

# electron analysis within OpEmuRec framework

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# Outline

- Electron energy estimation : nue sample
- Software developments
- Electron energy estimation within 2 bricks :  $\tau \rightarrow e$
- Electron shower reconstruction in nue data from EU
- 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/OpEmulO/march2011/TAUE/DATA/taueforemu_tgt1000_OpR4.0_rec_11.root`

- Processed through OpEmulO
- 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)**  
**LAST**  
**OPEMUREC(v3)/OPRELEASE(4.0)**

# Electron energy estimation : nue sample

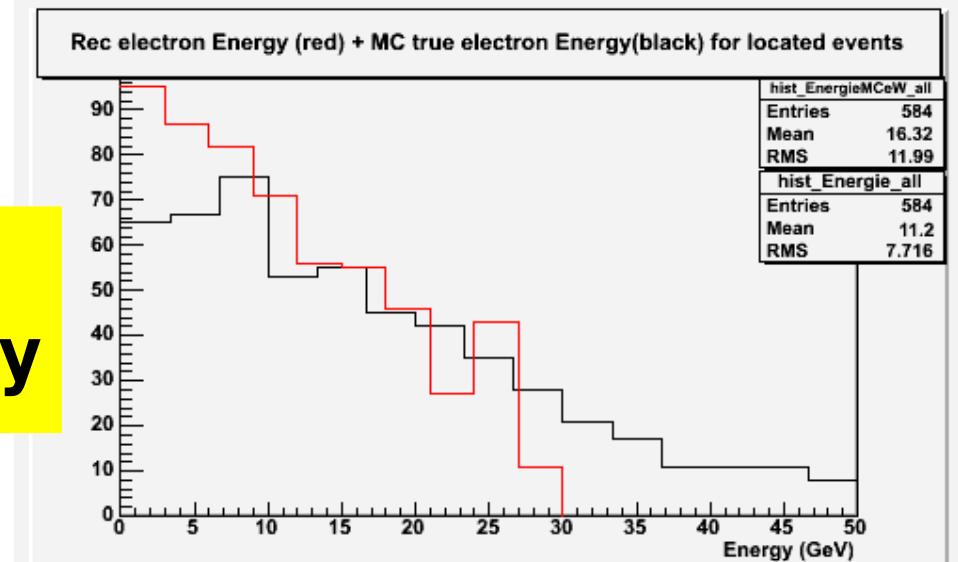
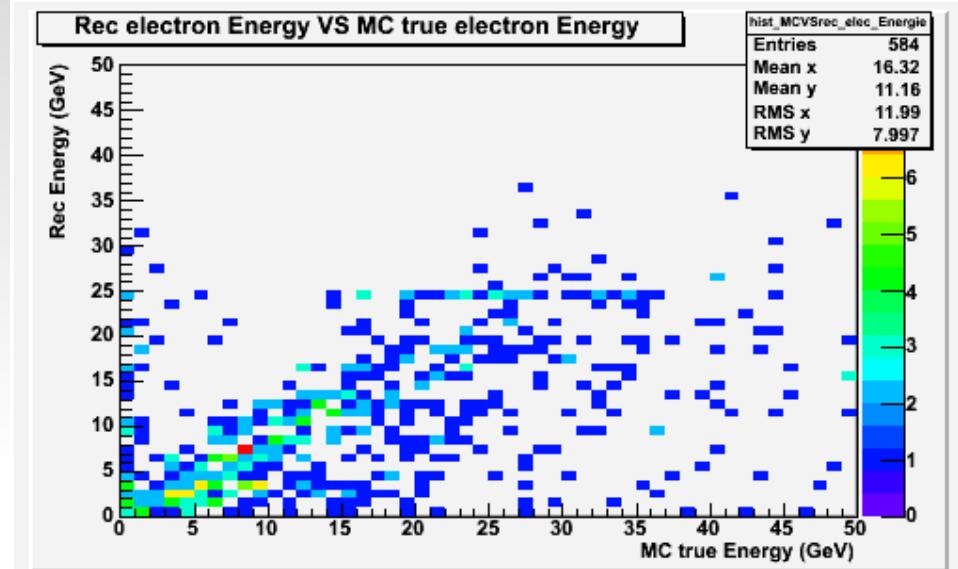
Underestimation :

→ come from downstream  
events  
= Under checking

Overestimation : ?

= Under investigation

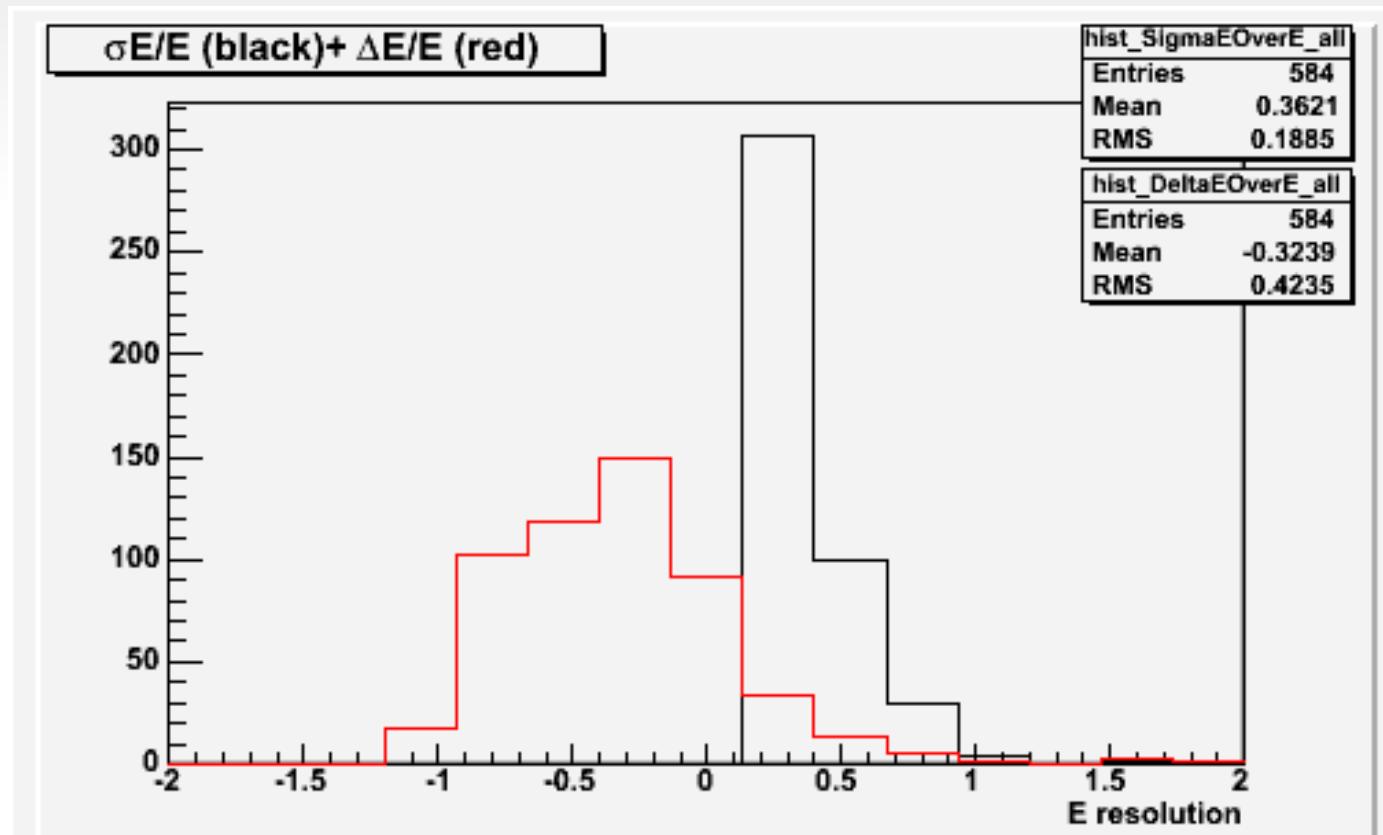
**- rec Energy**  
**- MC true Energy**



# Electron energy estimation : nue sample

$\sigma E$  : error given by shower algo  $\rightarrow$  mean error 36%

$\Delta E$  : energy resolution wrt MC true energy  $\rightarrow$  mean error 42%



# Shower software developments

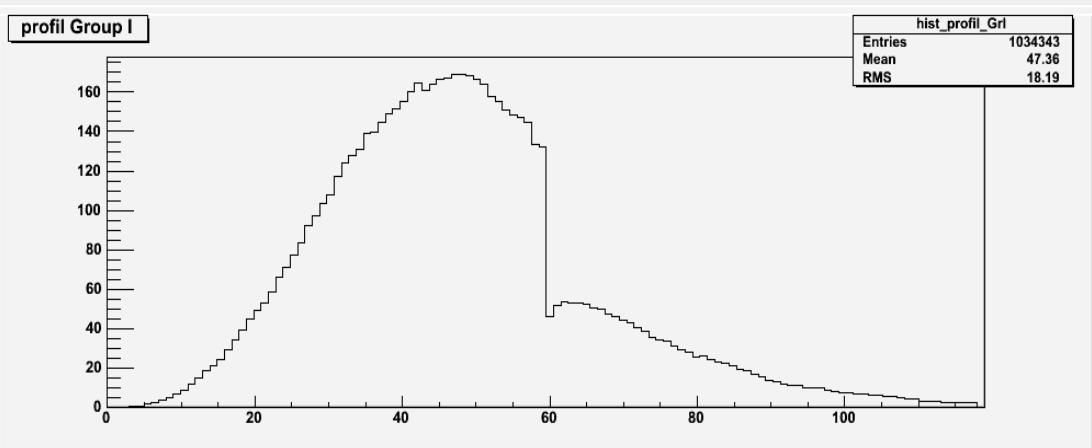
Full Implementation of OpEmuRec – Shower Algo within OpEmuRec framework :

- Shower Algo is fed with any OpEmuRec output from ALIGNMENT to VERTEX
- but we need to tune the opening volume in order to reproduce data analysis (Andrea)
- develop a specific algorithm to reconstruct showers within 2-bricks (on going)
  
- a shower Algo tutorial has been sent to EWG
- commit the implementation of the shower algo on the CVS server (on going)

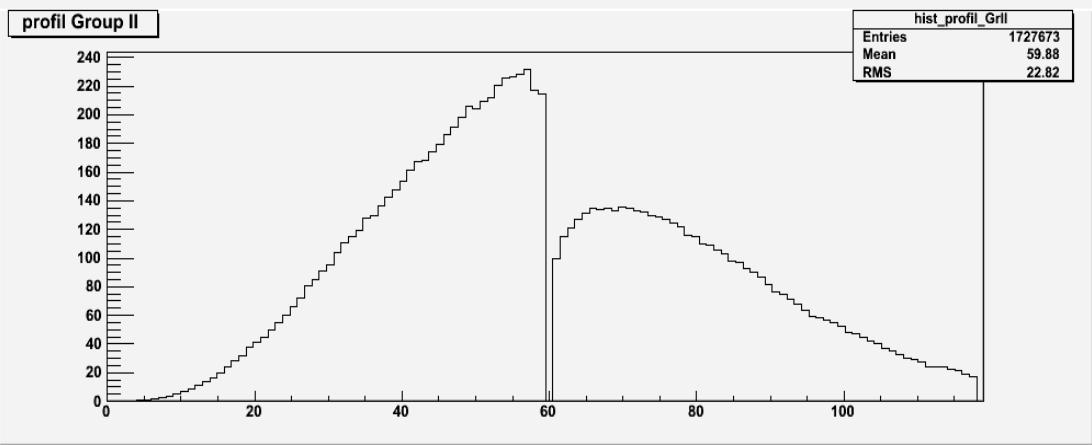
# 2-bricks analysis

Groupe Ib: events with the primary vertex in the first half-brick  $z < 0$   
&& up to plate 29

Groupe II : events with the secondary electron tracks in the second brick downstream



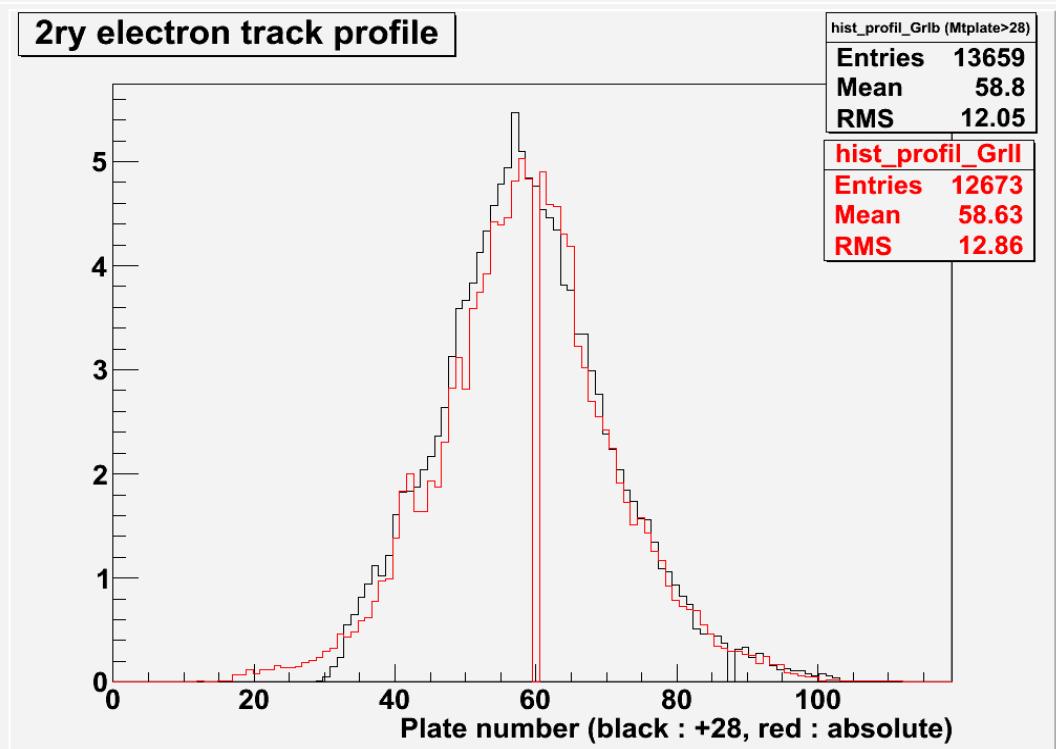
Status : 20% mean error  
on the Energy by  
reconstructing events  
which go in the 2nd brick



Next : profiles are not  
matching between the two  
bricks  
→ BT profiles

# 2-bricks analysis

- EWG request : which plates & surface to scan in the 2nd brick



Status : roughly 20 plates

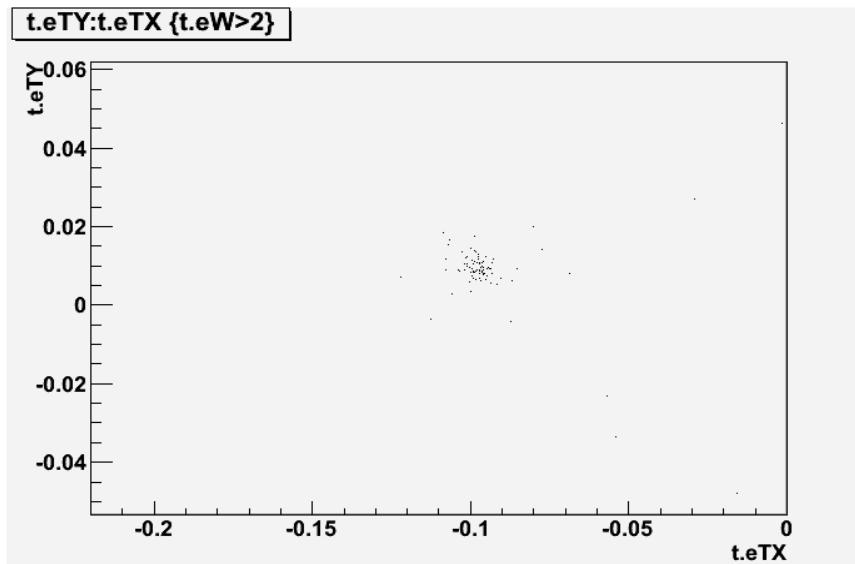
Next :  
→ BT profiles  
→ nue sample

# Calibration of shower tool : beamtest brick analysis in Bern

Scanning in Bern is currently on going :

Strategy :

- start with 4 GeV electron brick
- scan of only the half of the brick because of time
- scanning should be finish in 2-3 weeks
- then scan the 2 GeV electron brick



Status : 5 plates done  
Today : BT efficiency  
computation  
This night : 2-3 plates  
more

# Outlook

## 1/ 2-Bricks analysis

- a/ shower algo development within 2 bricks
- b/ nue & taue BT shower profile analysis

## 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 : beamtest brick analysis in Bern
- d/ Data analysis : comparison of my result with the one already produced by scanning labs

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

# Backup slides