

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/OpEmuIO/march2011/TAUE/DATA/tauef
oremu_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)
LAST
OPEMUREC(v3)/OPRELEASE(4.0)

Electron energy estimation : nue sample

Underestimation :

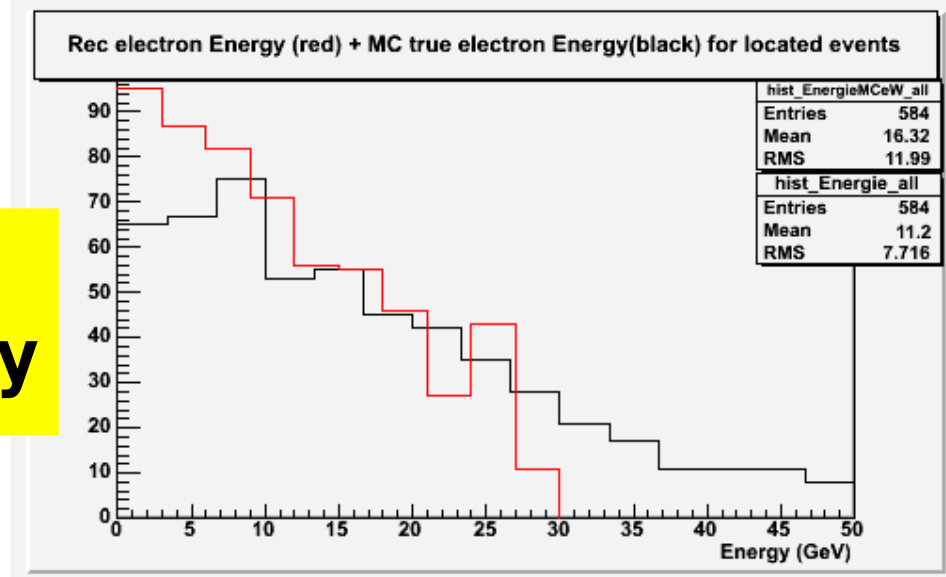
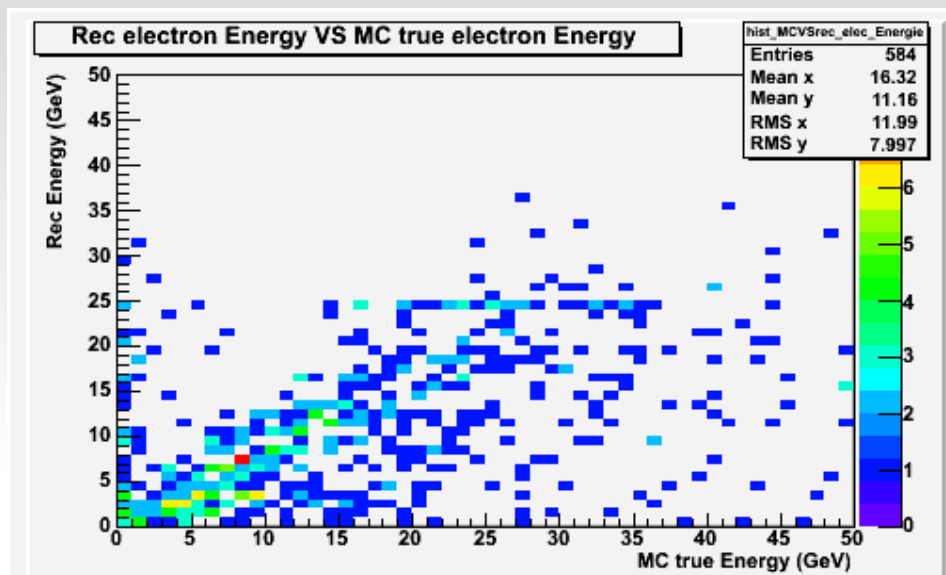
→ come from downstream
events

= Under checking

Overestimation : ?

= Under investigation

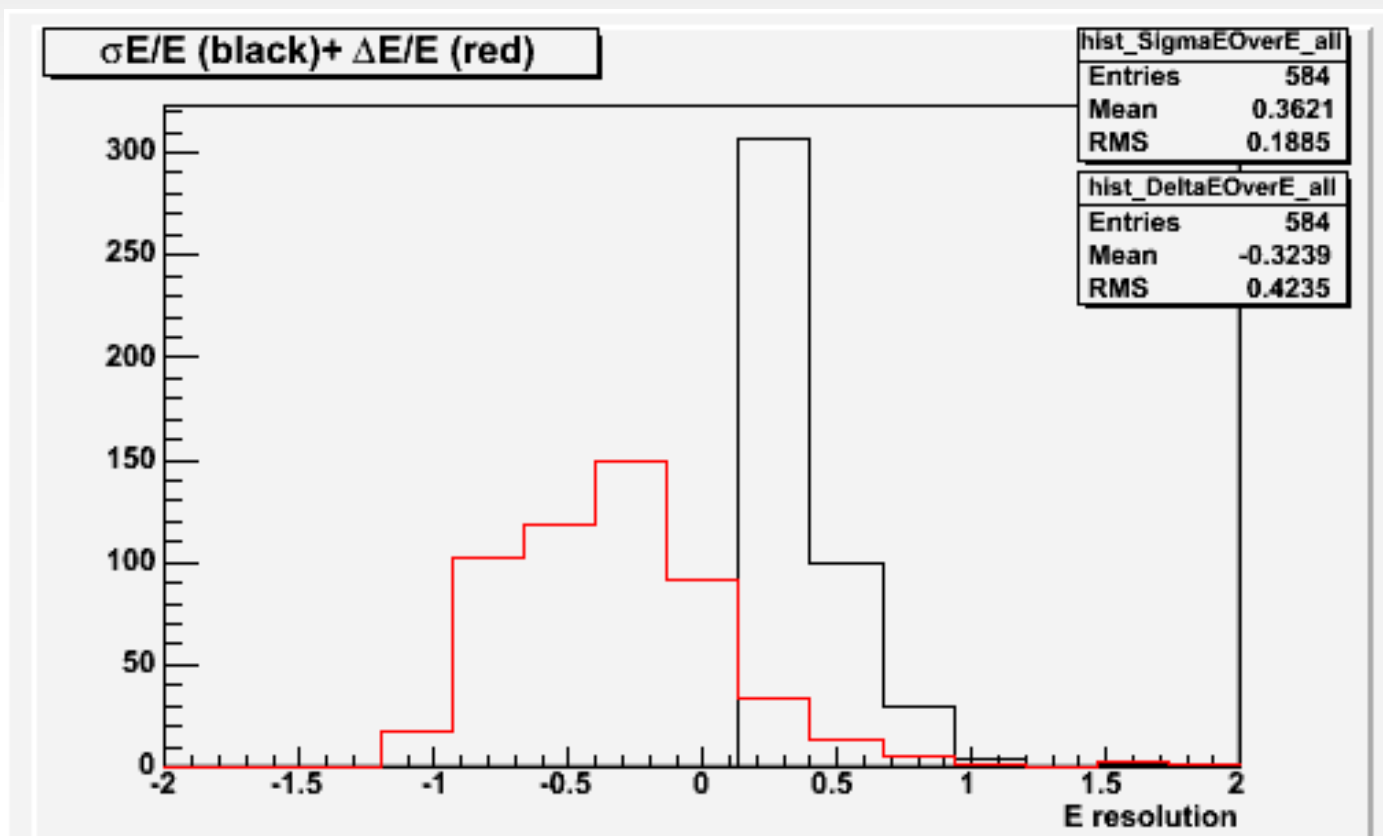
- **rec Energy**
- **MC true Energy**



Electron energy estimation : nue sample

σE : error given by shower algo \rightarrow mean error 36%

ΔE : energy resolution wrt MC true energy \rightarrow mean error 42%



Shower software developments

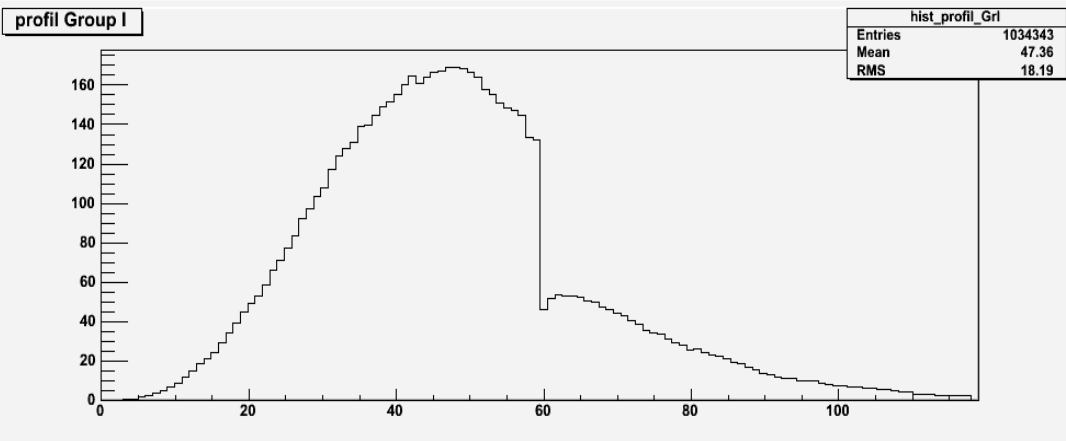
Full Implementation of OpEmuRec – Shower Algo within OpEmuRec framework :

- 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)

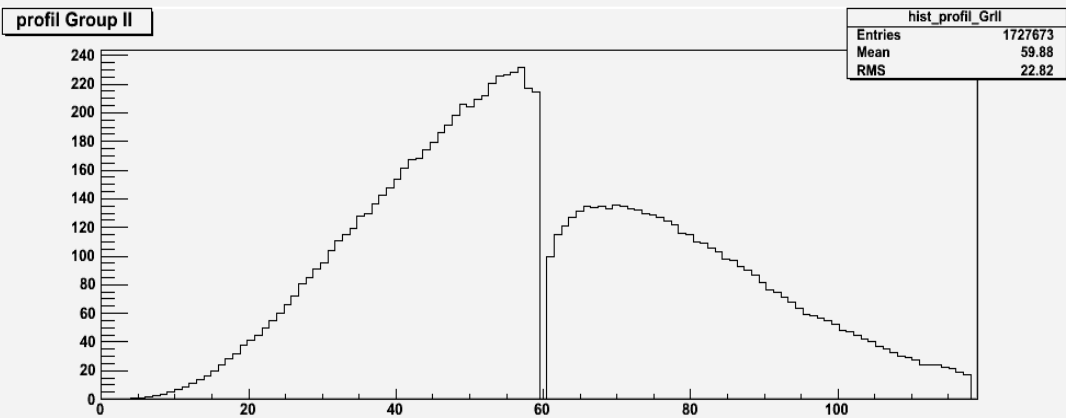
2-bricks analysis

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

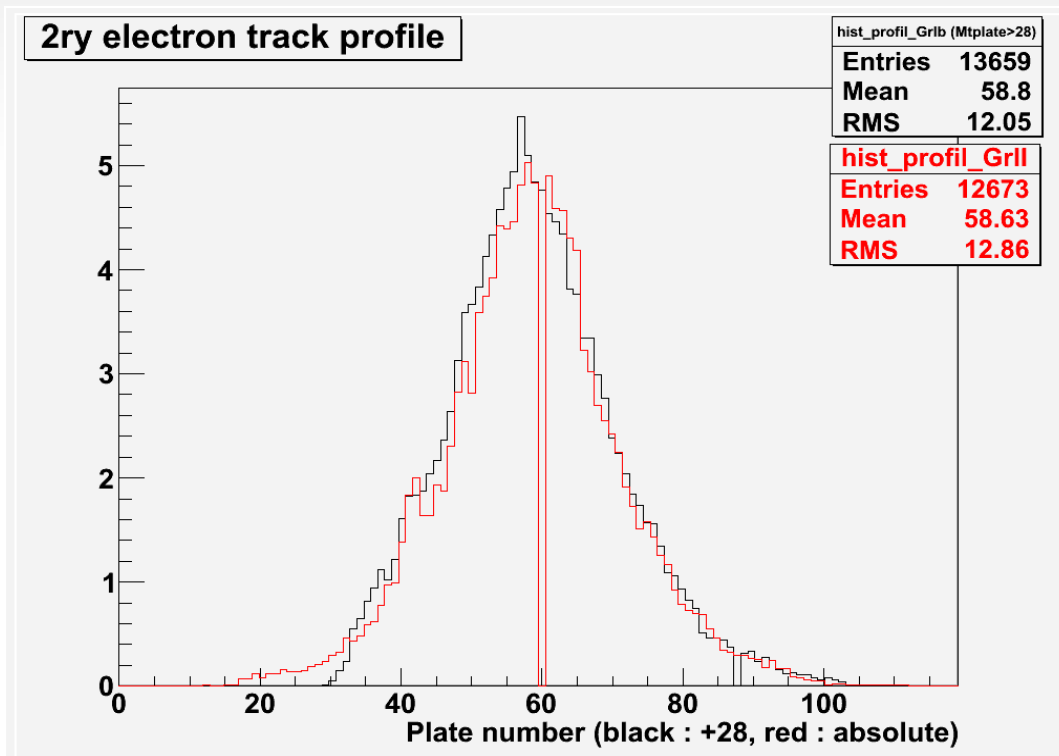


Next : profiles are not
matching between the two
bricks

→ BT profiles

2-bricks analysis

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



Status : roughly 20 plates

Next :

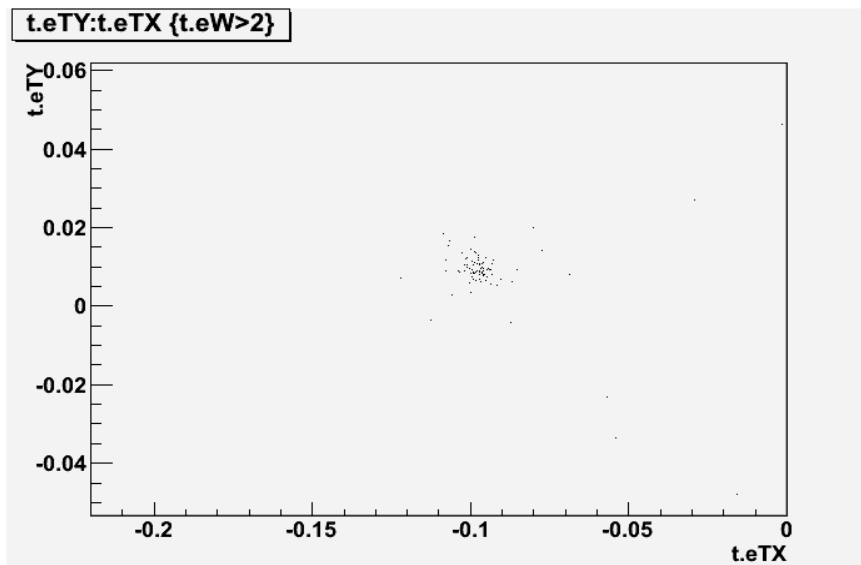
- BT profiles
- nue sample

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