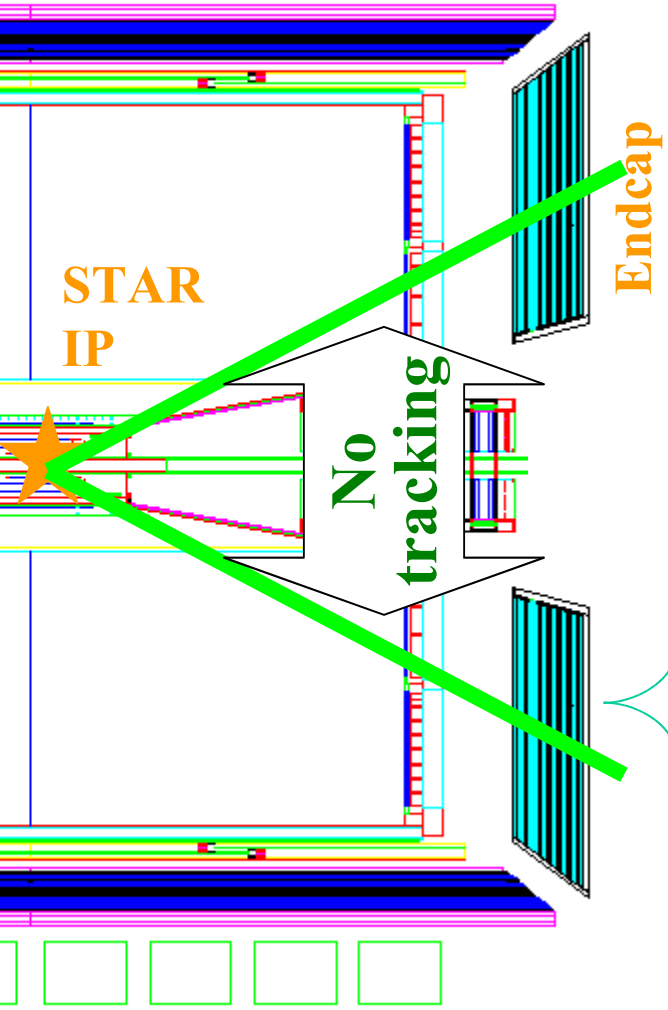
EEMC Calibration in 2004

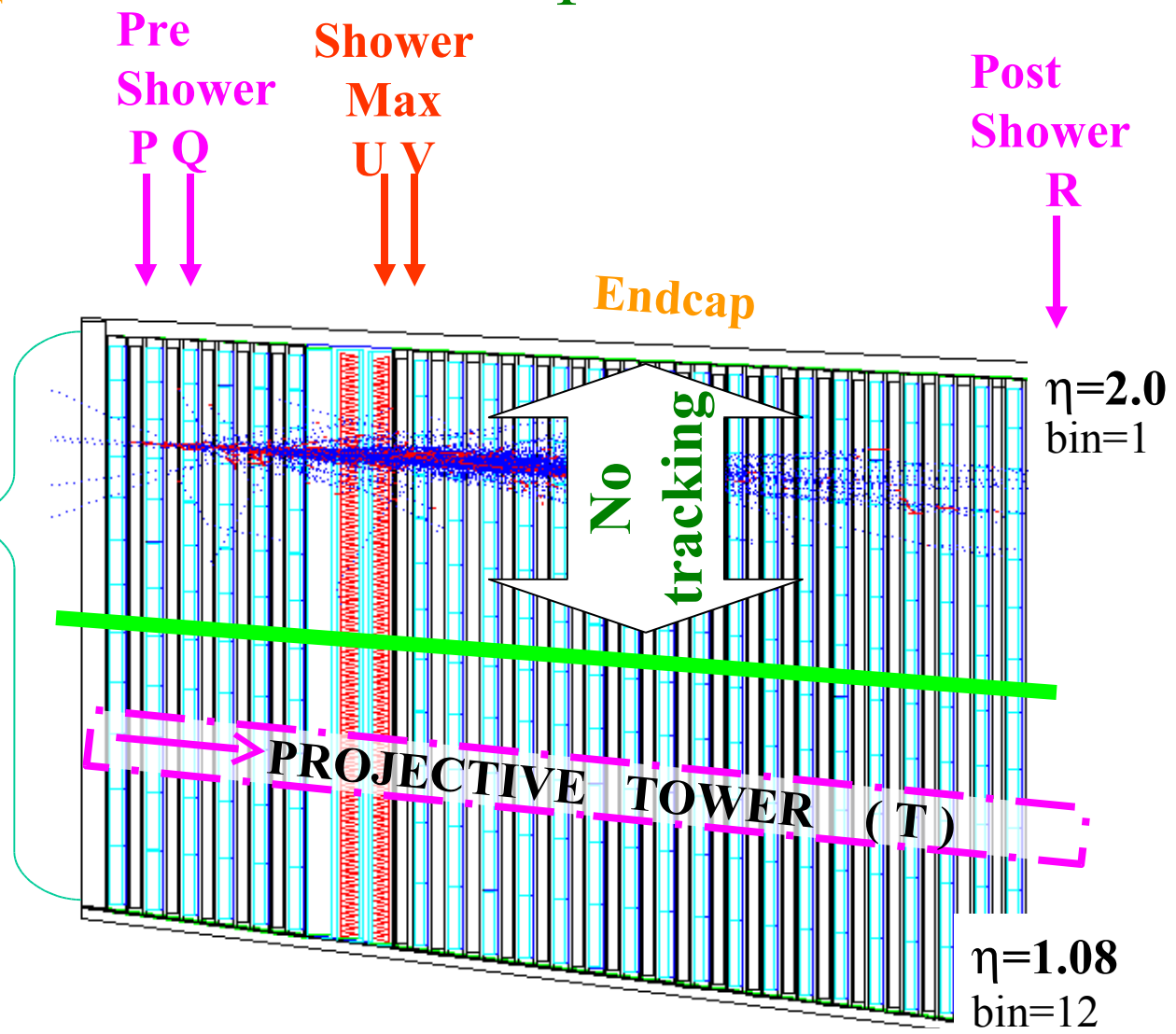
- MIP signature w/ SMD
- Absolute gains for SMD, pre/post-shower, towers
- HV setup scheme for 2005 running

Jan Balewski, IUCF
Joint EMC Meeting
December 3, 2004

Why calibration with fast detectors only ?

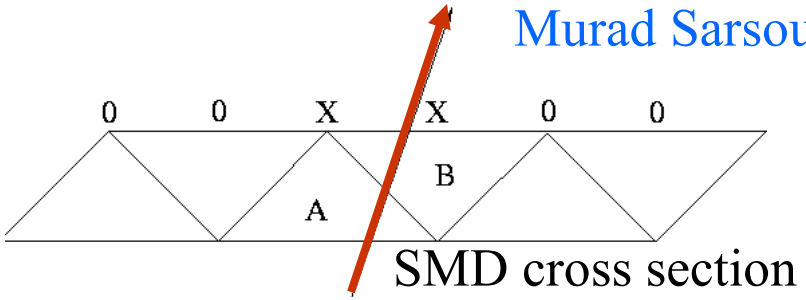


6-Fold Response of EEMC



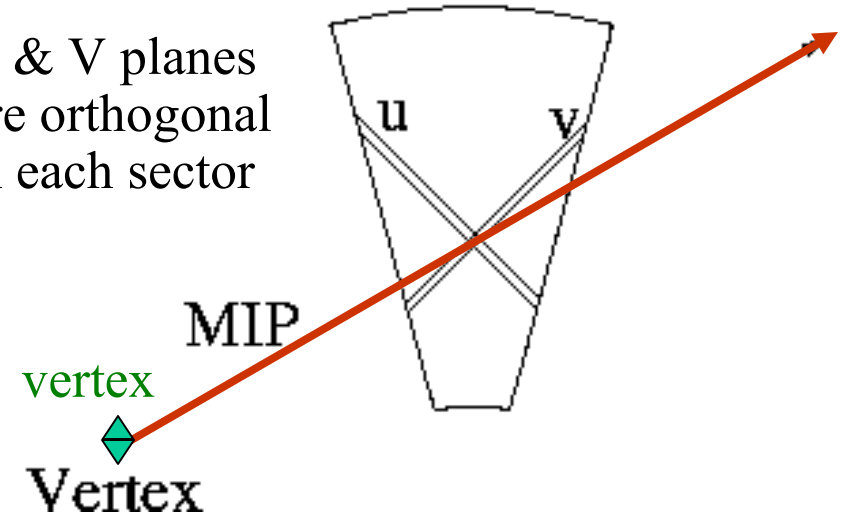
METHOD: MIPs from Isolated Pairs of SMD Strips

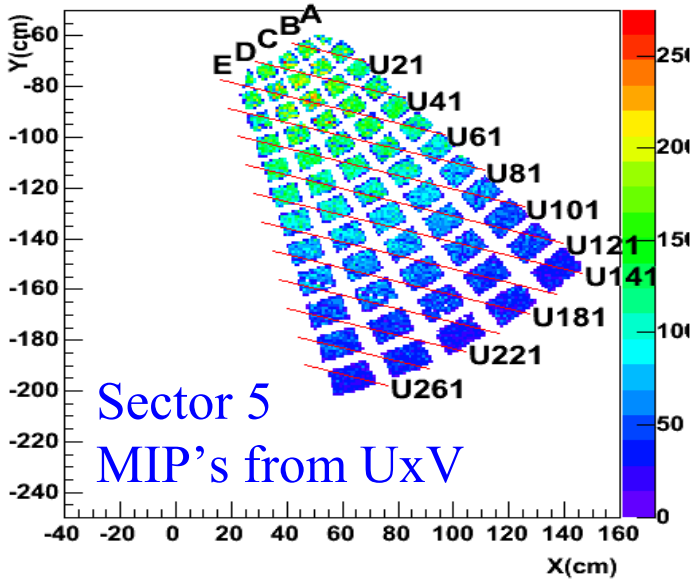
Murad Sarsour +JB, IUC

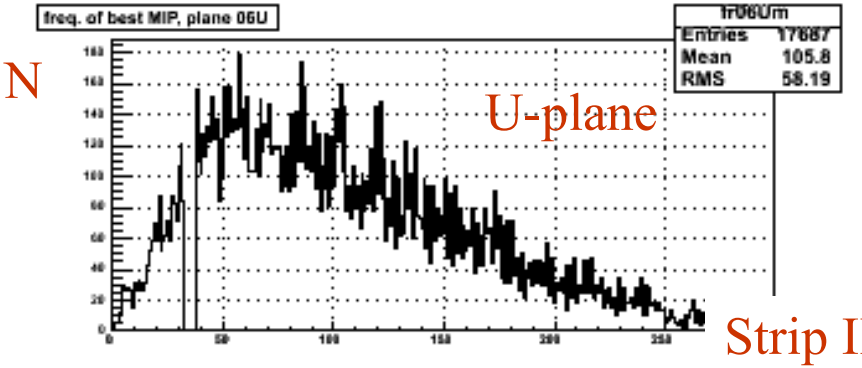


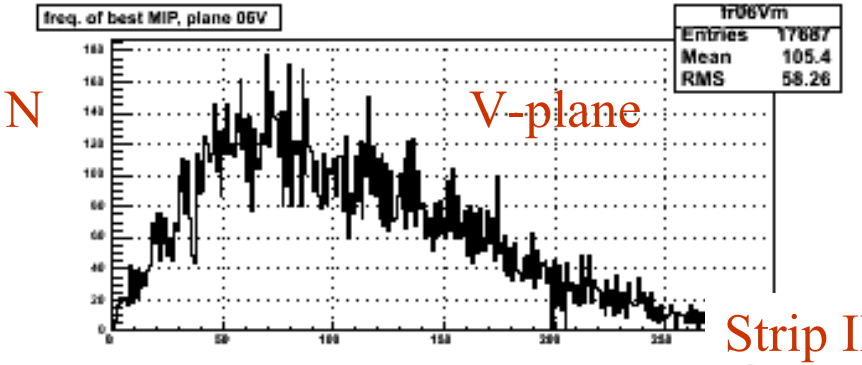
SMD cross section

U & V planes are orthogonal in each sector









Slopes used to relative gain match of strips

Absolute SMD Calibration

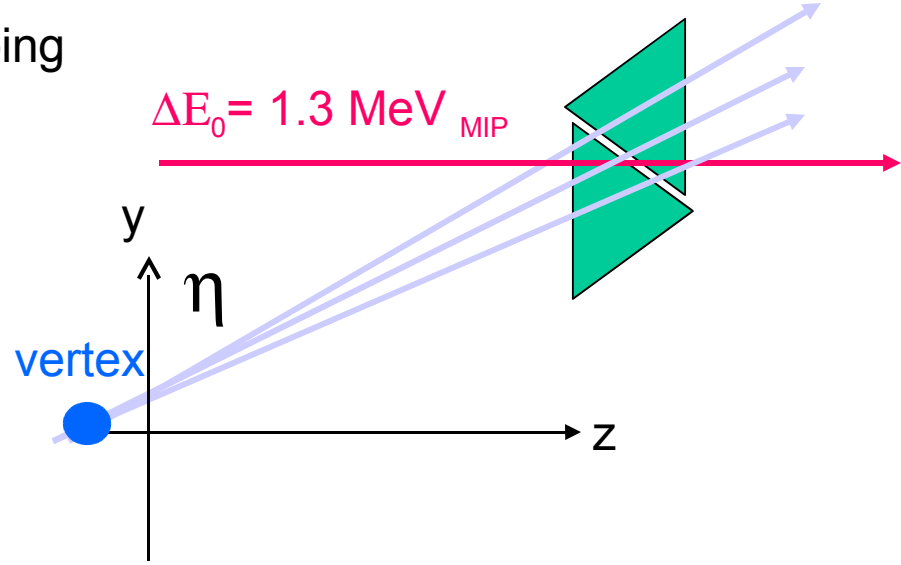
- Units are average energy deposit of MIP going perpendicular through the SMD plain

- constrain on gains:

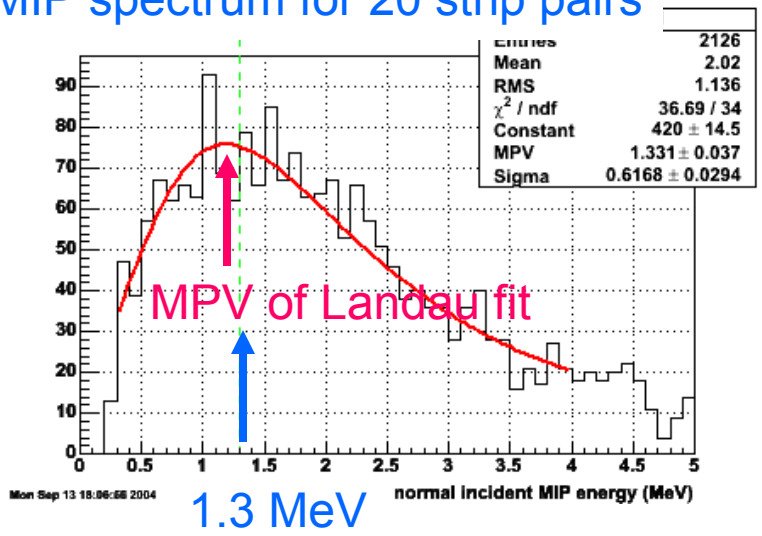
$$MPV(E_{1+2}) \equiv \Delta E_0$$

$$E_{1+2} = \left(ADC_1 / g_1 + ADC_2 / g_2 \right) \cdot tgh(\eta_x)$$

$$\Delta E_0 = 1.3 * 10^{-3} GeV = 7mm * 1.8 MeV / cm$$

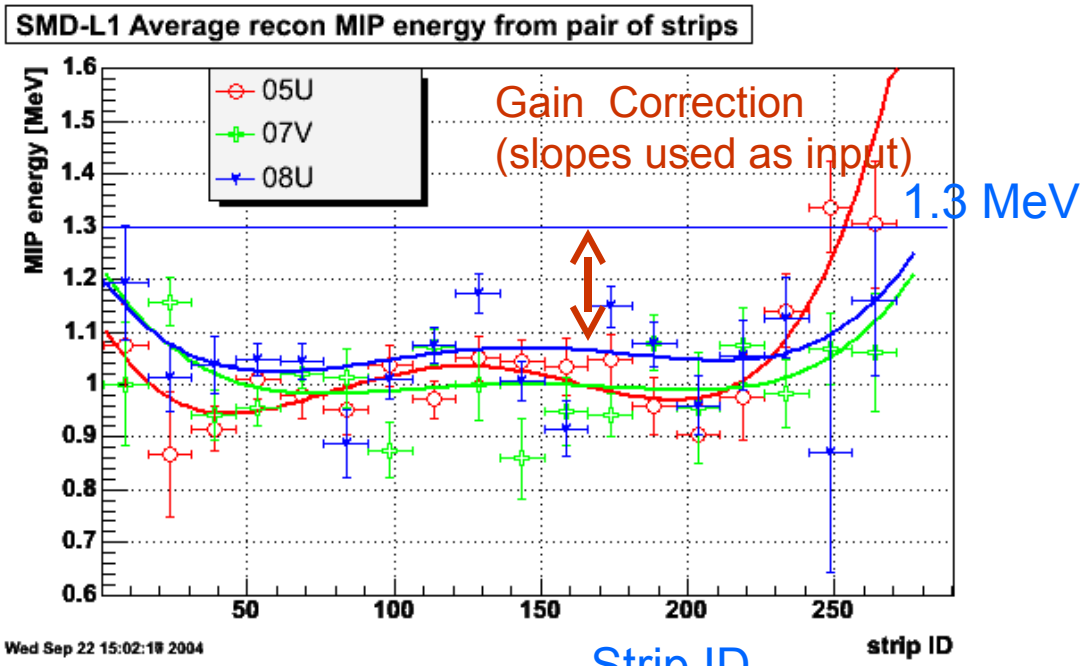


MIP spectrum for 20 strip pairs



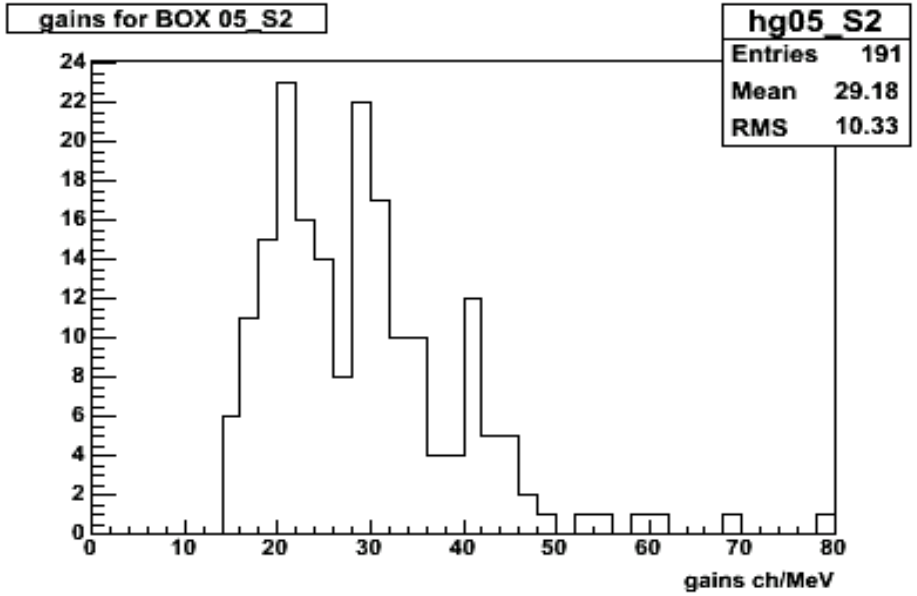
1.3 MeV

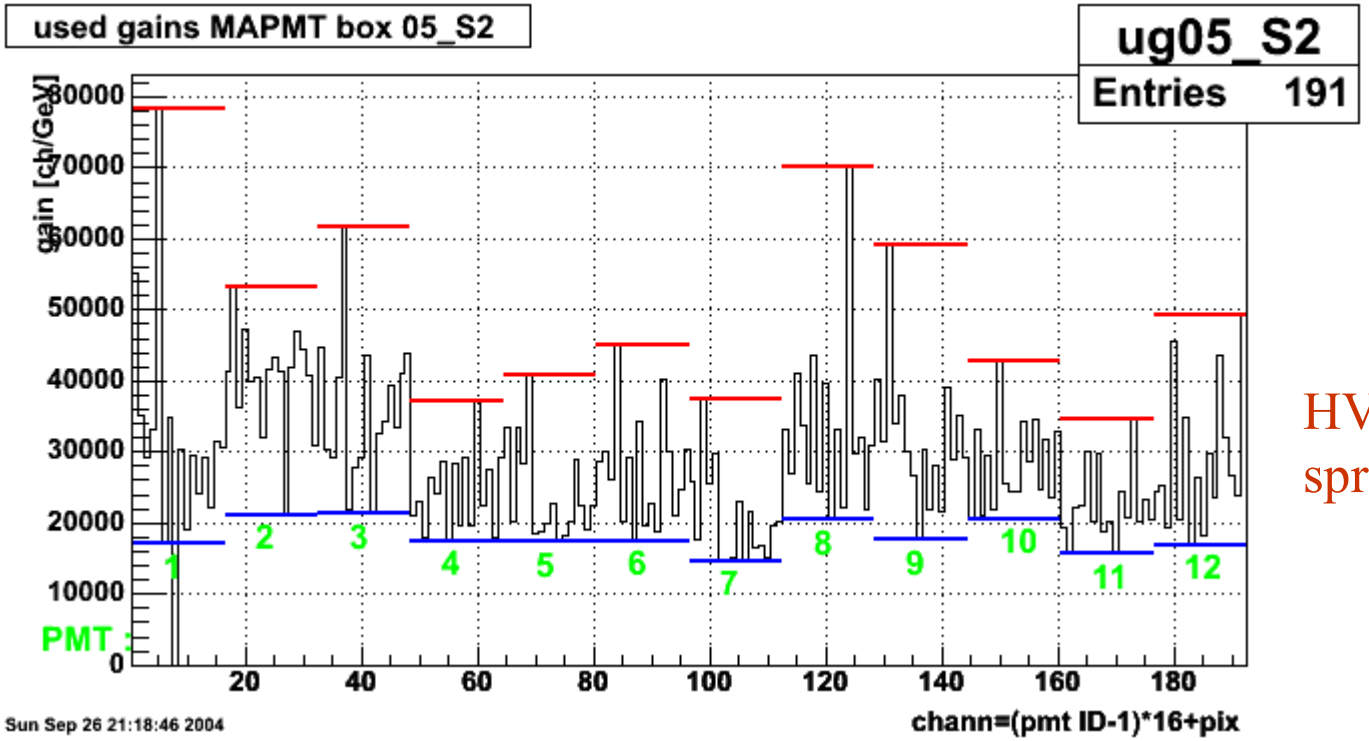
Pair energy E_{1+2}



Strip ID

Distribution of SMD gains





HV change will reduce spread to some extent

Absolute Pre/Post-shower Calibration

- Units are energy deposit of MIP going perpendicular through tile

- Formula for gains from Landau fit to MIP peak

$$g_i = \frac{MPV_i \cdot tgh(\eta_i)}{\Delta E_0} \qquad i = tower\_index$$

$$g_i[ch/GeV] \quad ; \quad MPV_i[ch]$$

$$\Delta E_0 = 0.9 * 10^{-3} GeV = 5mm * 1.8MeV/cm$$

- reco of actual energy deposit in a tile

$$E_i = \frac{ADC_i}{g_i}$$

$$E\ [GeV]$$

any particle:

charge track,γ, π^0

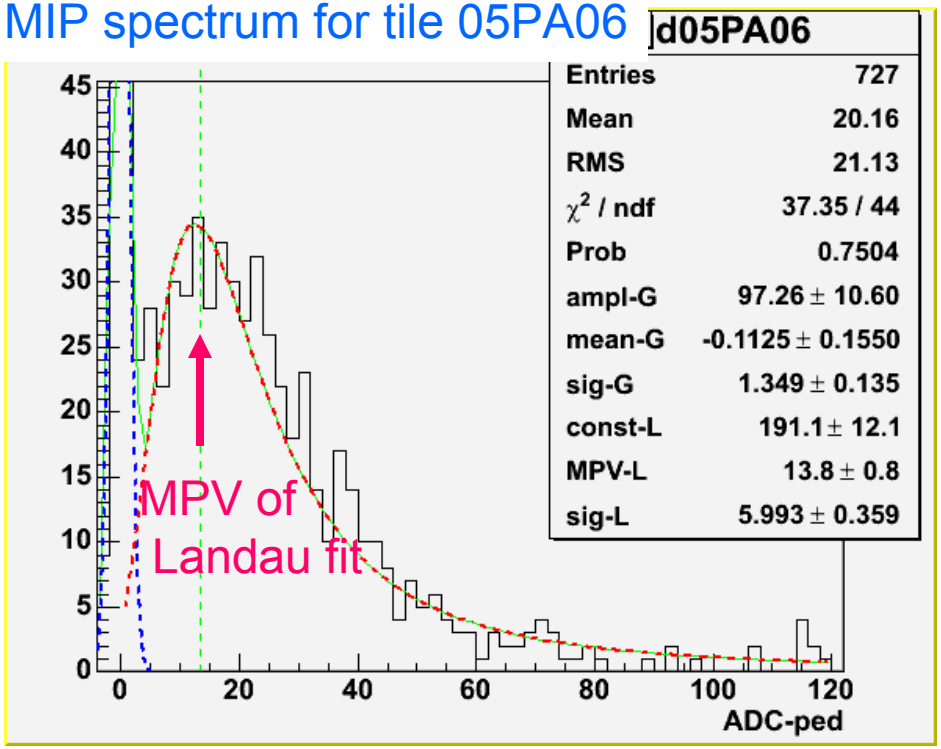
- reco of energy equivalent to MIP perp to tile

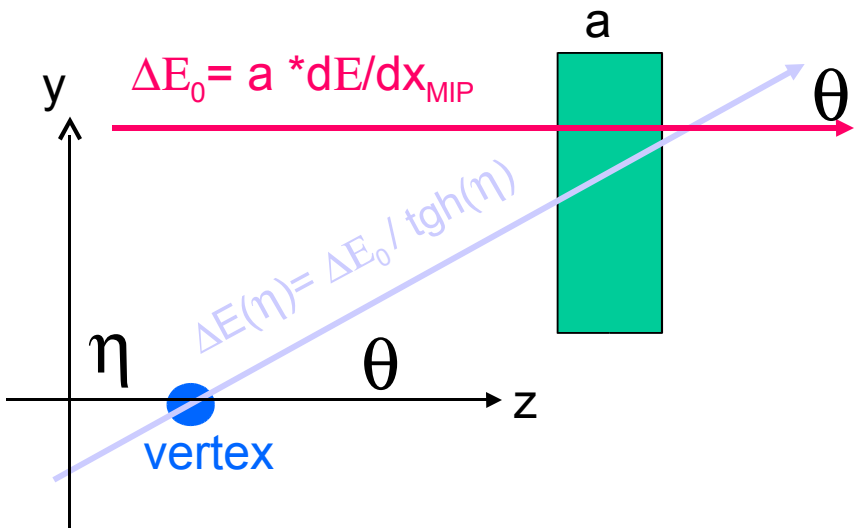
$$E_i = tgh\ (\eta_i)\frac{ADC_i}{g_i}$$

$$E\ [GeV]$$

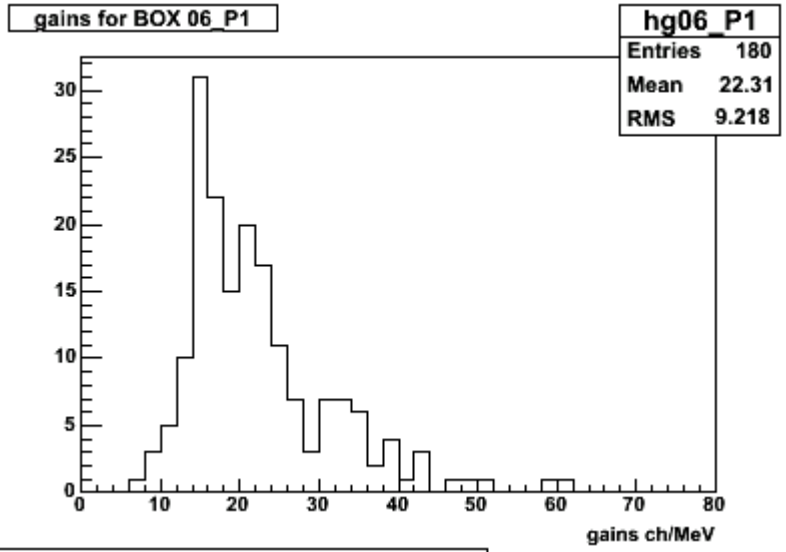
only charge track

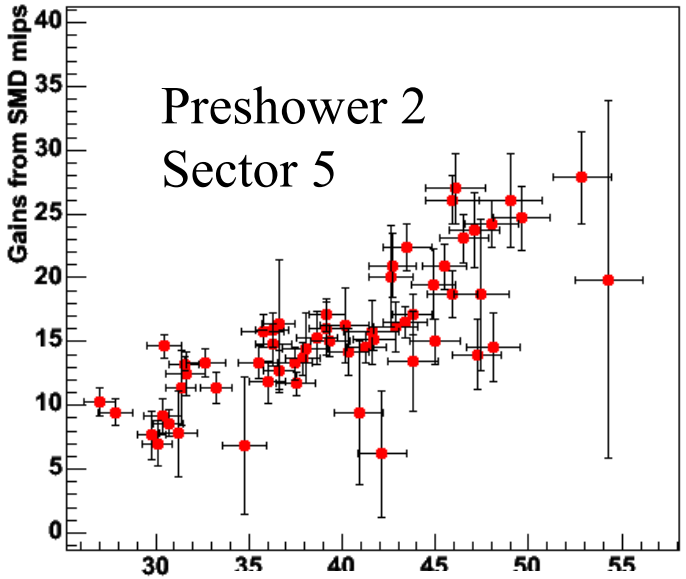
MIP spectrum for tile 05PA06





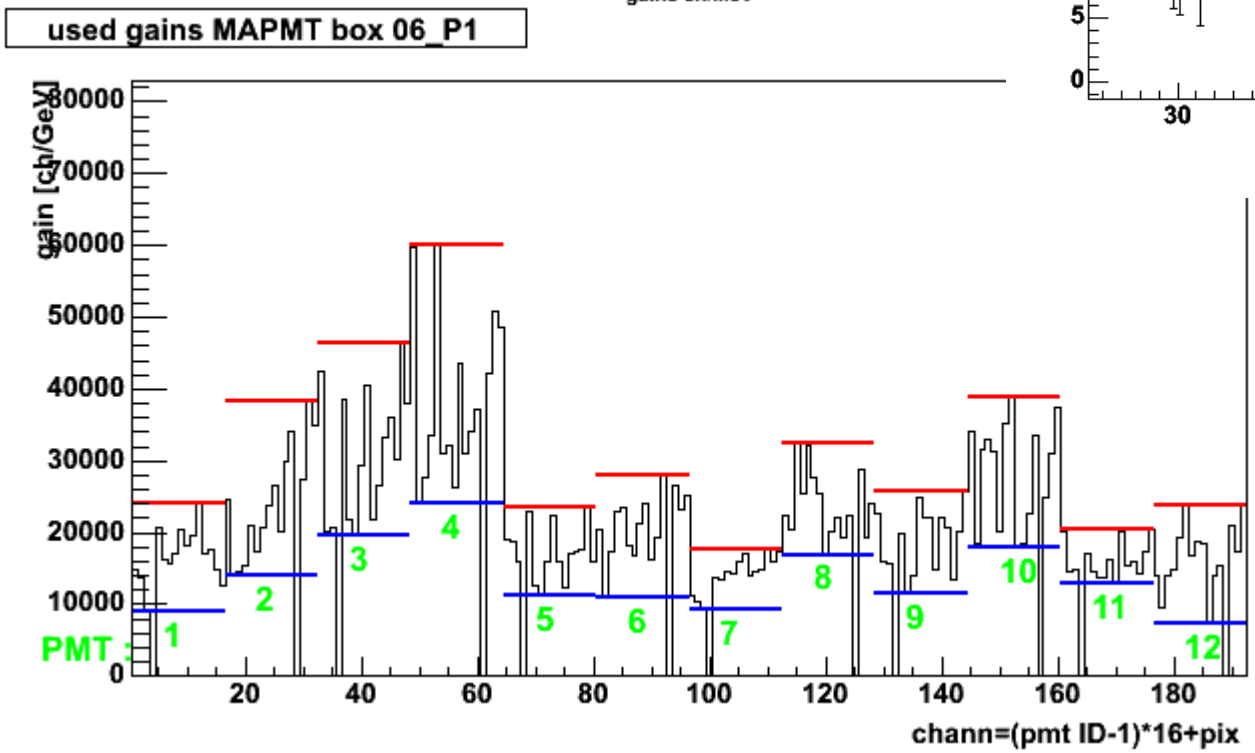
Pre/Post-shower absolute gains





M P V of MIP

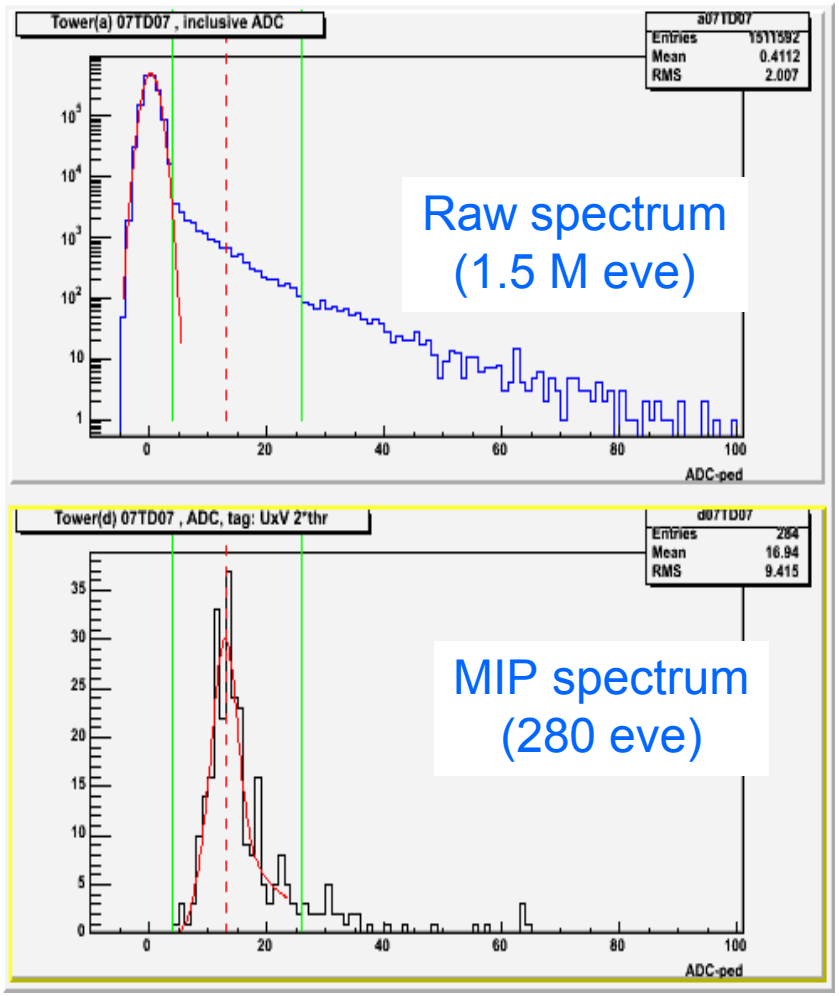
Gains from slopes (a.u.)



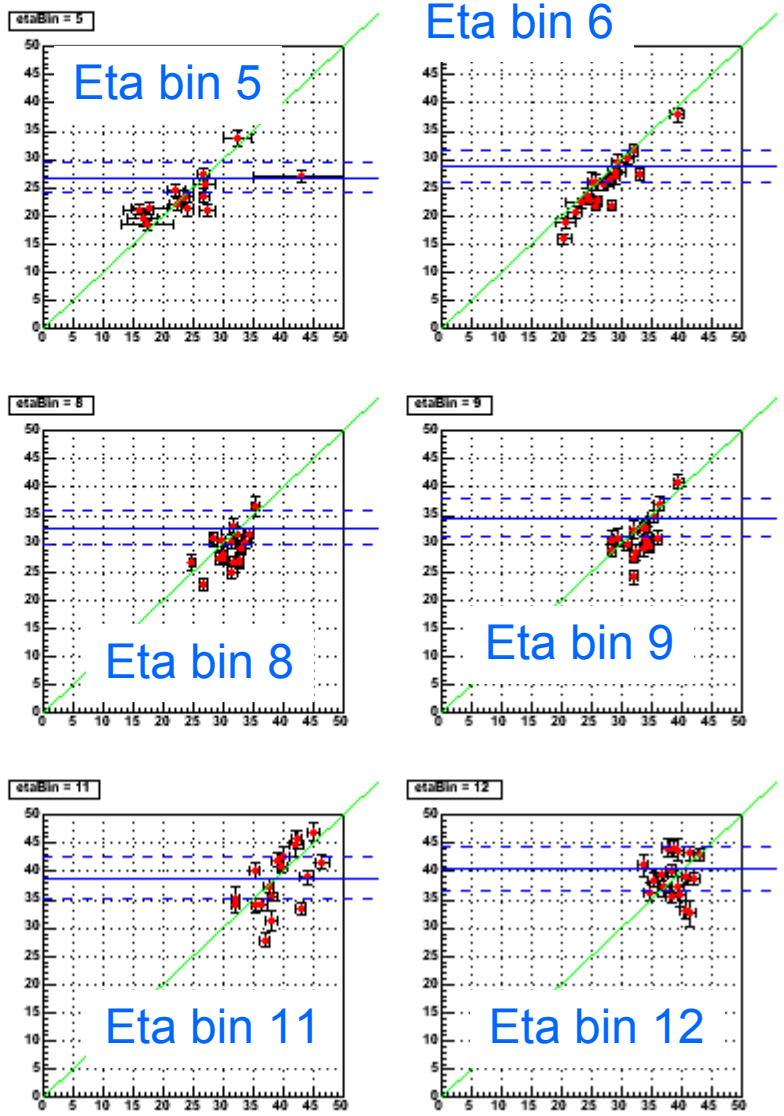
Absolute Calibration of Towers (sectors 5-8)

- **use 6 'o' in** ooxxoo **or** ooxoo **in UxV patterns** (veto ~2 x 4cm)
- **require pres1, pres2, post > thres= ped+5chan**

Tower 07TD7

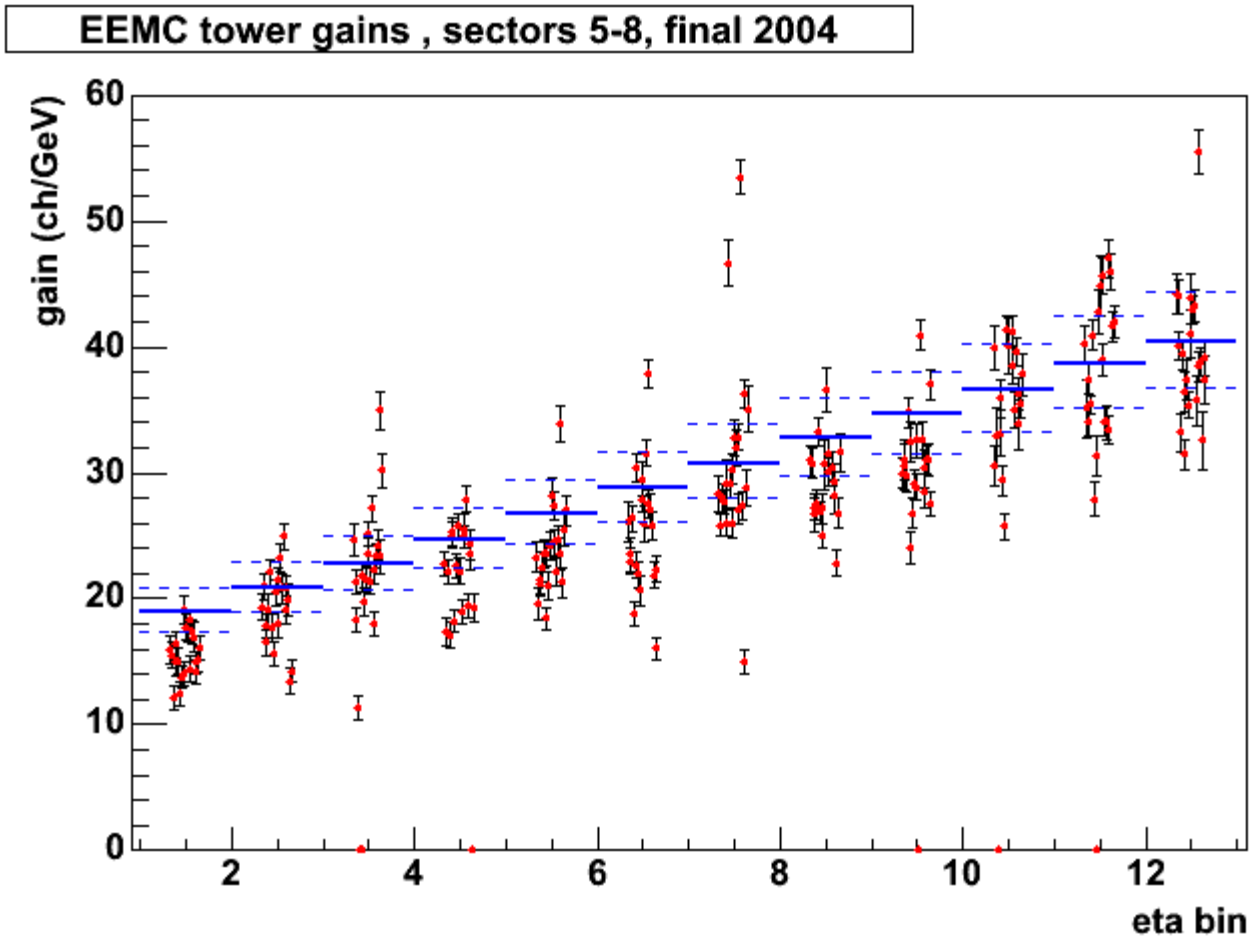


Gains from MIPs w/ SMD



Gains from MIPs w/ TPC (P. Zolnierczuk)

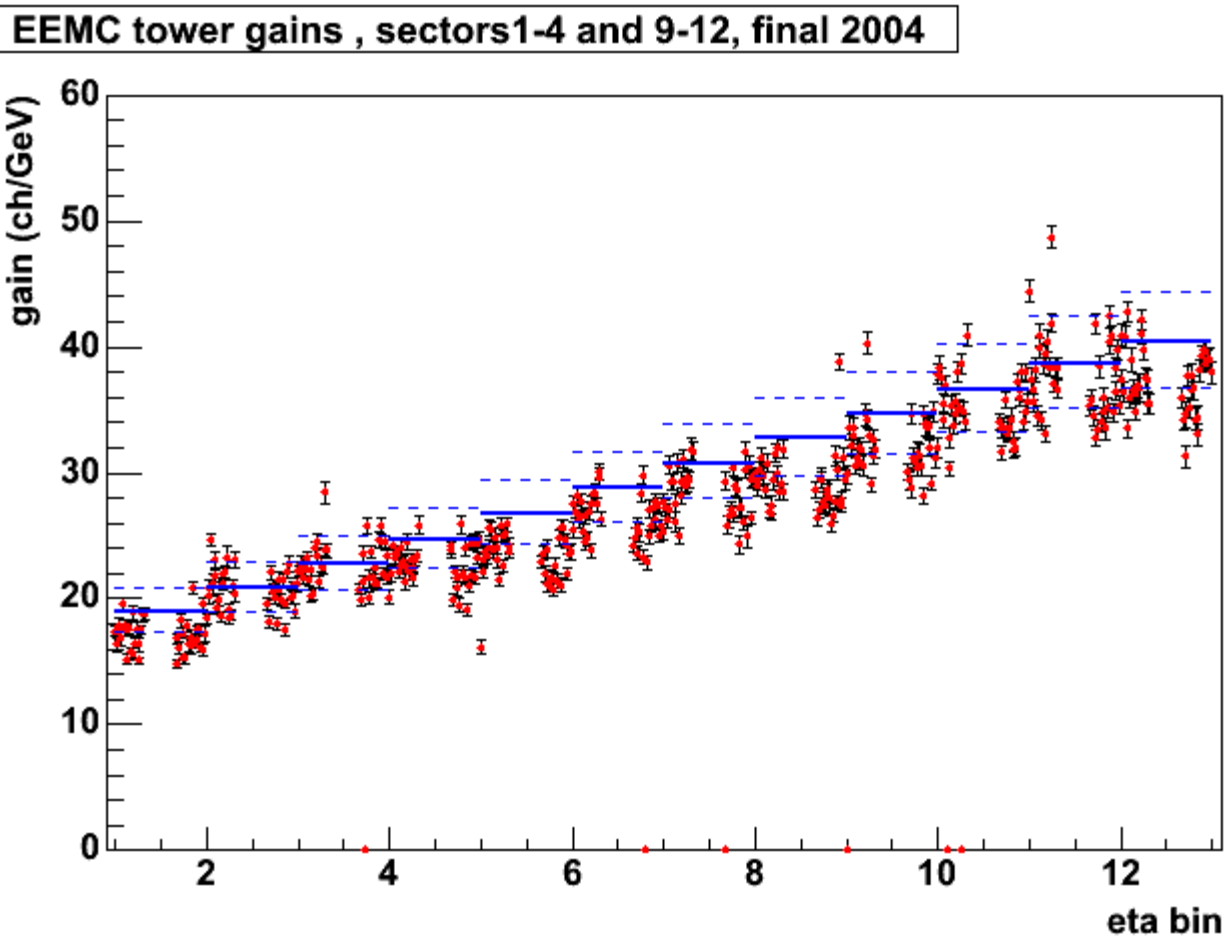
Tower gains summary sectors 5-8

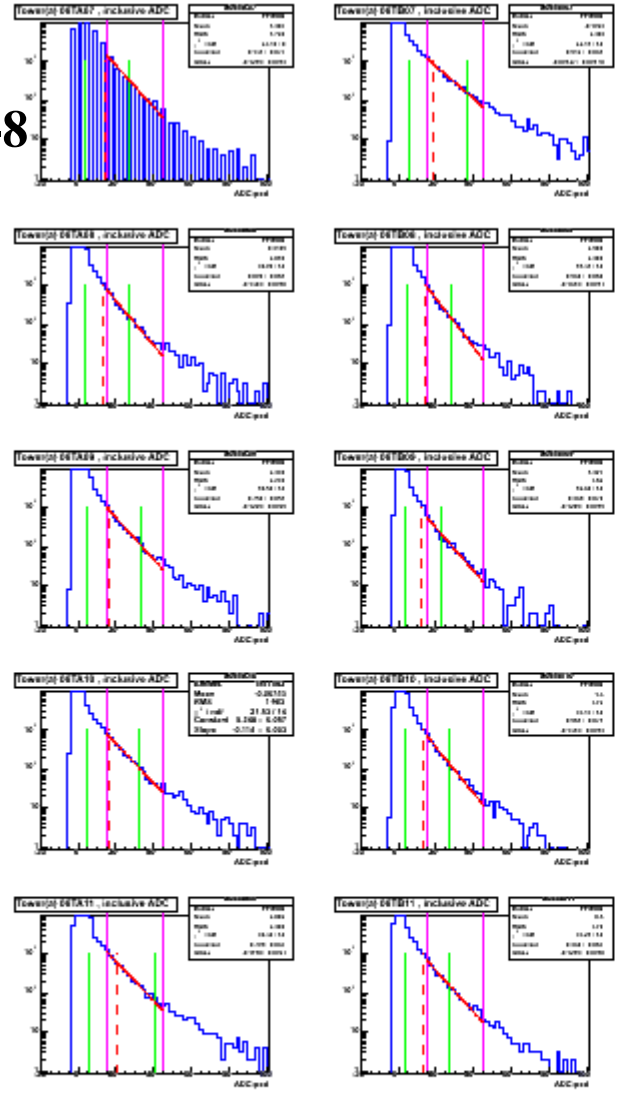


Goal +/- 10%
ET=60 GeV @
ADC=4095

Tower gains for sectors 1-4 and 9-12

- **No SMD installed in 2004**
- **use slopes**
- **absolute (eta dependent) scale from calibrated sect. 5-8**
- **use only runs with slow detectors (less corruption)**





Murad & Jan want to thank:

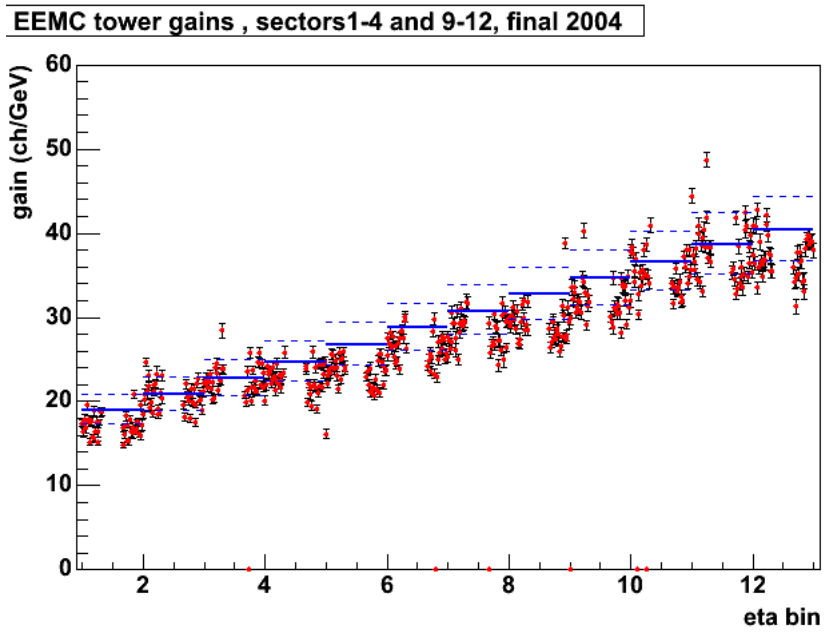
- Dave – produce ezTree for bulk of pp200 data
- Iwona, Ernst – disk space @ LBL & assistance

Summary for 2004 data

- EEMC is calibrated for 2004 data
- MIP's define gains for individual towers in sectors 5-8 and all pre/post-shower tiles
- Slopes define relative gains for individual towers in sectors 1-4, 9-12 and all SMD strips.
- Absolute scale for all EEMC set by MIP's

  pi0's will be used to set the final energy scale for towers, once available, perhaps 10-20% change

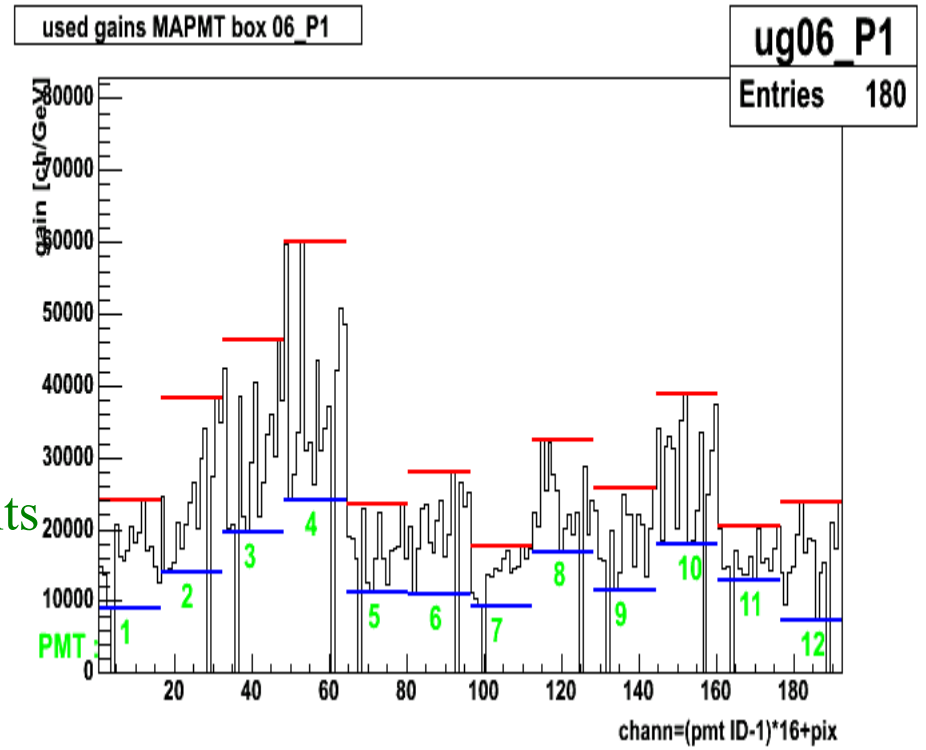
HV setup scheme for 2005 running



Towers:
-Find average gain per eta bin
-Change HV for outliers above 10%
-Use slopes to confirm relative gains

SMD, Pre, Post-shower:
- Equalize MAPMT's

2-3M minB (fast detector only) events
is enough to repeat MIP calib for all elements
Perhaps not needed?



Backup

MIP gains vs. AuAu62 slops, SMD