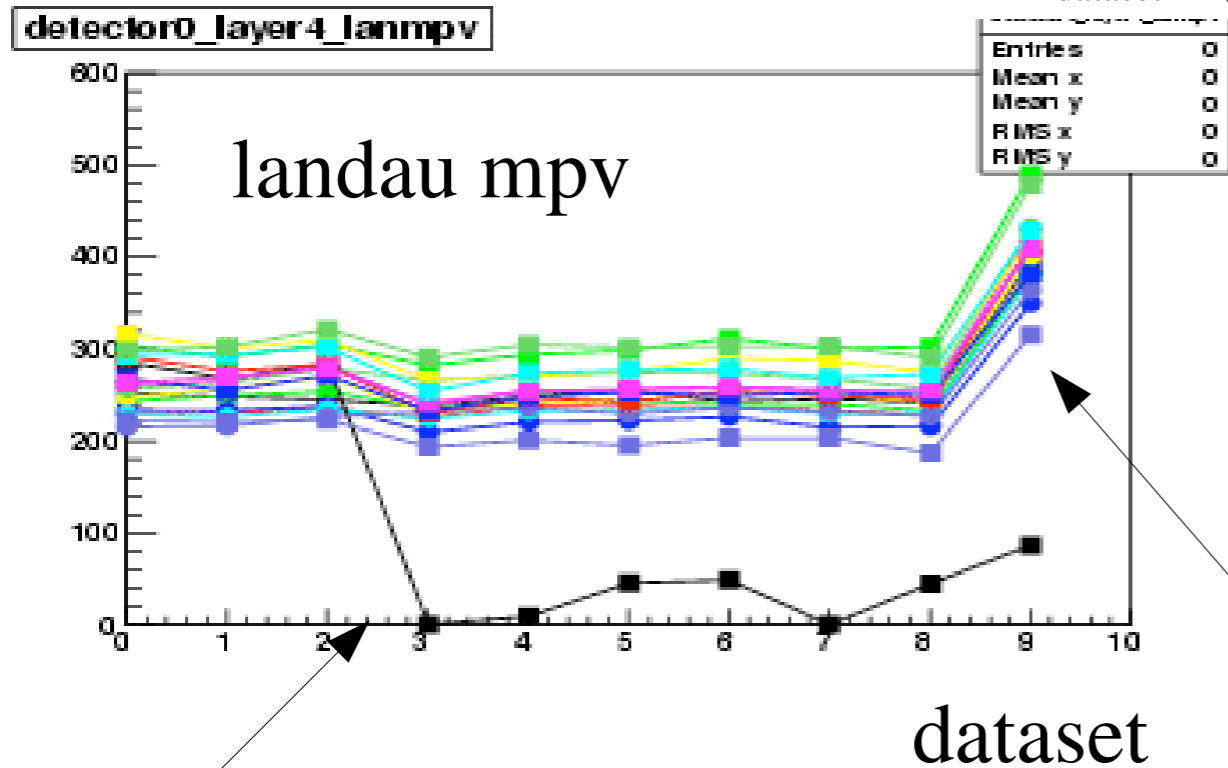
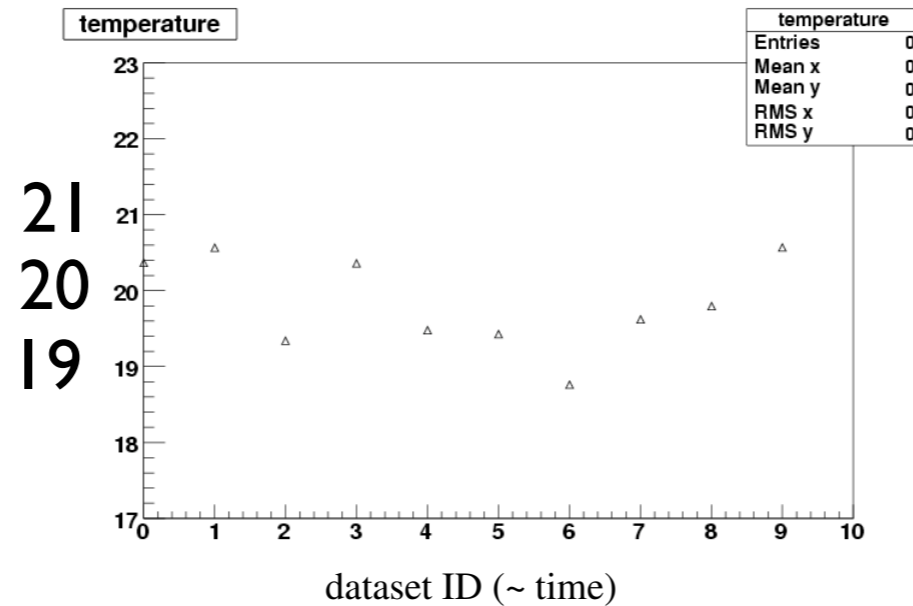
w/o WLSF

w WLSF

w/o WLSF

# DESY BT analysis **calib.**

- check data sets with temperature

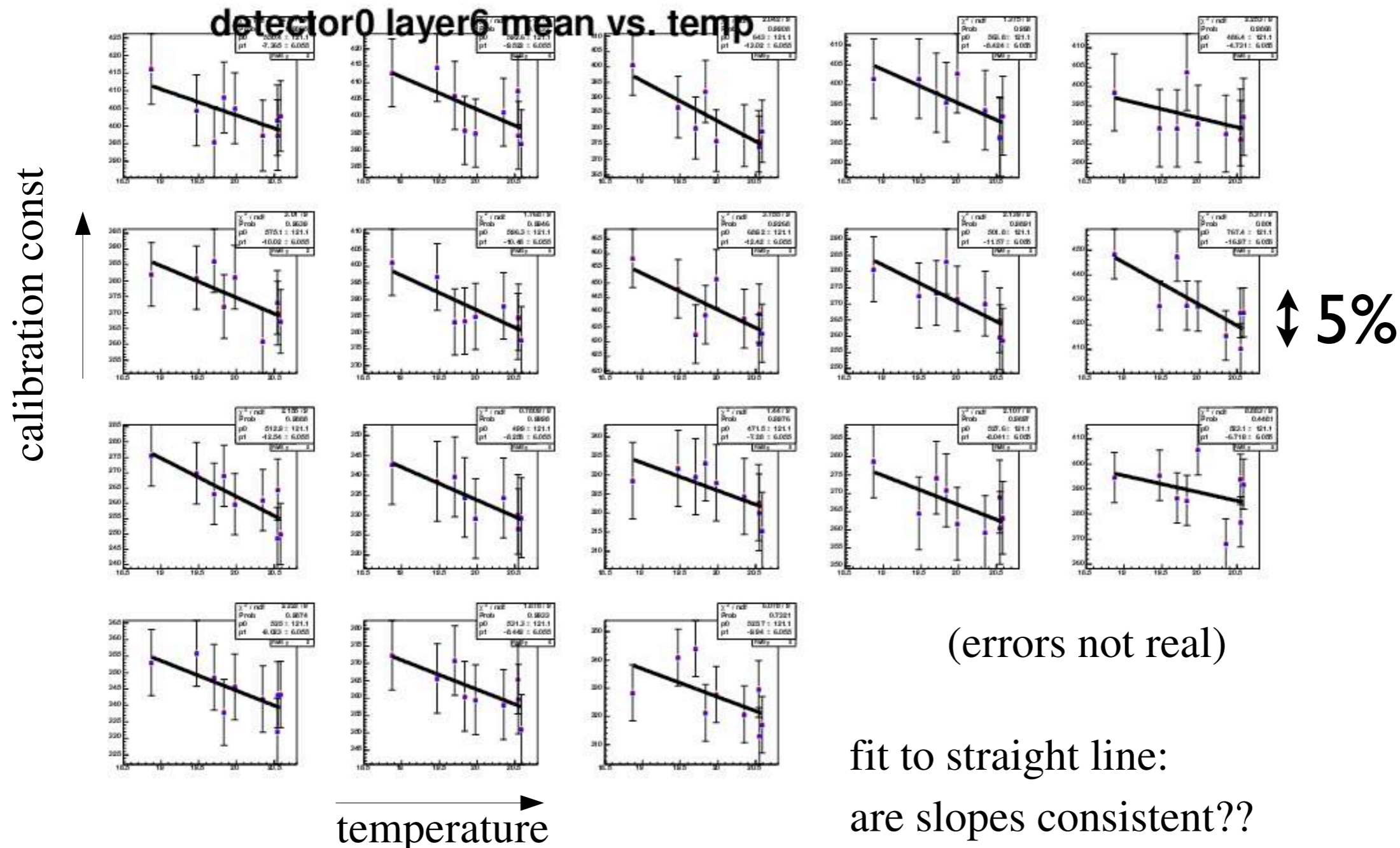


one strip dies

the peak values all rise at last measurement

# DESY BT analysis temp.

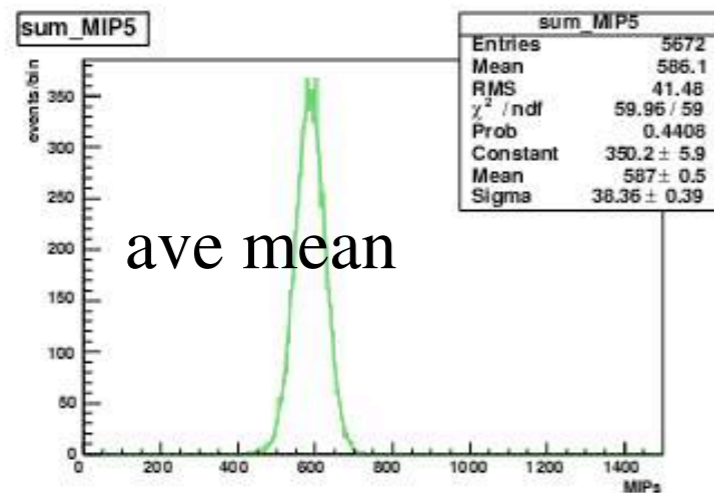
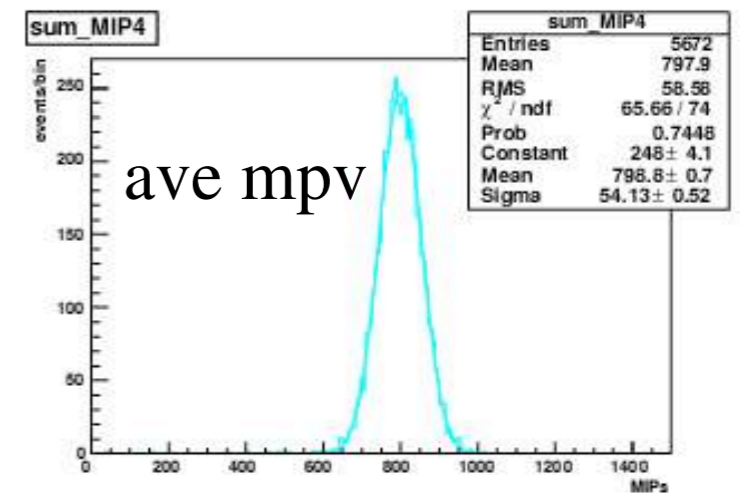
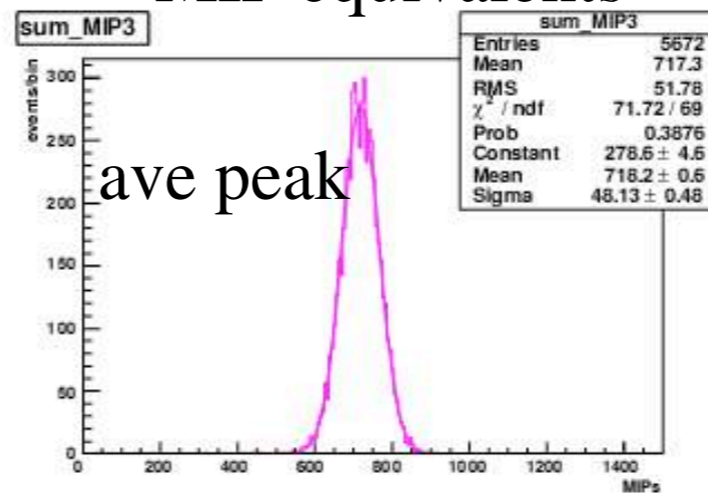
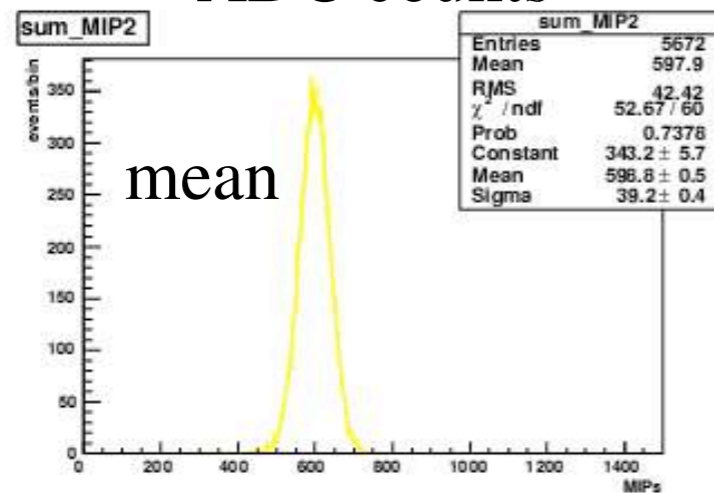
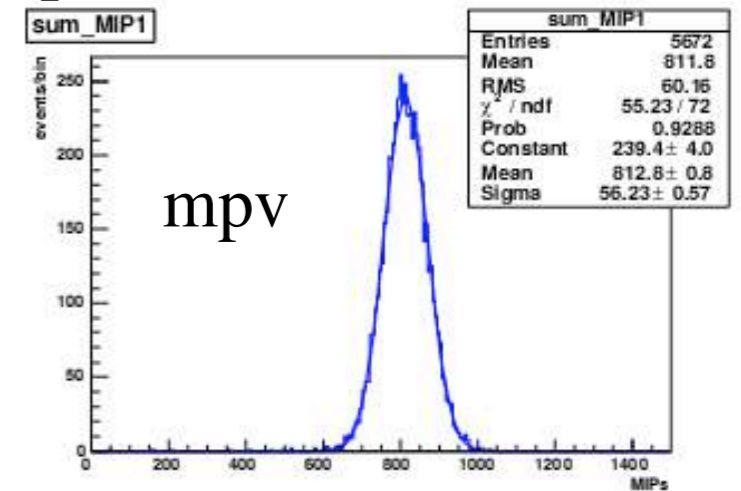
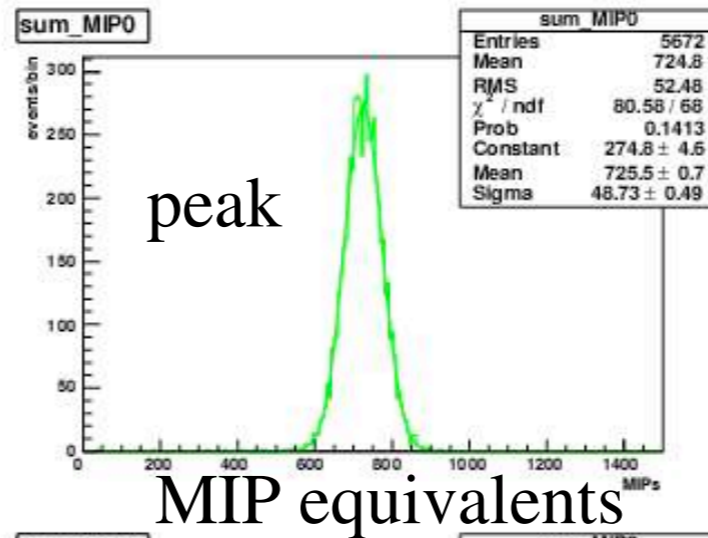
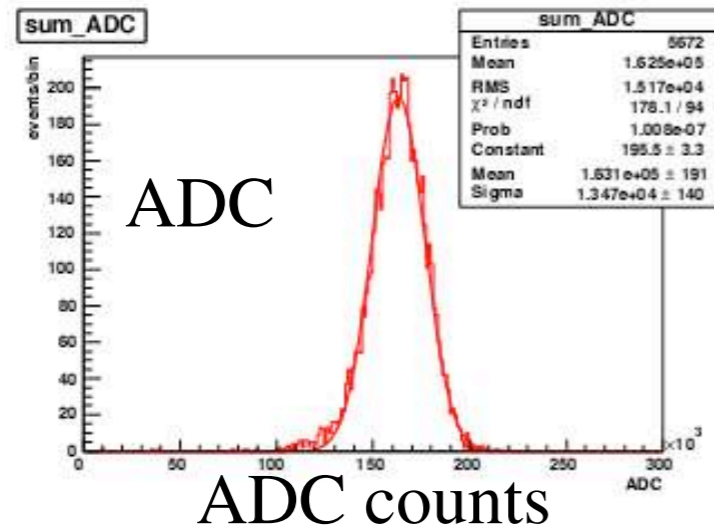
- temperature coefficients
- temperature dependence of calibration



# DESY BT analysis beam

5 GeV position, central injection. sum over all strips in detector

no temperature correction



ADC – no calibration

peak – peak of conv landau

mpv – of underlying landau

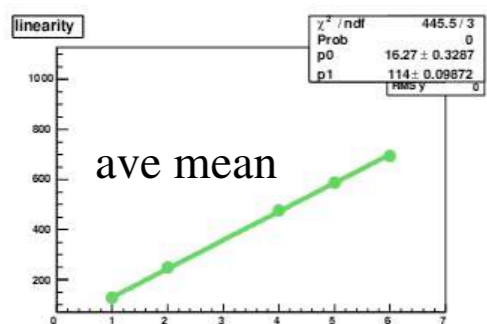
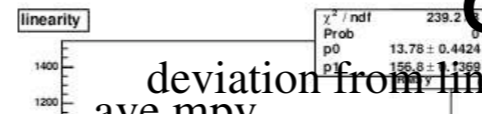
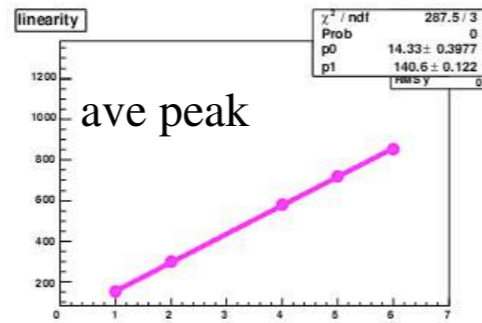
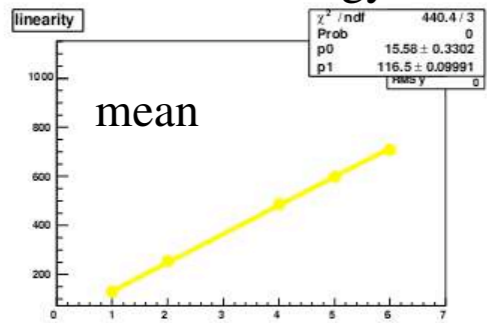
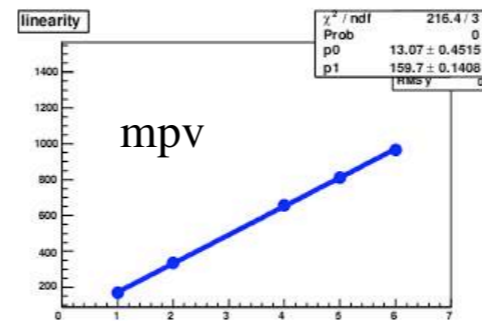
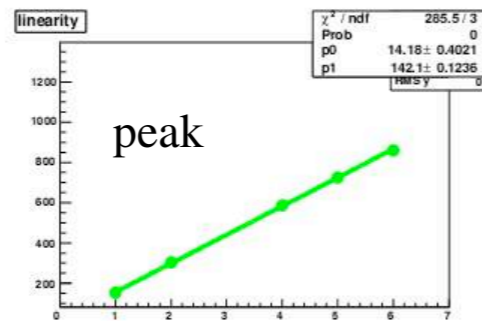
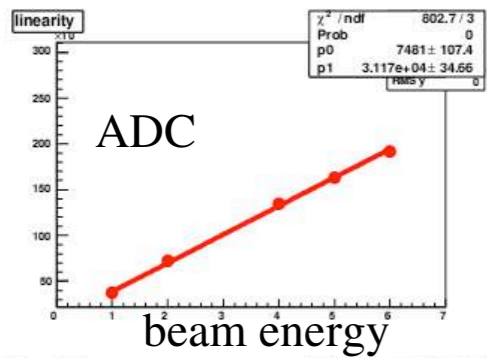
mean – of ADC

ave = average over all 5 9mm sections

# DESY BT analysis **linearity**

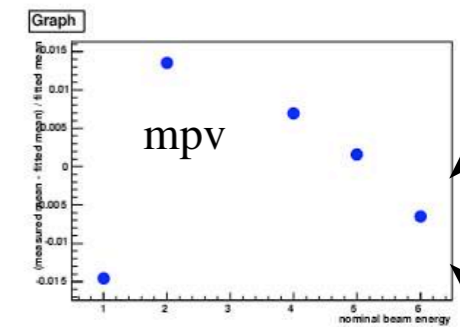
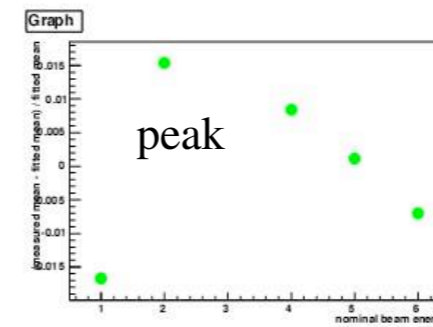
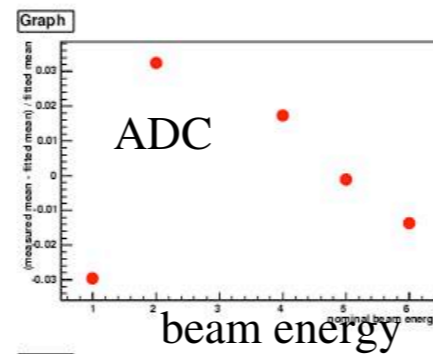
- linearities

linearity with several calibration definitions

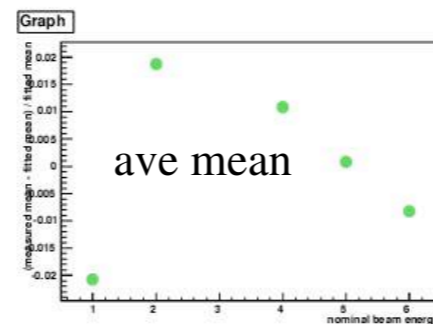
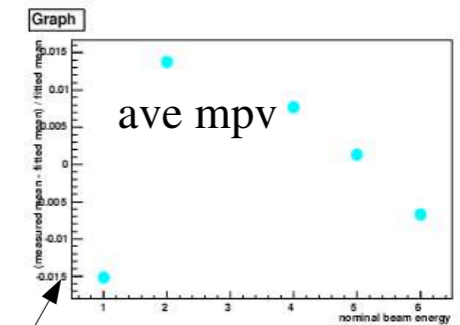
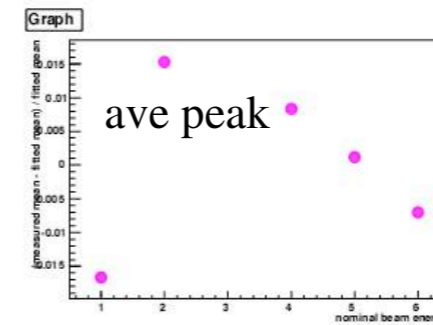
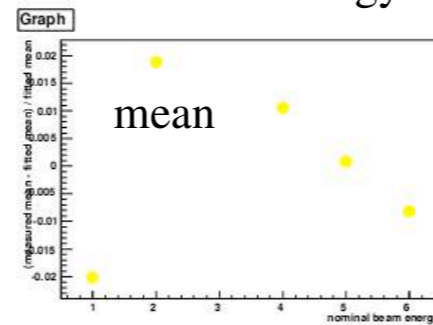


deviations from straight

$$\text{deviation from linearity} = (\text{measured} - \text{fitted}) / \text{fitted}$$



↕ 2%



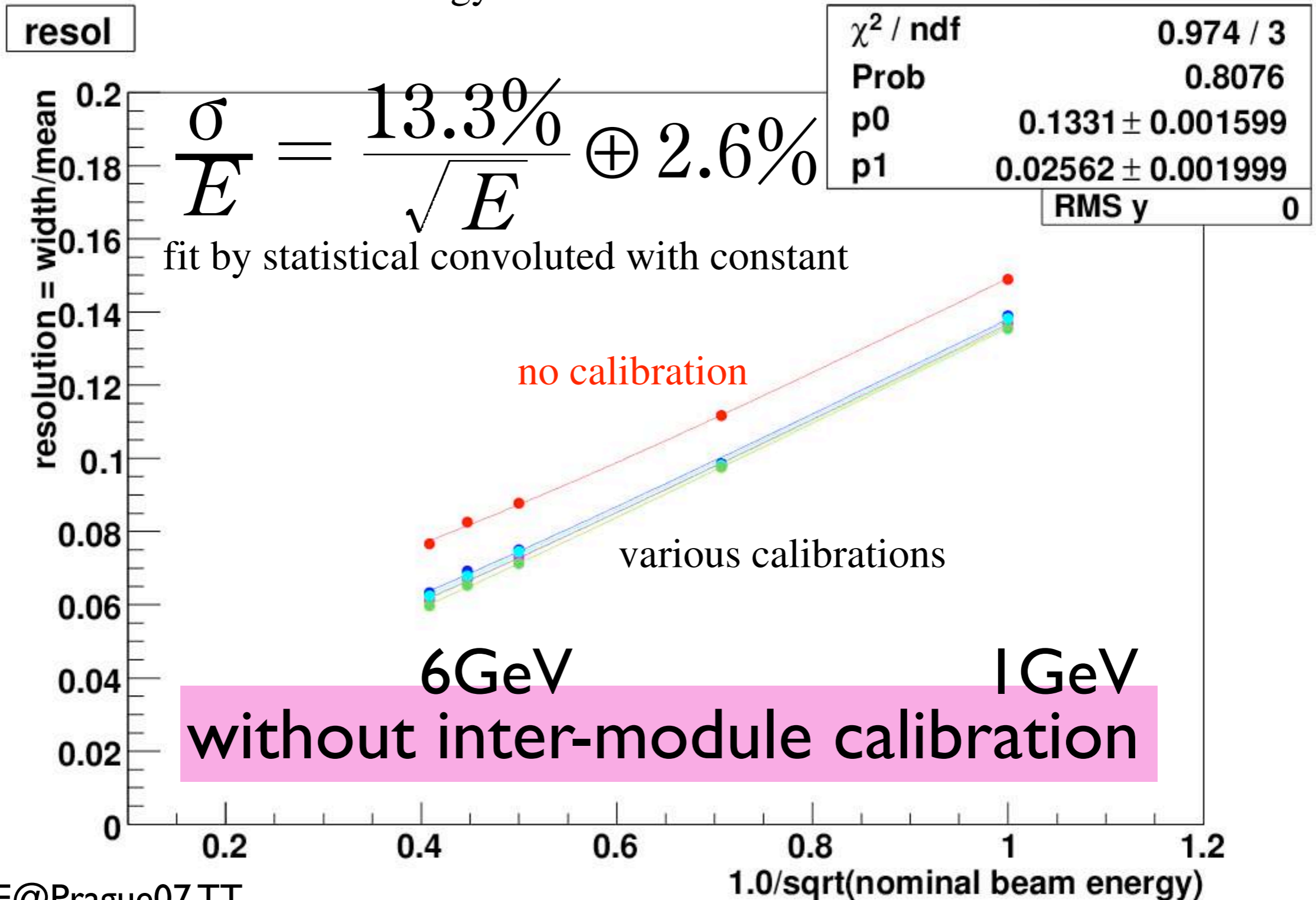
have similar behavior

I-6GeV

# DESY BT analysis **resol.**

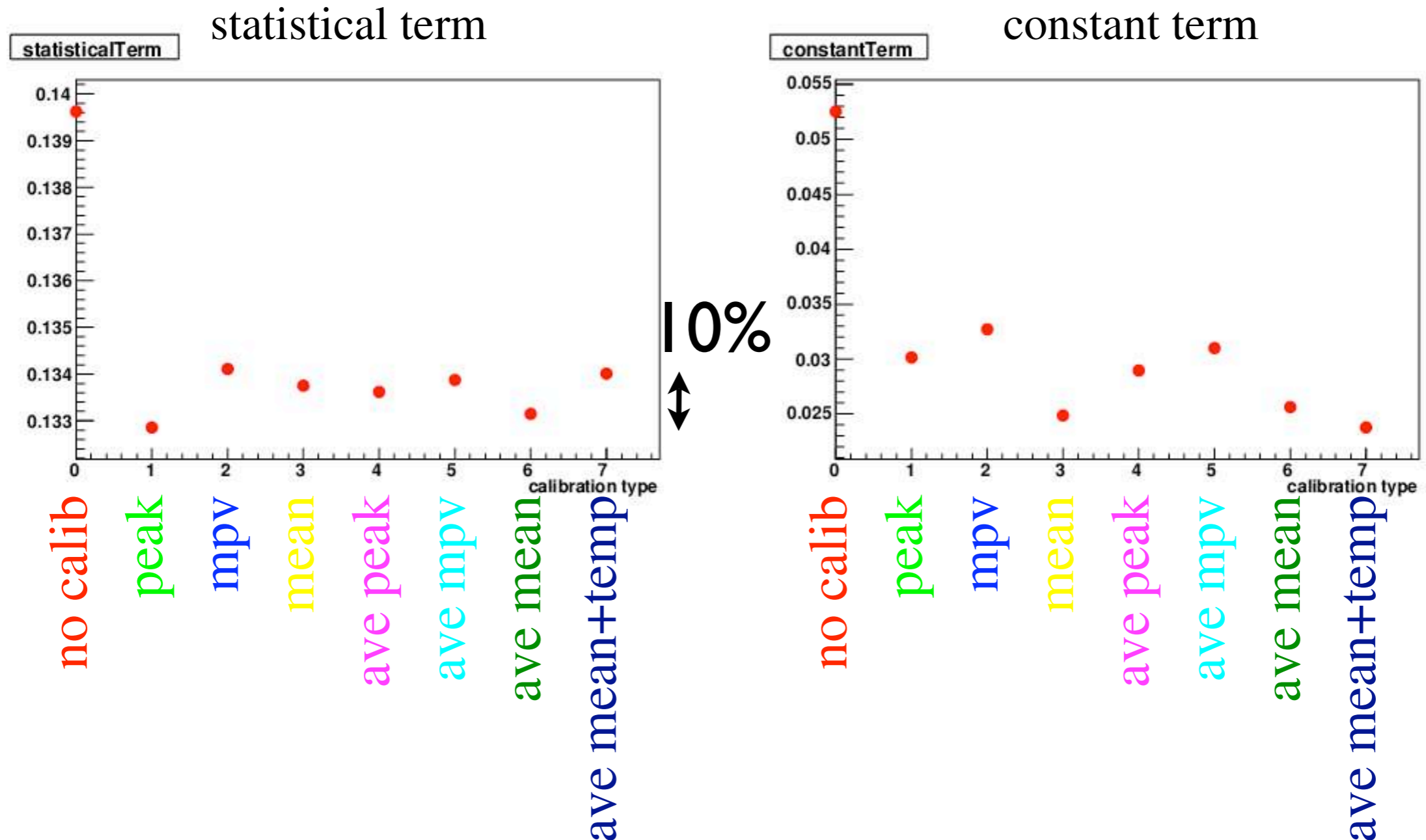
- resolutions

resolution vs energy & calibration



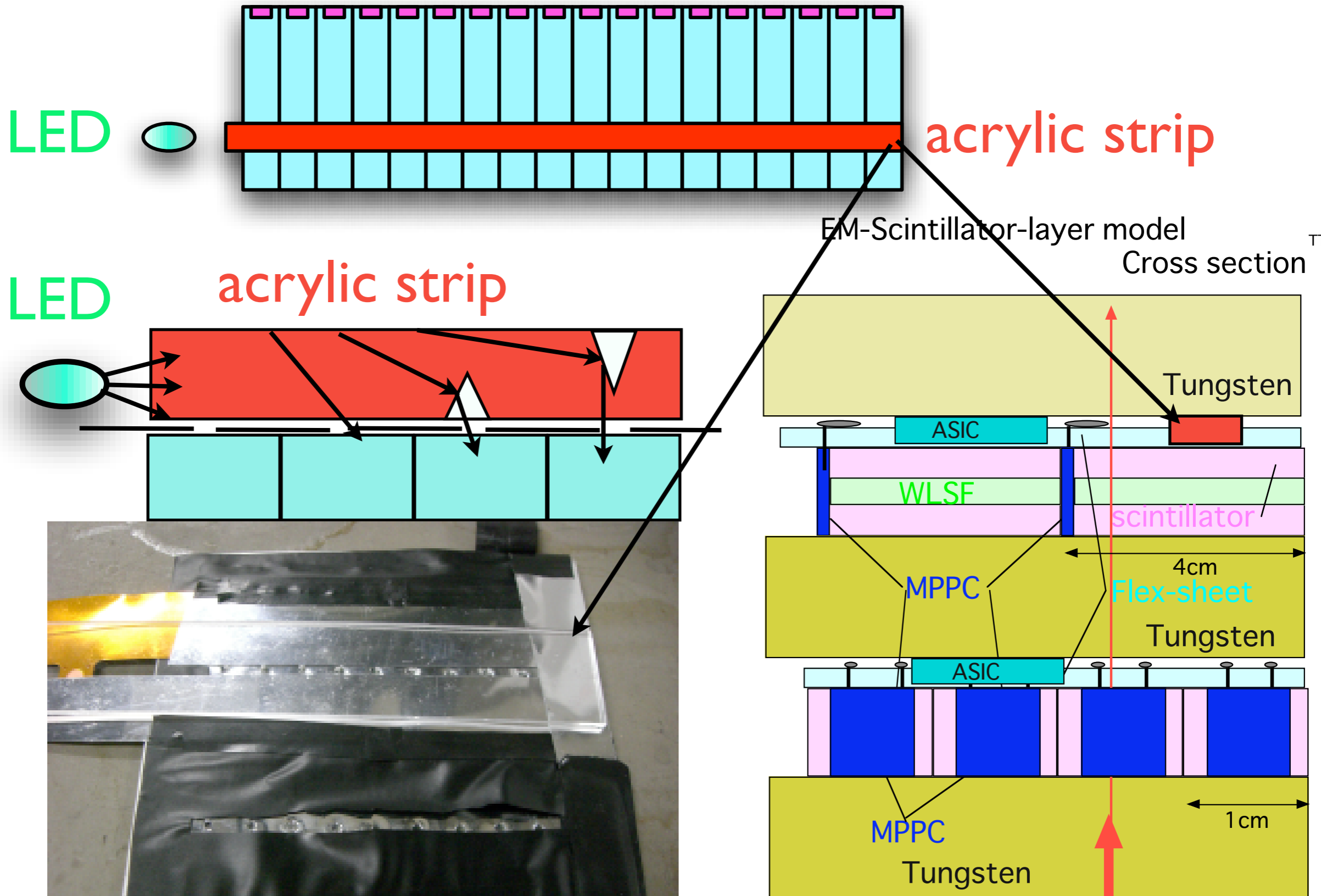
# DESY BT analysis fit

- resolutions



a bit large const. term

# MPPC gain monitor



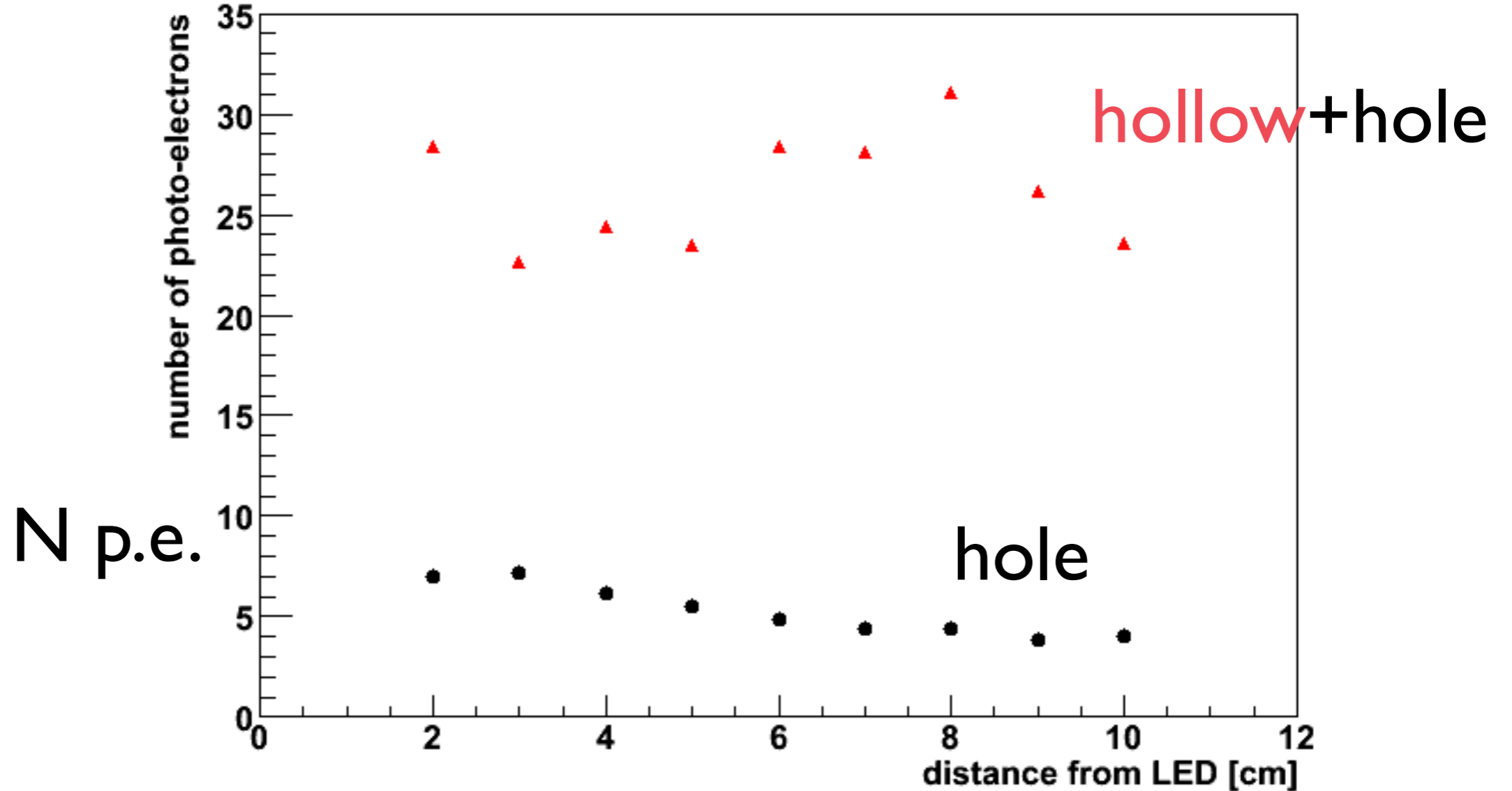
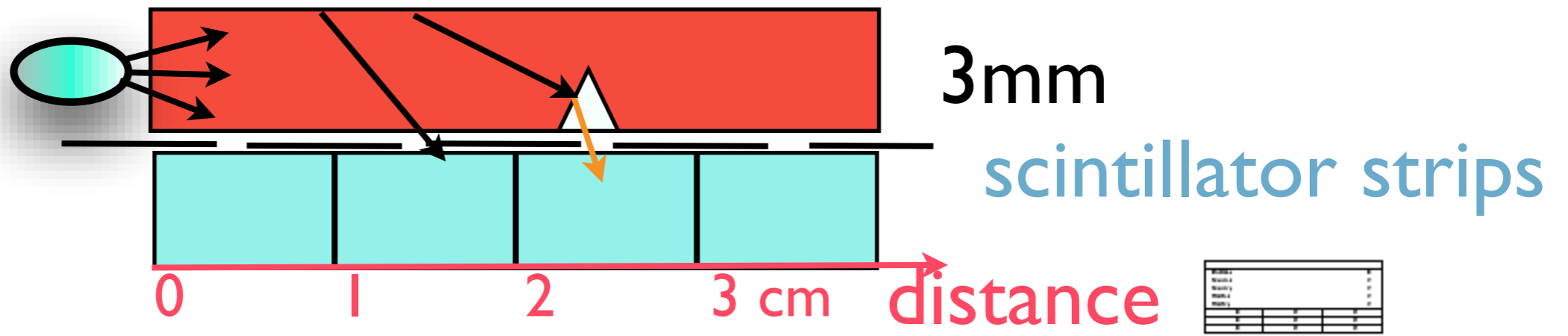
TT Oct 06



# acrylic strip gain monitoring

LED

acrylic strip

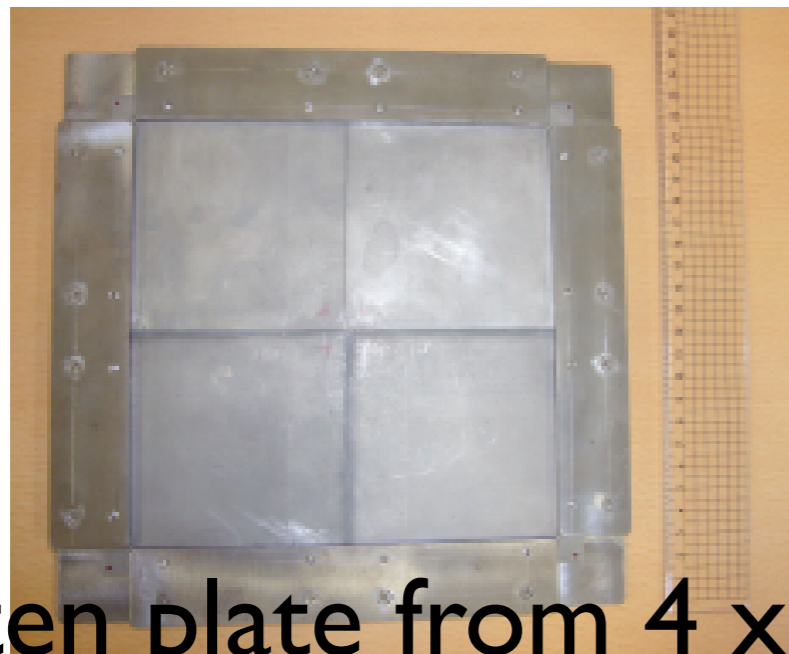


# summary and outlook

- progress in understanding of Beam test data
- preparation of the next Beam at Fermilab
- with monitoring system
- produce the detector end of this year
- verify pion (MIP) calibration

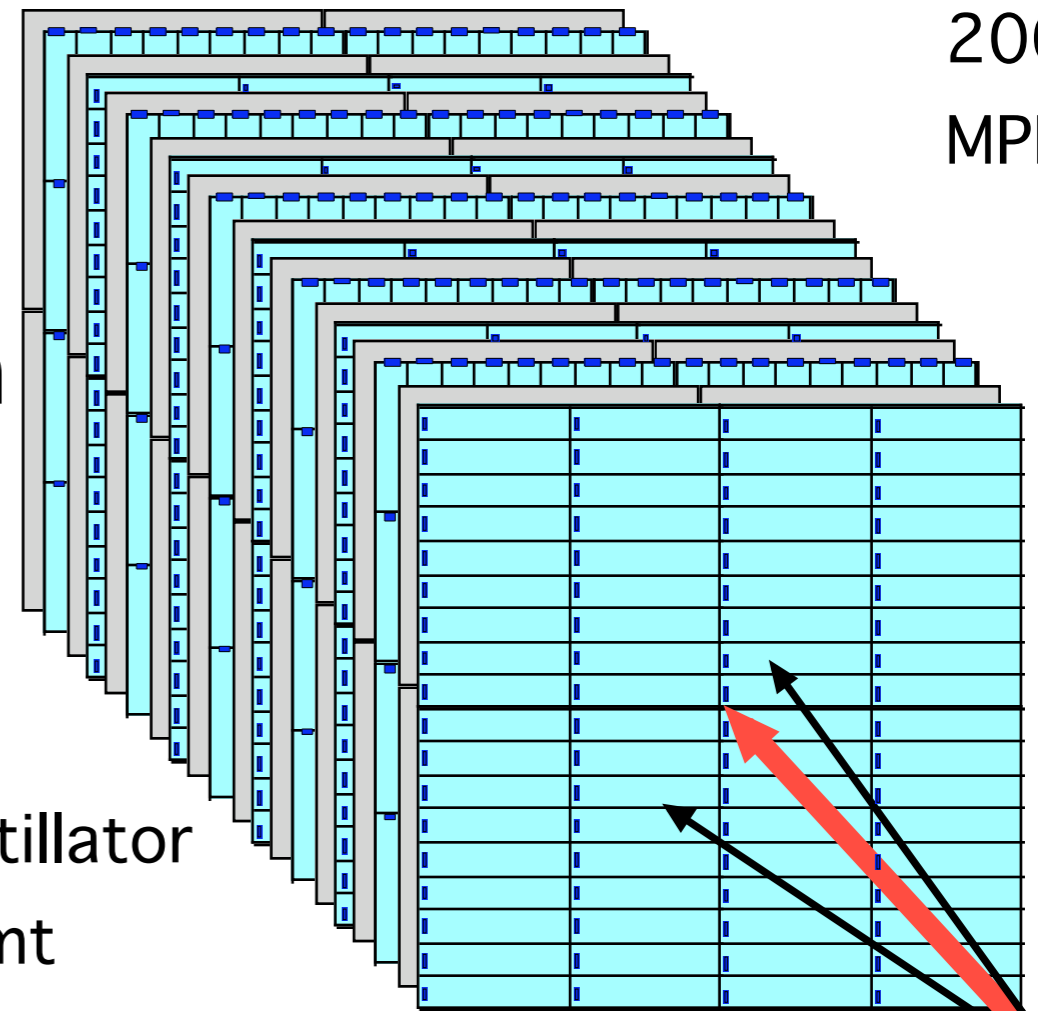
CALICE **Sc-ECAL** at Fermilab

2000c  
MPPC



tungsten  
3.5mmt

scintillator  
3mmt



tungsten plate from 4 x 10cm x 10cm

CALICE@Prague07 TT