# electron analysis within OpEmuRec framework

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# Outline

Electron energy estimation within 2 bricks : nue & taue samples

Calibration with electron testbeam bricks data

Outlook

# MC Sample - OpRelease 4.0

Samples of 1000 $\tau \rightarrow e$ DIS & QE produced by Elisabetta
/sps/opera/operap/production/OpEmuIO/march2011/TAUE/DATA/taueforemu_tgt1000_OpR4.0_rec_11.root

- Processed through OpEmuIO
- Processed through OpEmuRec packages : CS, Scanback, Link, Alignment, Track & Shower by using all plates available in the brick

- All packages up to OpEmuRec Track are taken from the release $GROUP_DIR/soft/OpRelease4.0_emulsion_march2011/
- OpEmuRec Shower is released here : /sps/opera/scratch/flbrunet/analysis/OpRelease_2011-04-04_OKwithShower/4.0/OpEmuRec/

**FEDRA RELEASE (1210)**
**OPEMUREC(v3)/OPRELEASE(4.0)**

# Nue/taue BT shower profile

Goal : determine surface and number of plates to scan in the second brick downstream

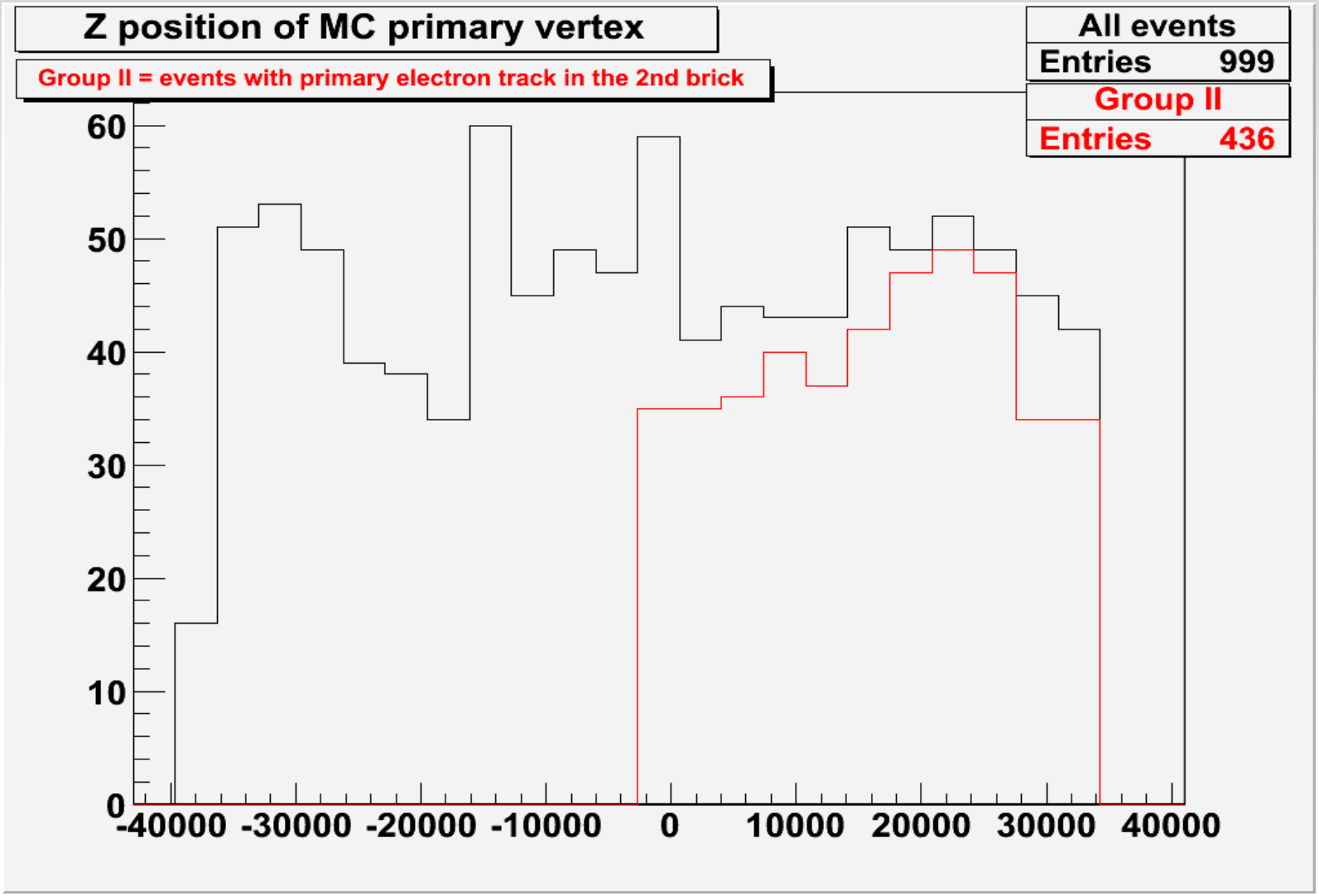
- Surface increases between plate 57 & 58 by a mean value of 2.4 $cm^2$

→ geometric acceptance of the showering : BT inside a cone of 0.02 cm2 transverse area at max

- Number of plate has to be 30 in total to have a optimal performance of the showering

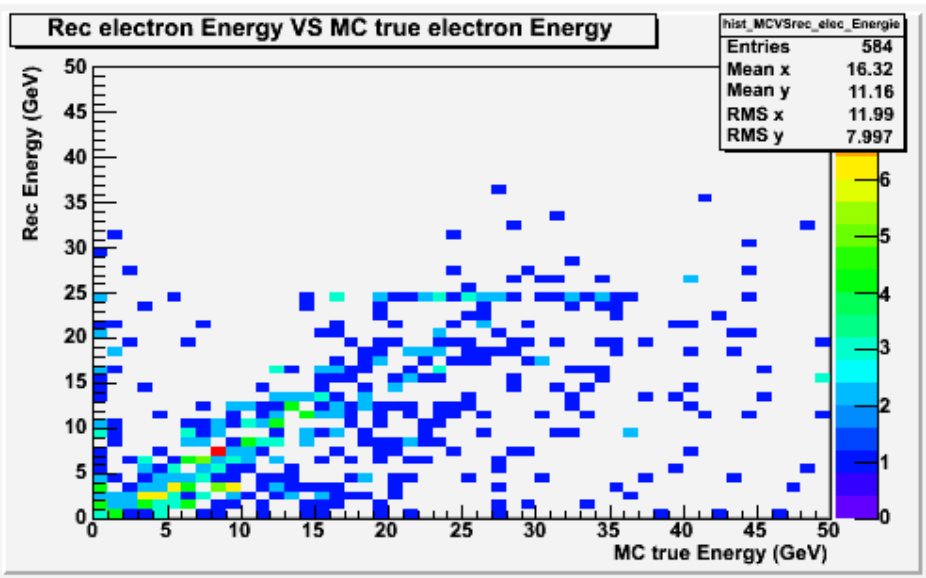
- X Position in the transverse plane is well aligned between plate 57 & 58 : mean $\Delta X = 37$ µm
- Y Position in the transverse plane is shifted between plate 57 & 58 : mean $\Delta Y = 884$ µm

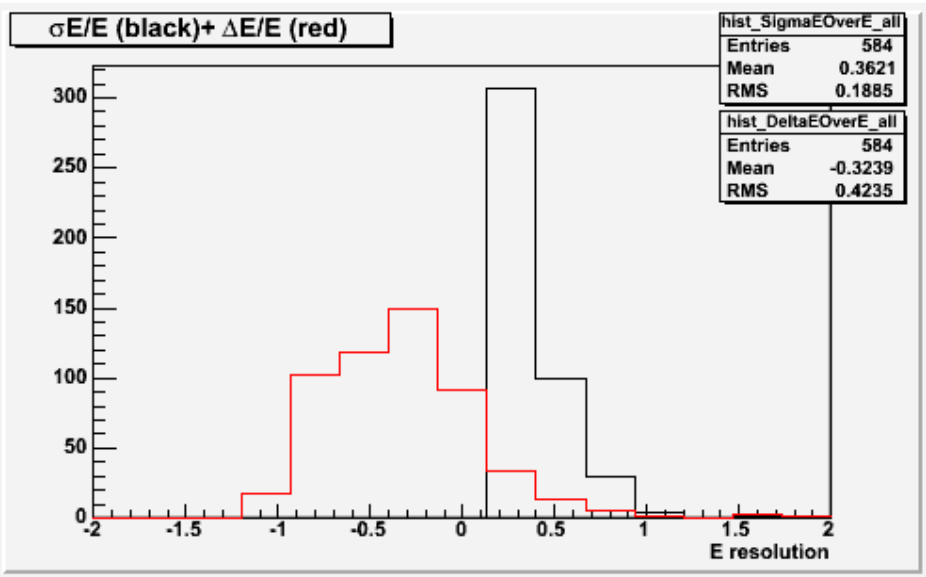
# Nue BT shower profile

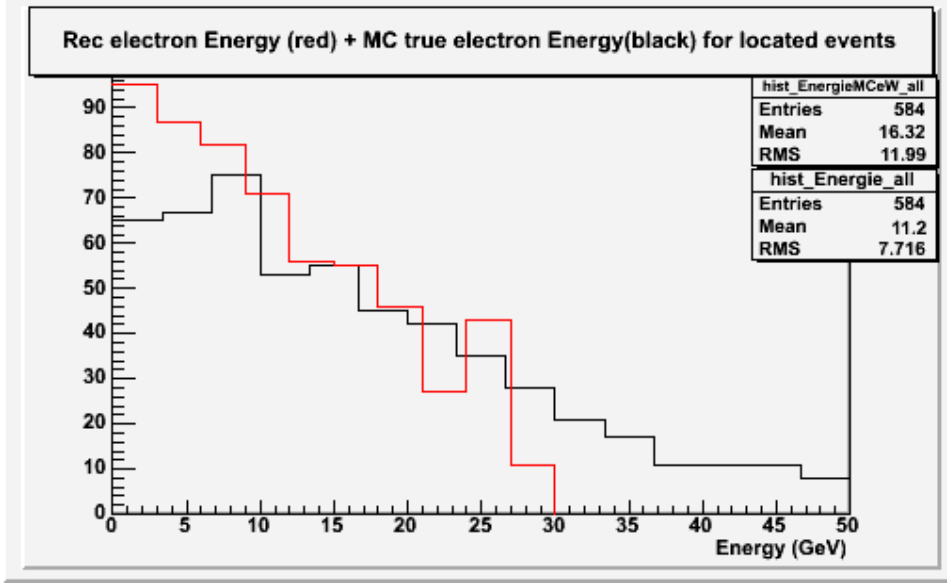



**44% of events have a « significant » part of the shower in the 2nd brick**

# Nue shower energy estimation : reminder

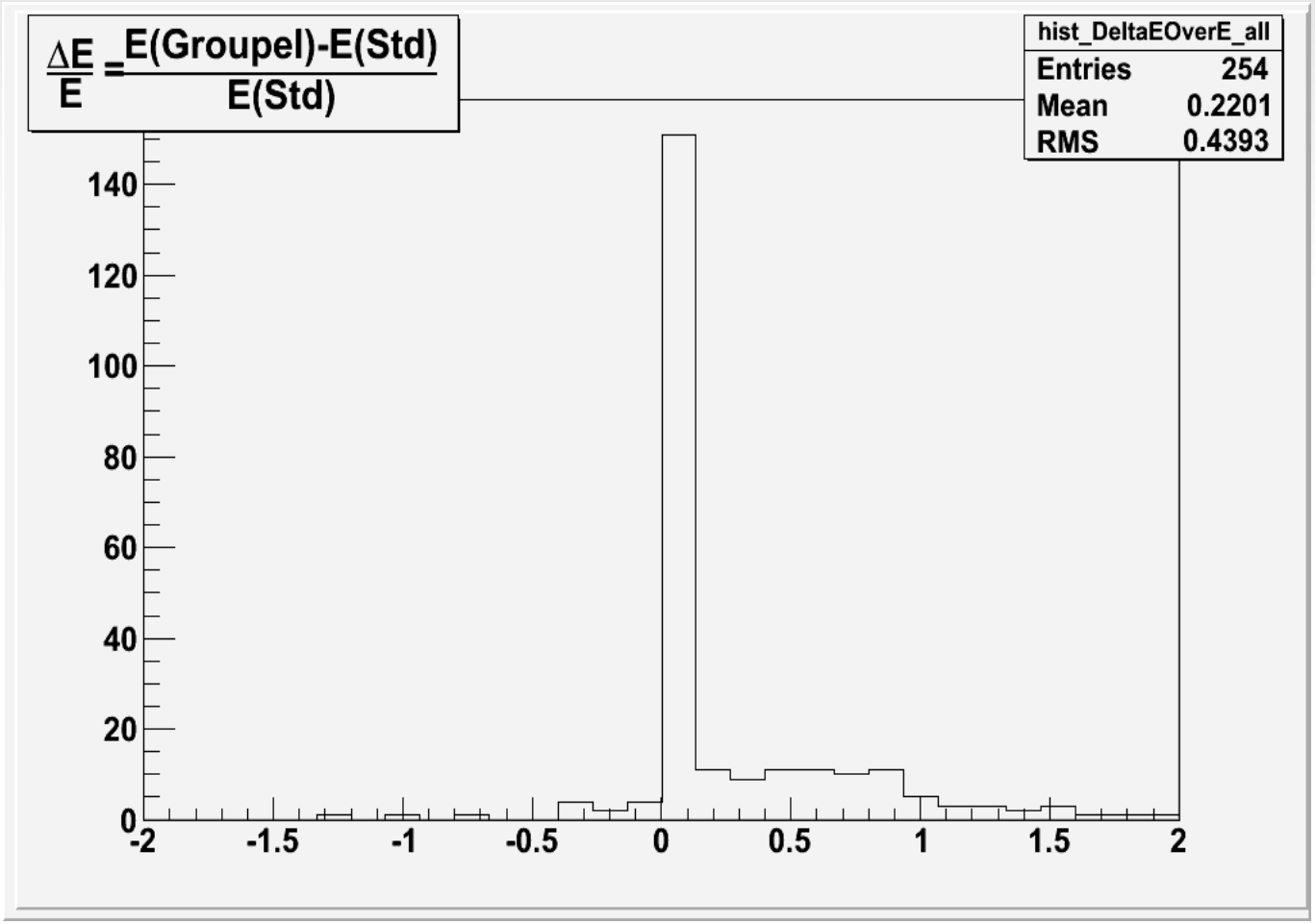


# Nue shower energy estimation

Reminder taue : 26% of events with significant fraction of showers in the 2nd brick with a 20% mean error on the energy.

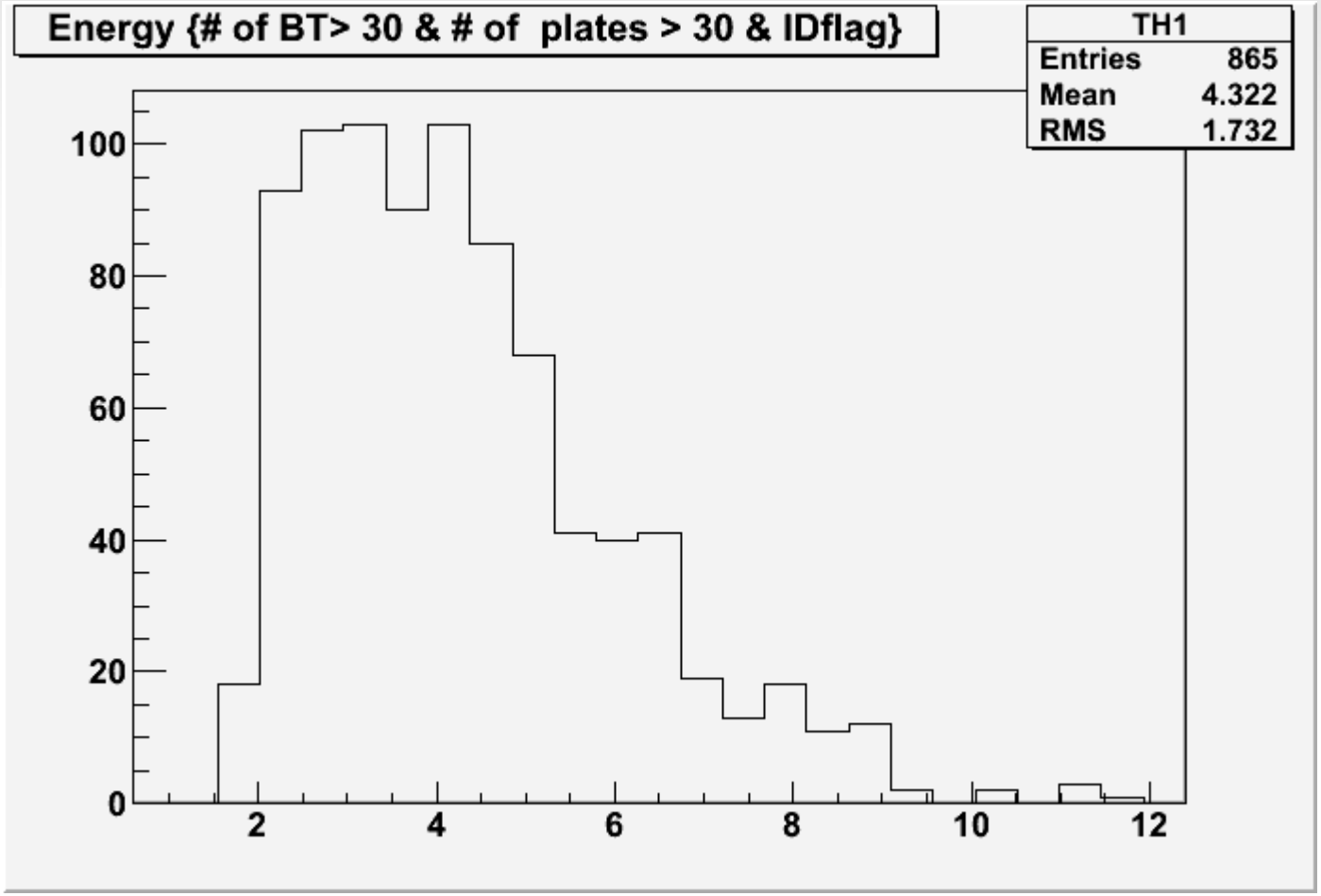



Nue : 44% of events with significant fraction of showers in the 2nd brick with a 22% mean error on the energy.

→ possible underestimation to check

# Monochromatic electron 4.0 GeV

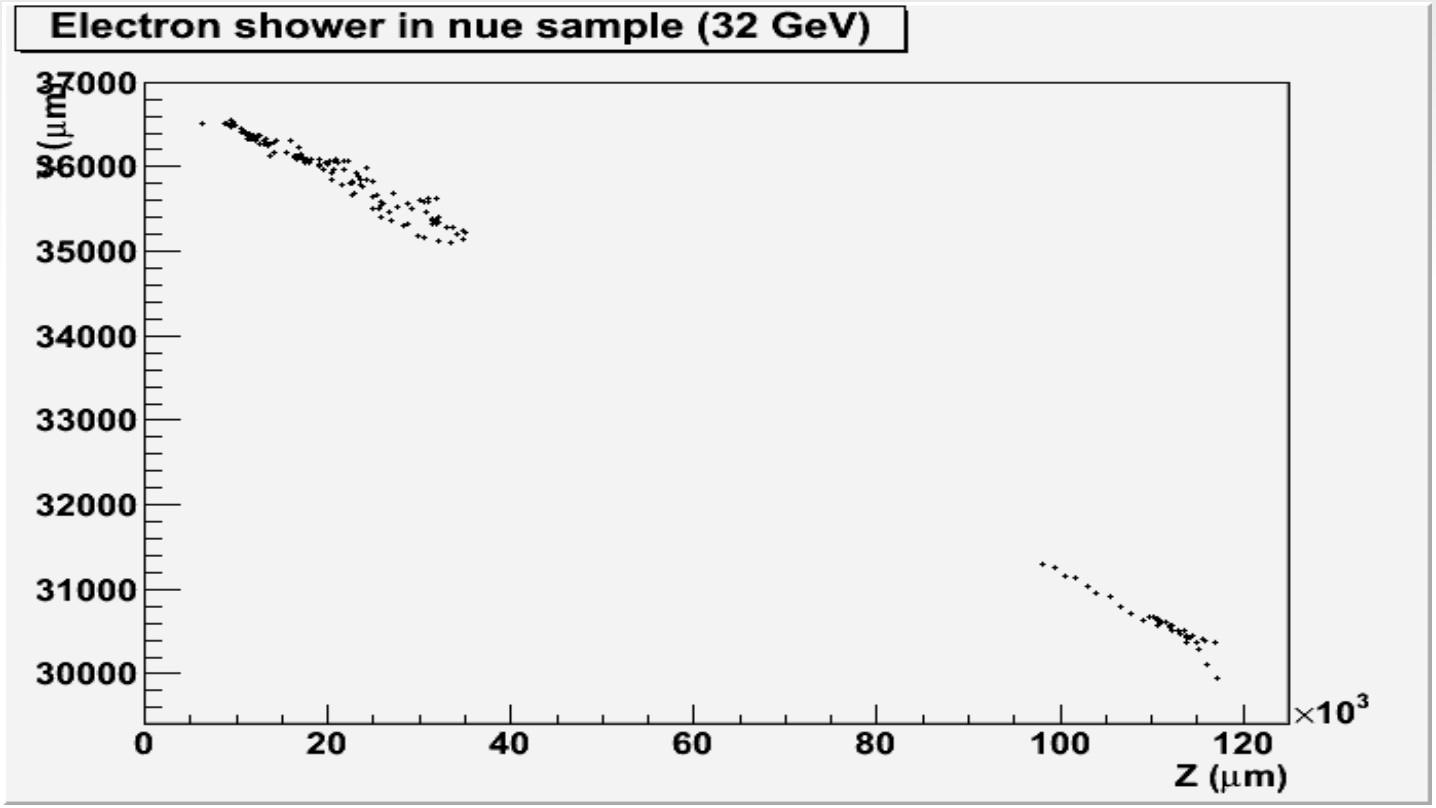
Goal : check with all recent developments the performance of the shower algo



# Shower reconstruction within 2 bricks

## Status

- Shower reconstruction within 2 bricks with standard geometric acceptance by taking into account the 6 cm TT-space : OK



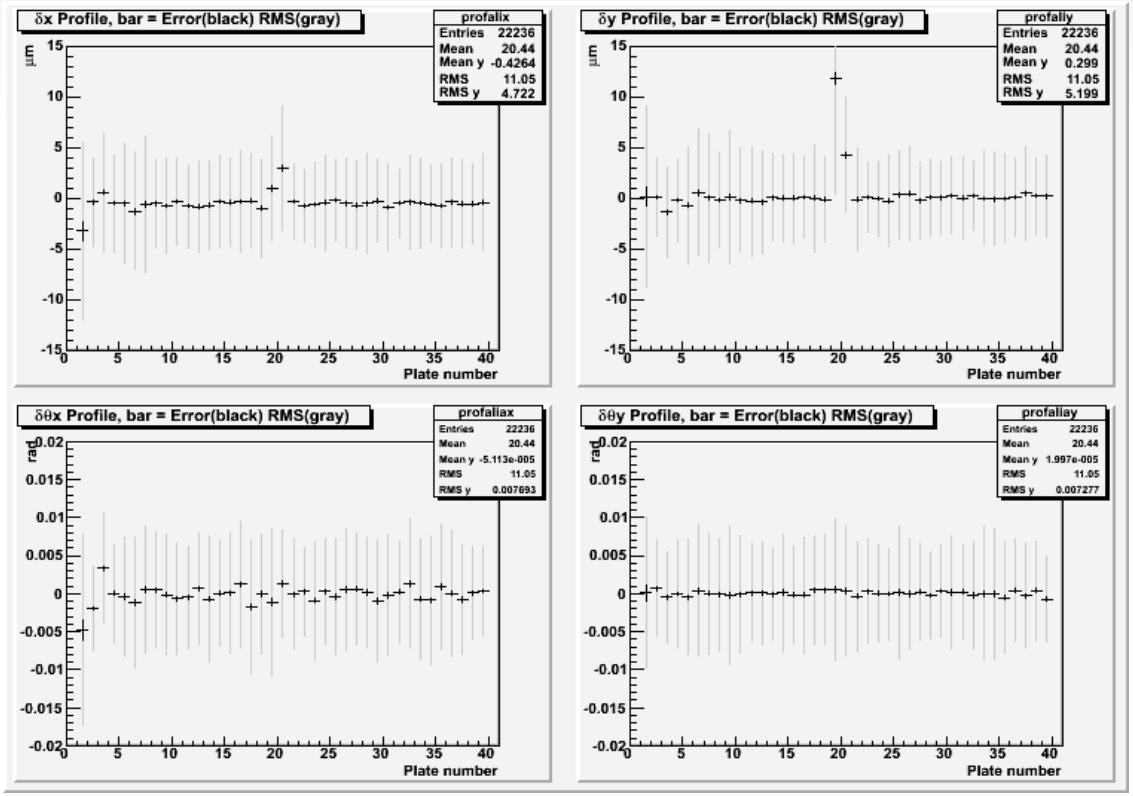

- Then standard energy estimation has to be performed and a 2-brick correction has to be defined

# Calibration of shower tool : beamtest 4 GeV brick analysis in Bern

Scanning in Bern is currently on going thanks to Tomoko, Ariga, Serhan, Annika :

4 GeV electron brick → 40 plates available on ½ area

2 GeV electron brick → 40 plates available on ½ area




Analysis in Annecy : on going

Alignment 4 GeV:

→ rescan of pl 20 ?

Alignment 2 GeV :

→ done by Annika

# Outlook

1/ 2-Bricks analysis

a/ shower algo development within 2 bricks : energy estimation

b/ nue & taue BT shower profile analysis : investigate energy + reconstruct showers & estimate error on the energy

2/ Electron Energy estimation

a/ understand over & under estimation in MC nue sample

b/ systematics study on pure electron MC samples

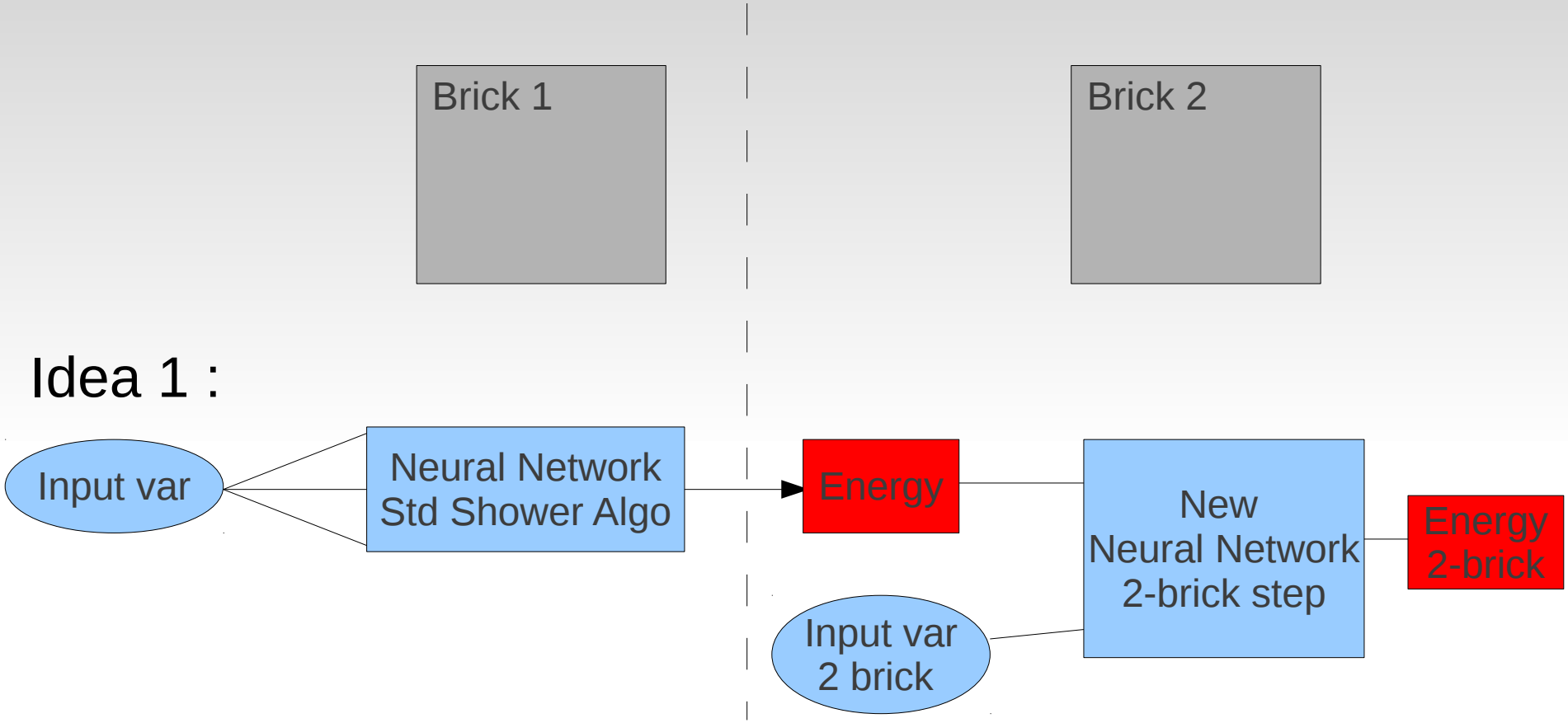
c/ Calibration of shower tool : shower reconstruction on selected tracks

d/ Data analysis : comparison of my result with the one already produced by scanning labs

3/ $\tau \rightarrow e$ analysis : background study

# Backup slides

# Shower reconstruction within 2 bricks

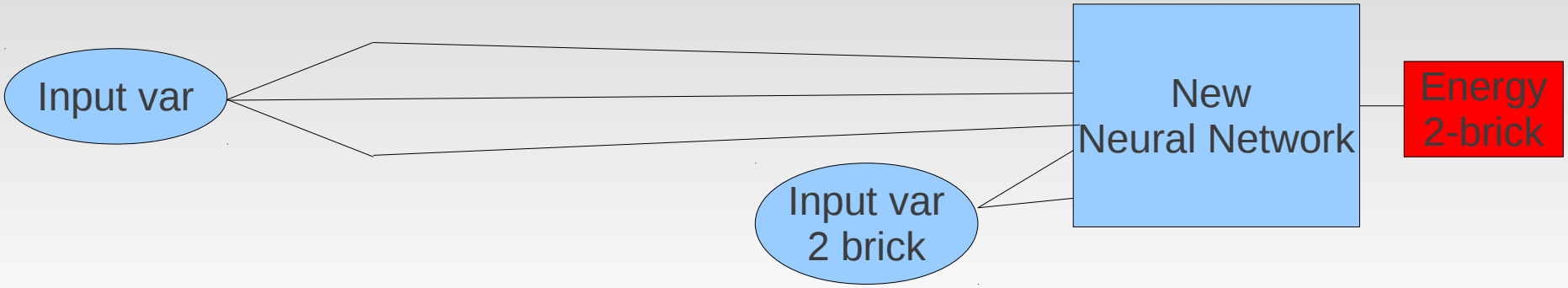



Interest : relatively quick → adding a next step after normal shower reconstruction

Problem : First Energy estimation has possibly unkwown systematics

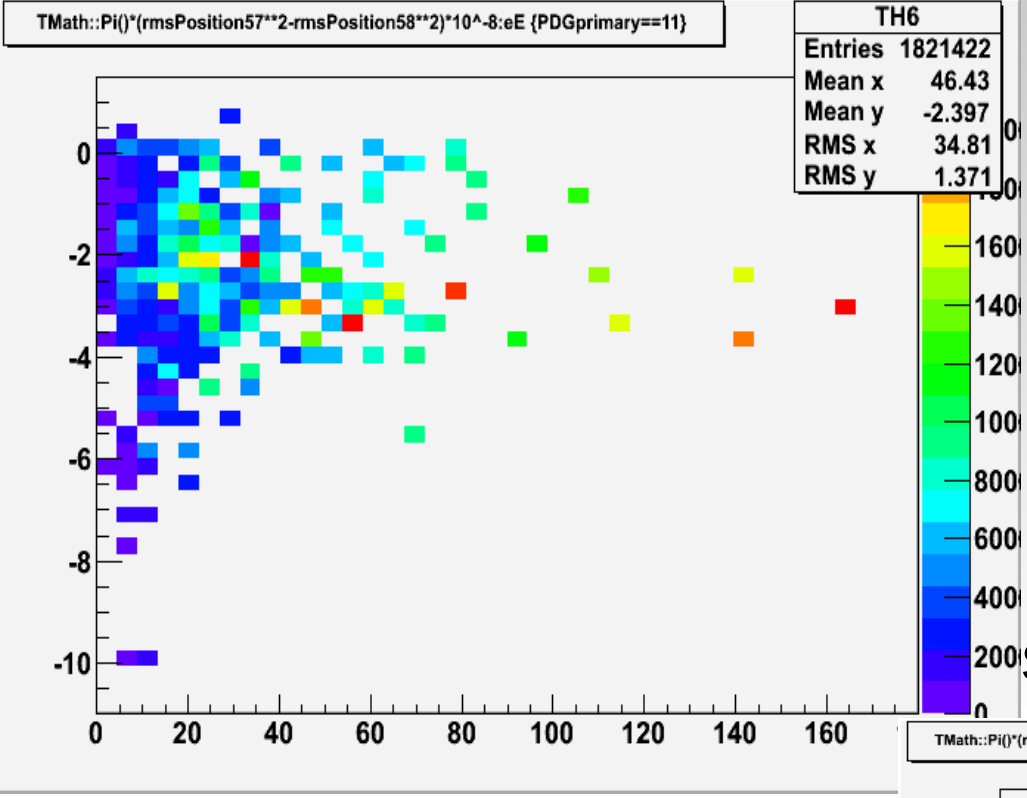
# Shower reconstruction within 2 bricks

Idea 2 :




Interest : a more understood energy estimation

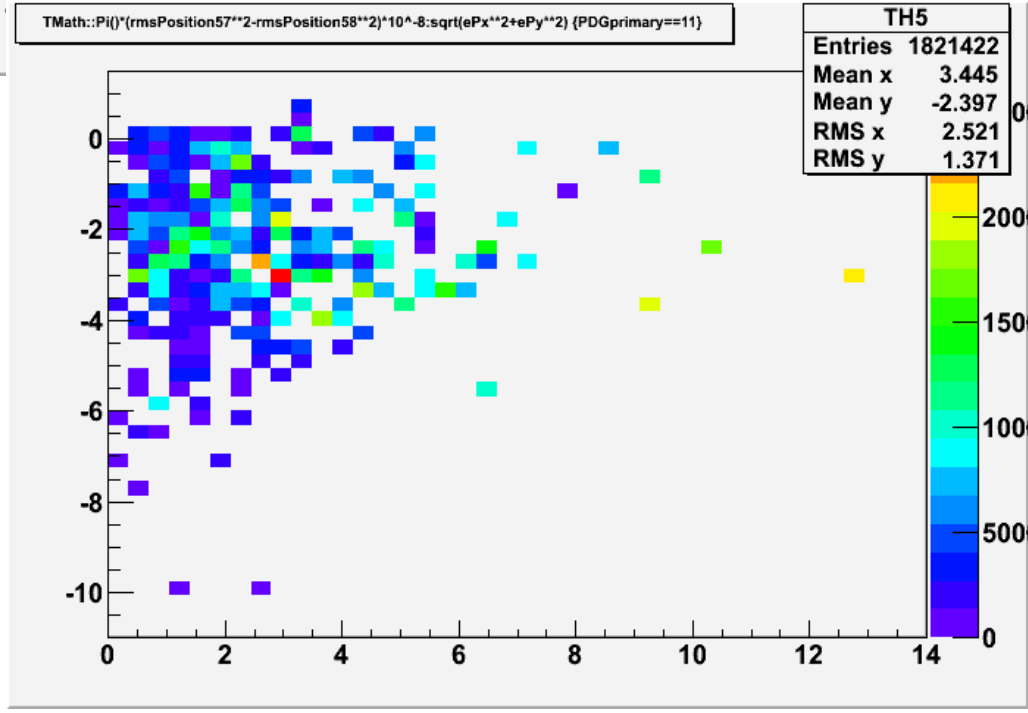
Problem : a tool different from the official one

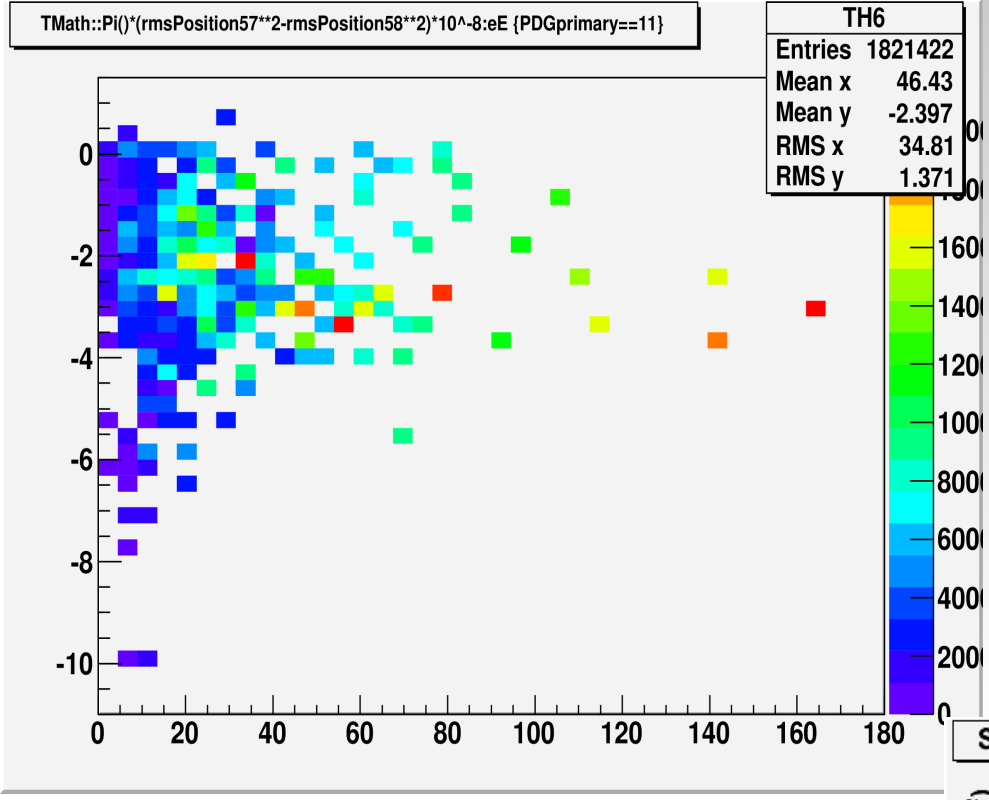



nue

Surface difference VS MC electron pT

Surface difference VS MC electron energy






taue

Surface difference VS MC electron pT

Surface difference VS MC electron energy