

Status of $K_{e2}/K_{\mu2}$

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KLOE general meeting
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Status of the software

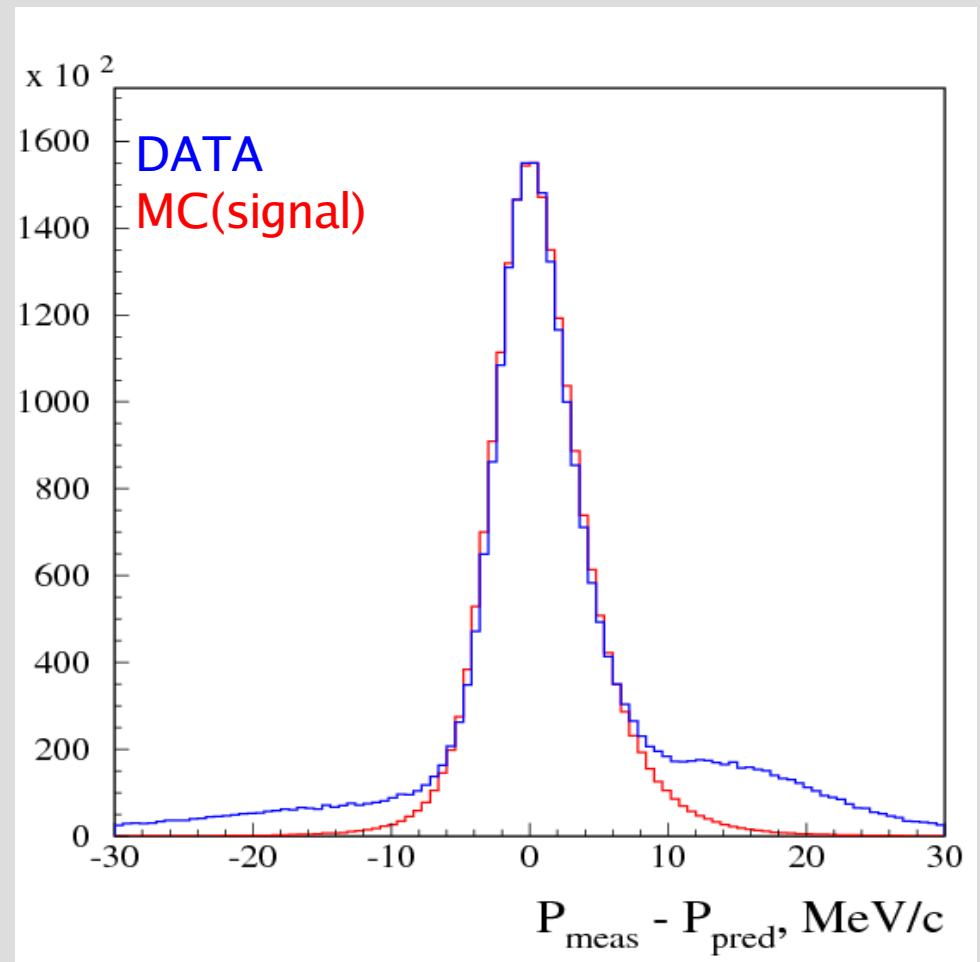
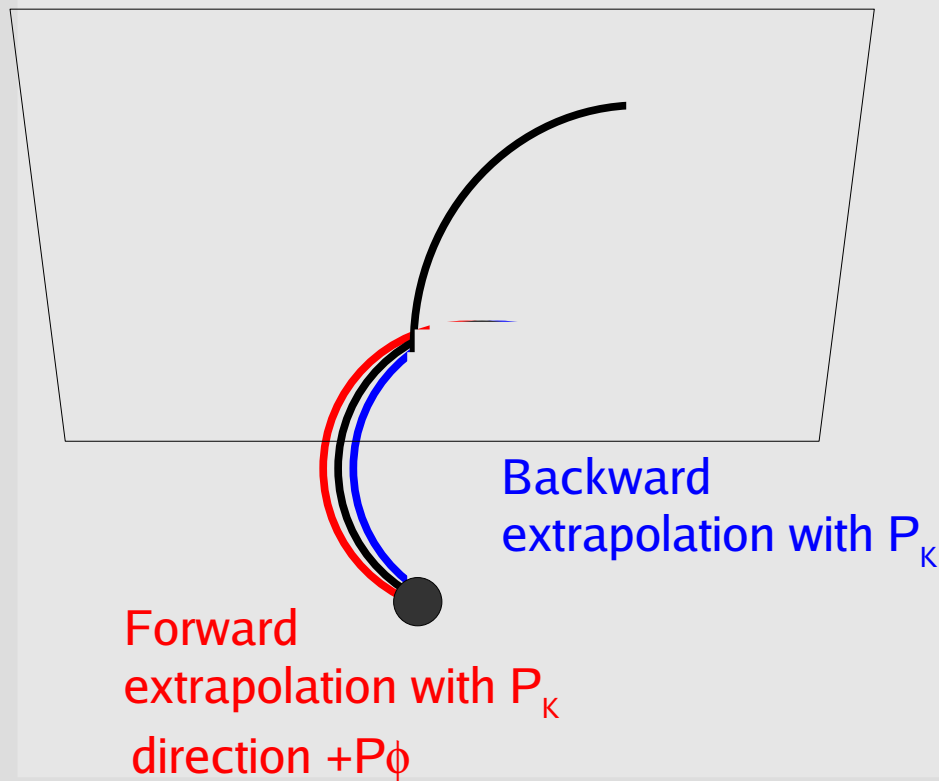
- BUG on recovery corrected + prompt γ s for Ke2g and ke3 added
- Critical issue – rare decays need several days to optimize each cut
- Move from PC to Farm
 - Modified HBOOK open Gzipped ntuples directly (save factor ~ 2 disk space)
- All chain tested and ready

The way to the 1% accuracy: statistical error

- More MC for background
 - Analysis of new production well under way ('04+'05 0.5 scale factor almost ready)
- Reduce background contamination
 - Use kinematics
 - Redundant measurement of K momentum + tighter cut on error a priori on missing mass
 - Better particle ID using calorimeter info:
 - Recover all cells with one only PMT fired
 - New definition of shower direction and impact point
 - New variables: higher momenta of shower distribution

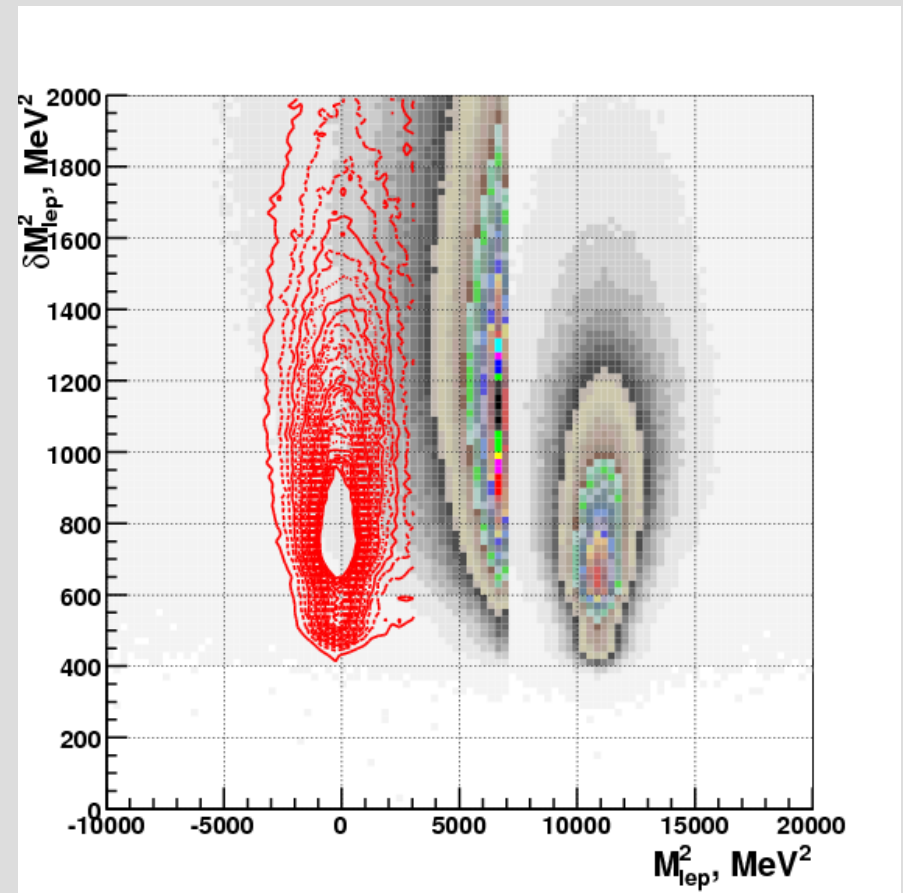
Kinematics

- Use $P_K - P_K^{\text{BOOST}}$
- Extrapolation with RK



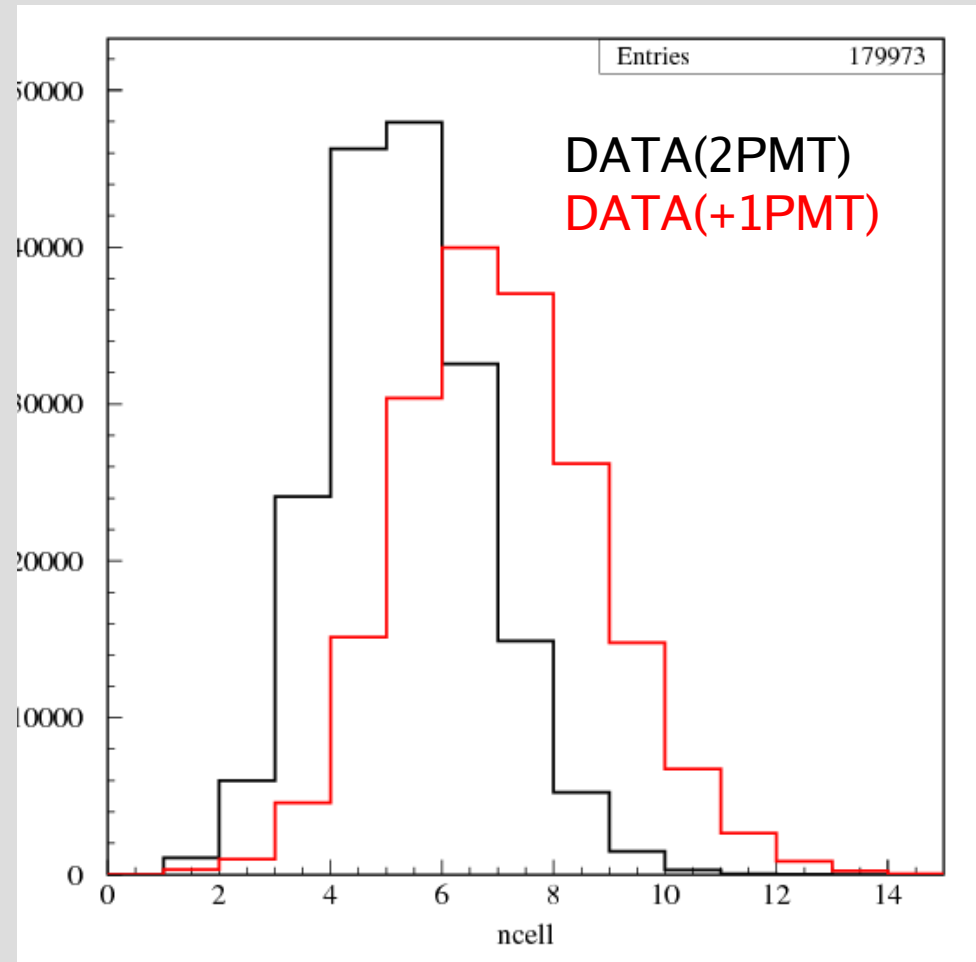
Kinematics: error on lepton mass

- Error on lepton mass still not fully exploited



Cells recovery

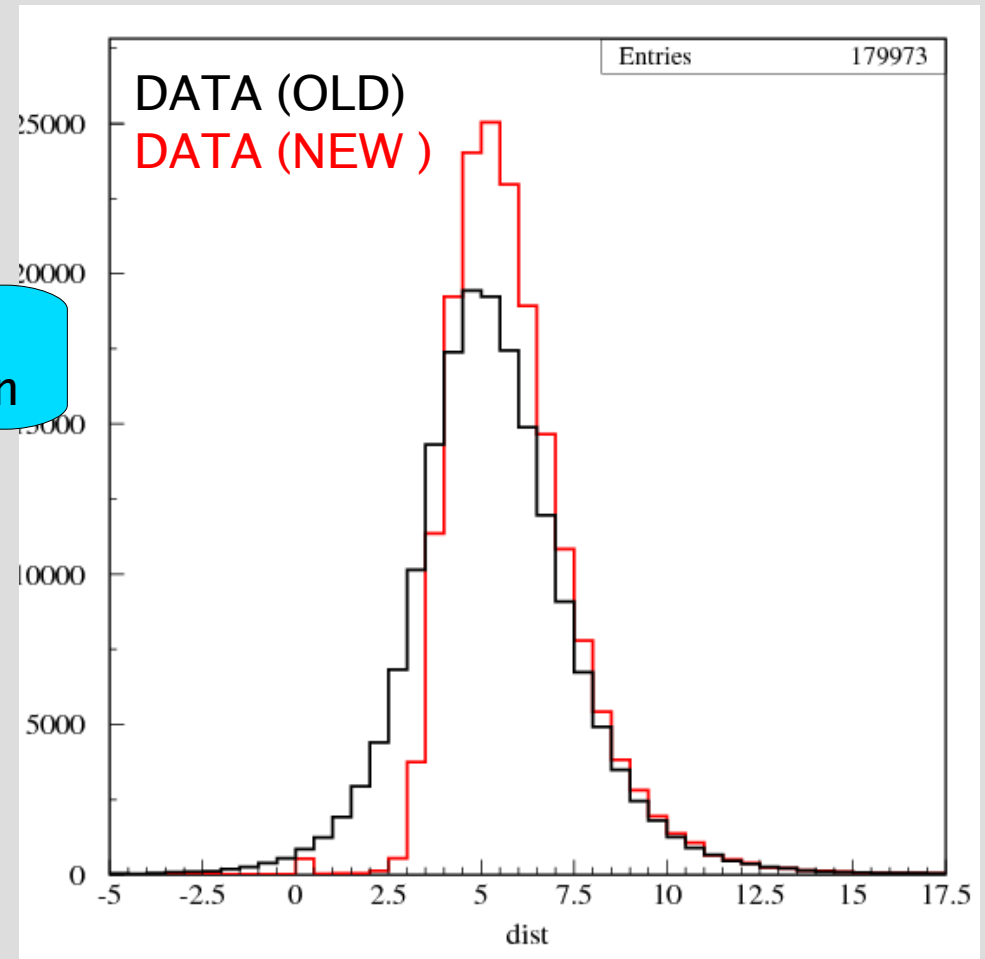
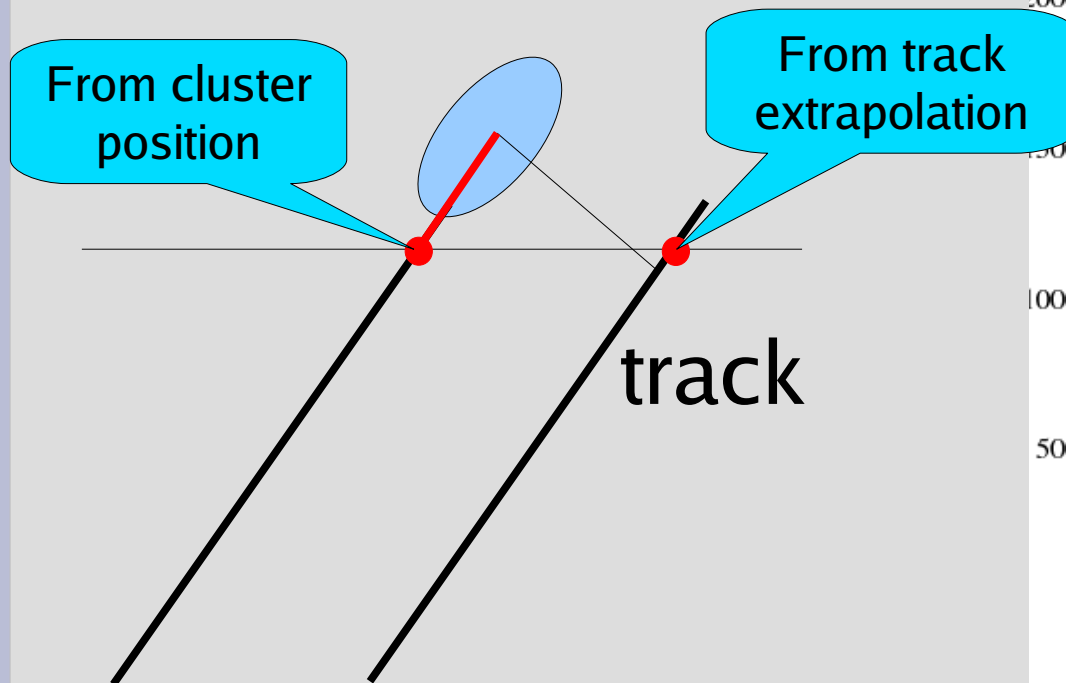
- Use incomplete cells (1 pmt only fired) to determine **all** cluster properties*
- Coordinate along fiber from centroid position



*only for energy evaluation all cells are used in the standard reconstruction

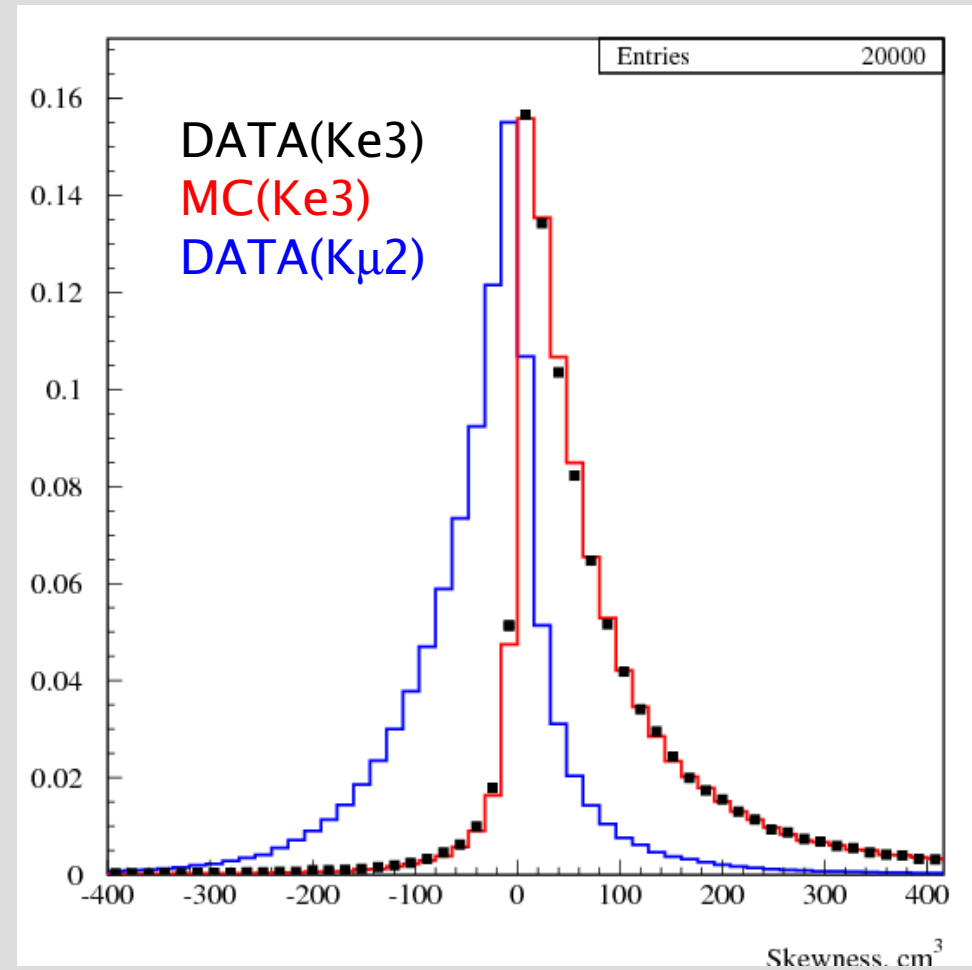
Cluster direction & impact point position

- New definition of cluster depth



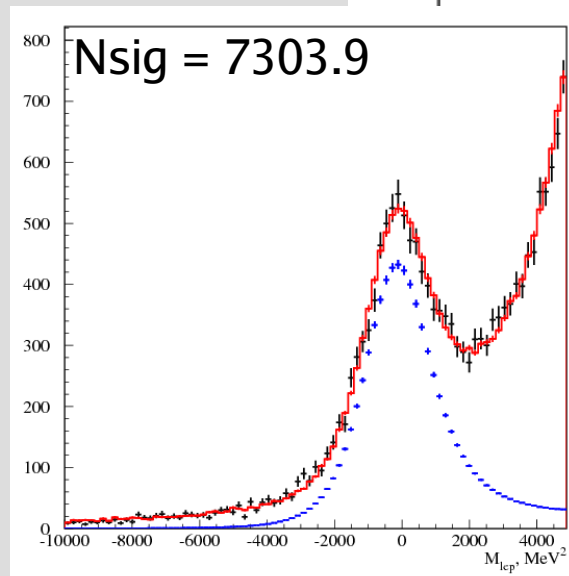
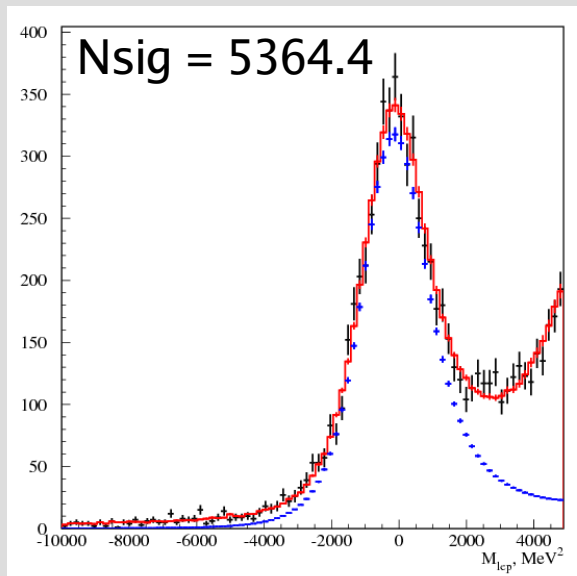
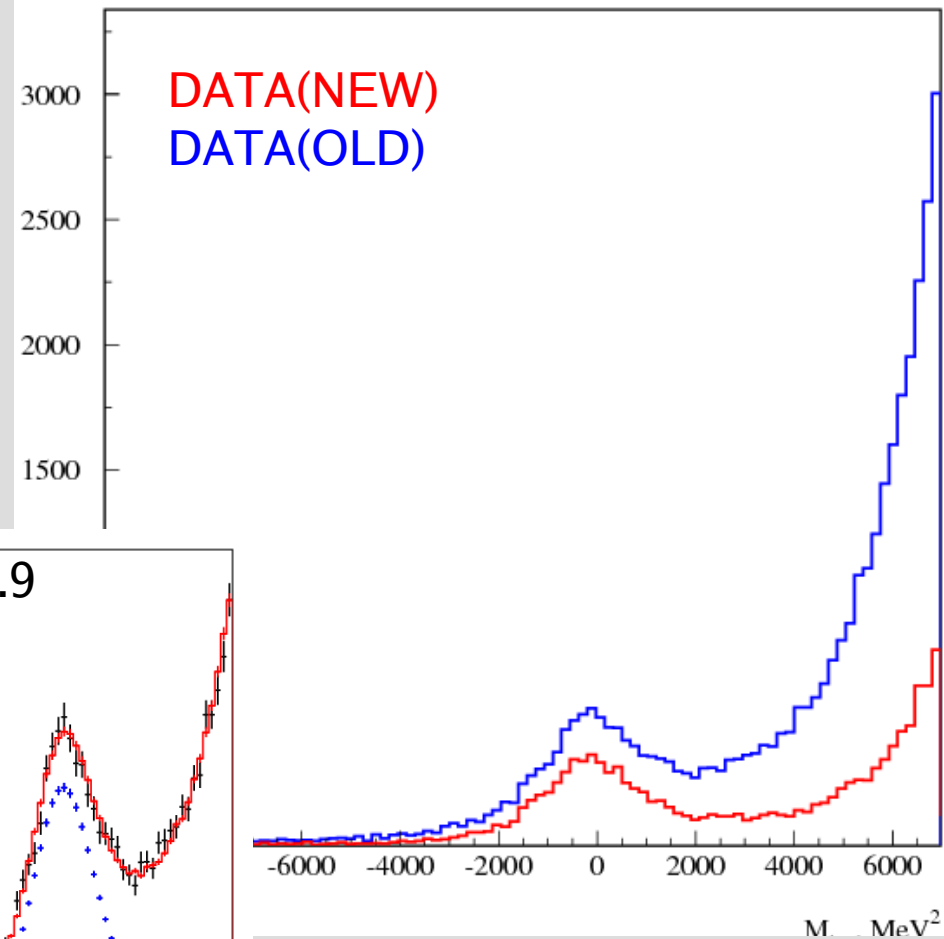
New variables

- All variables benefits from new procedure
- Skewness brings additional separation



Effect

Selection still to be tuned:
factor 3 more rejection
can be obtained, paying
25% on efficiency

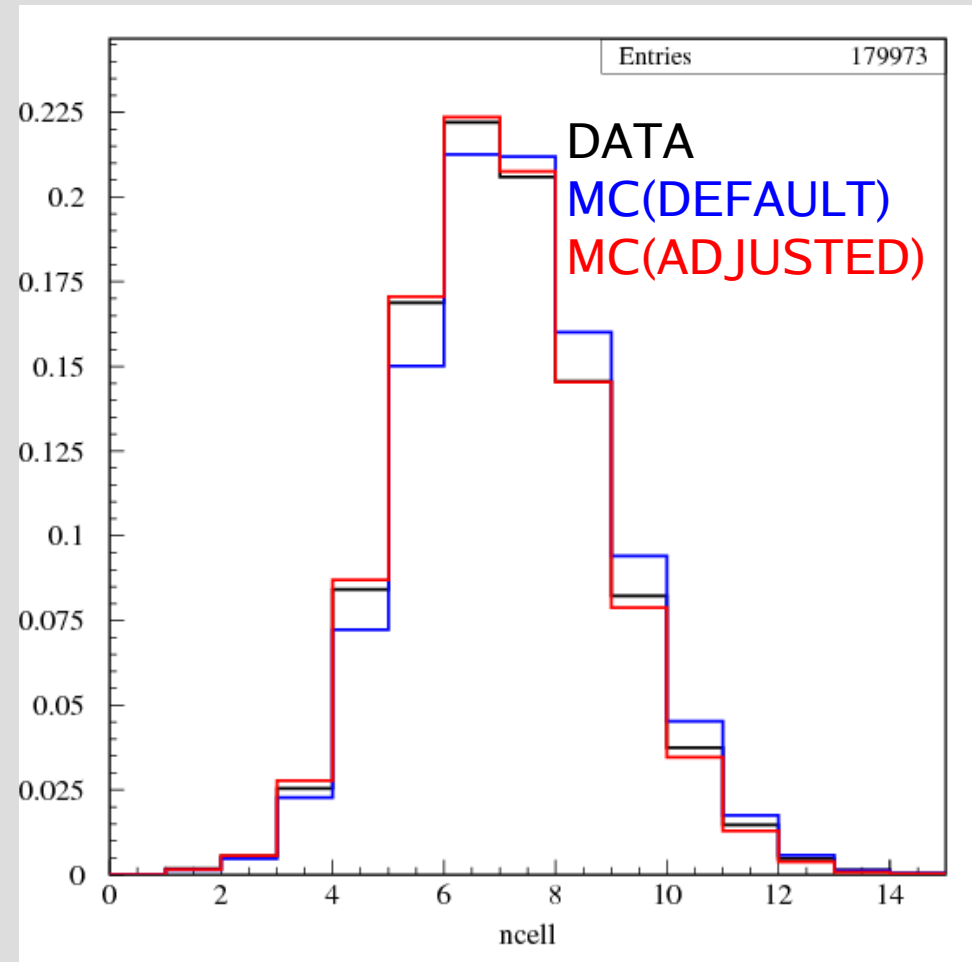


The way to the 1% accuracy: systematic error

- Dominated by PID selection efficiency
 - Adjusting MC response to data
 - Energy scale
 - Threshold
 - Energy response saturation
 - Control samples
 - Increased statistics for Ke3 CS
 - Trying to use Bhabha events
 - Ke3 from charged kaons

Threshold

- Cell energy from MC distribution shows an excess wrt data at low energy
- $\langle \# \text{ of cell} \rangle$ from MC slightly higher wrt data
- Apply additional threshold at 0.8 pe



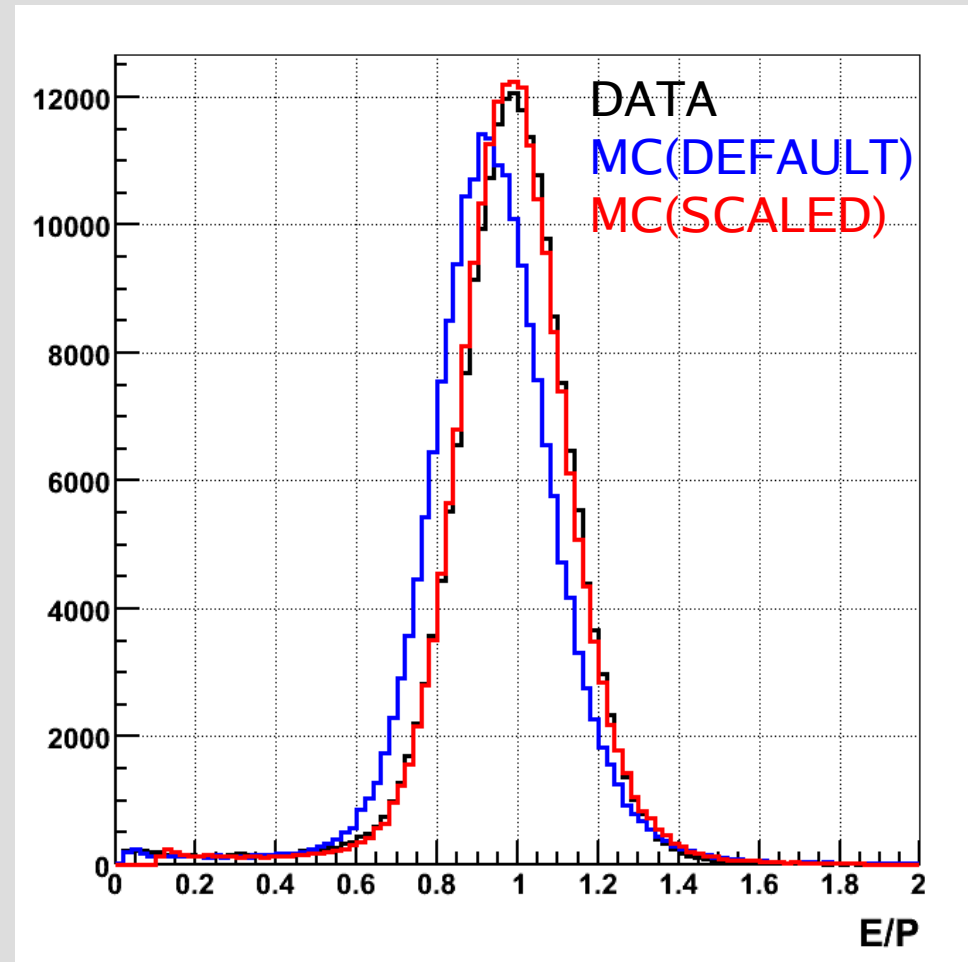
Energy scale and resolution

- Resolution in MC worse than in data
- Scale almost OK
- Rescale MC cell energies using E_{tru}

democratically:

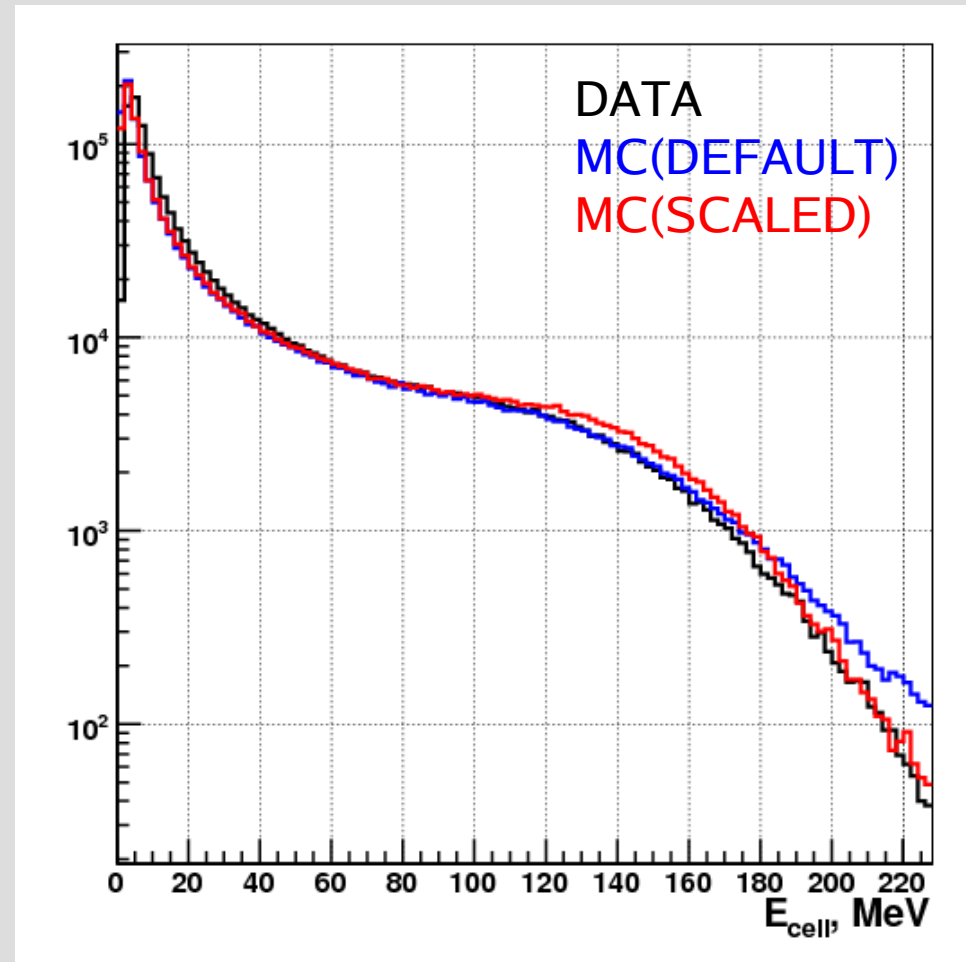
$$E_i^{\text{new}} = E_i a + E_i (1-a) \frac{P}{\sum E_i}$$

$a = 0.92$



Saturation ?

- E_{Cell} distribution from MC has a longer tail wrt data
- Hints of saturation?
 - Physics (Mario)
 - PMT (Alex, Tom)
- Practically:
 - Apply saturation with Fermi-Dirac
 - New scale ~ 1.15 : almost able to recover e/μ energy response ratio



Conclusion

- New analysis chain is ready
- Refined kinematic cuts
- Improvement in particle ID:
 - New cluster depth
 - Skewness
 - Threshold refinement
 - Cell calibration
- Almost ready to finalize, hope to do so for late winter conferences