A FIRST CHECK OF THE ECAL DATA JULY 08 FNAL

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OUTLINE

- Data List in this analysis
- Reconstruction
- Electron selection
- Response
- Energy resolution
- Longitudinal Profile
- Conclusion

DATA LIST

- Trigger : 20x20

CALIBRATION RUNS

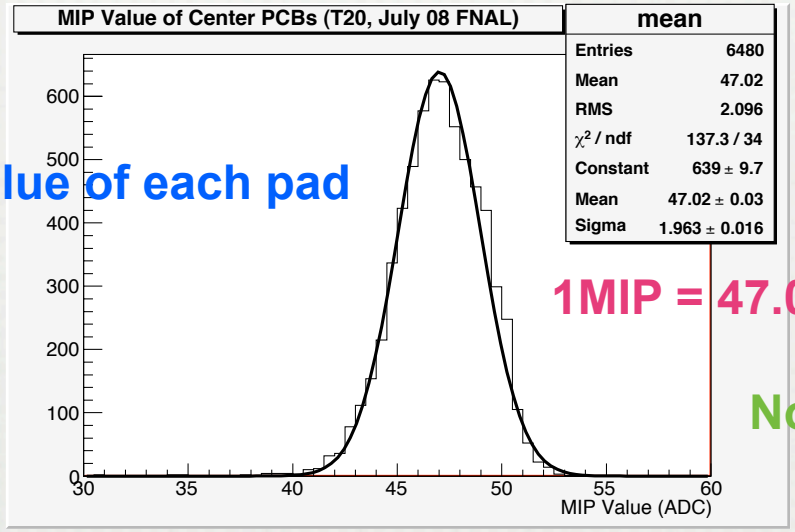
		Run Number	Nevent
muon	32GeV	500518, 500529, 500531, 500532	207k

ELECTRON RUNS

		Run Number	Nevent After Reconstruction
e-	1GeV	500541, 500542, 500550	207k
	2GeV	500551, 500552	177k
	4GeV	500553, 500555, 500556, 500558	171k
	6GeV	500561	150k
	8GeV	500572, 500573	126k
	12GeV	500612	183k
	20GeV	500630, 500631	196k
e+	1GeV	500574, 500575	85k
	2GeV	500593	114k
	4GeV	500594	118k
	6GeV	500596	107k
	8GeV	500597, 500599, 500602, 500604	226k
	12GeV	500605, 500606, 500608, 500609	267k
	20GeV	500627, 500628, 500629	257k

RECONSTRUCTION

- Reconstruction Software: calice_reco v04-06-mc02
- ADC->MIP calibration : using the constants of 2006 CERN
  - MIP Value of 20x20 July 2008 FNAL: (Not applied yet...)



MIP value of each pad

1MIP = 47.02+-0.03 ADC

Note: for 2006, 1MIP ~ 26 ADC

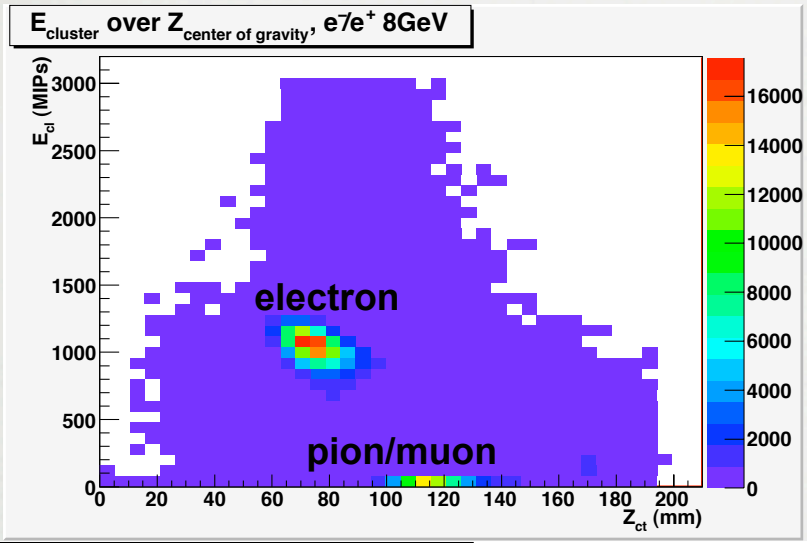
- Energy Sampling Structure Correction:
  - Only weights of 3 sets of layers are considered. No precise sampling factors are considered yet. Going to do that next steps. (maybe..)

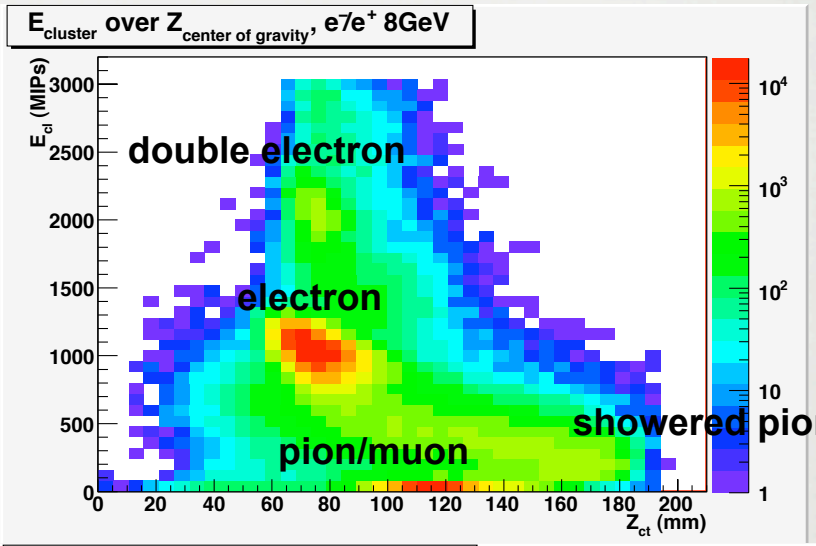
$$E_{\mathrm{raw}} = \sum_{i=0}^{i=9} E_i + 2 \sum_{i=10}^{i=19} E_i + 3 \sum_{i=20}^{i=29} E_i,$$

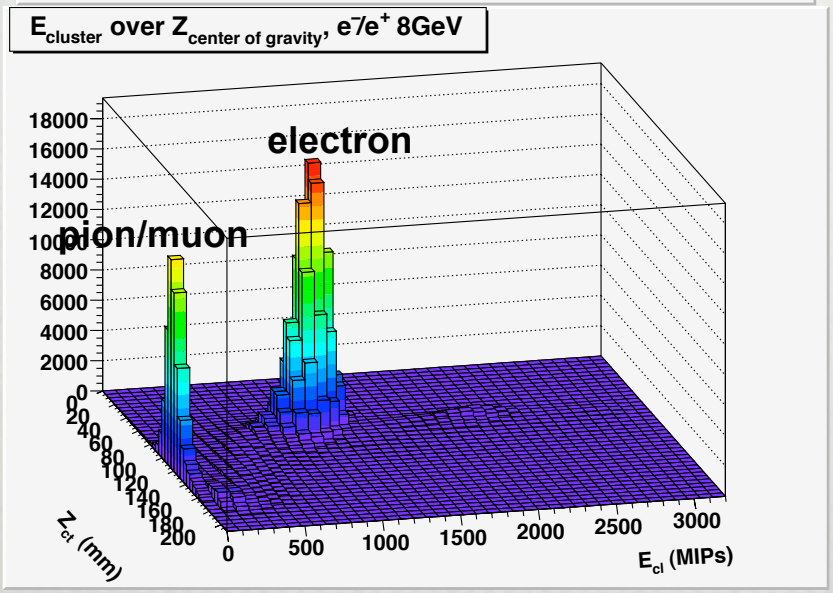
- Center of Gravity and Cluster Inertia were calculated.

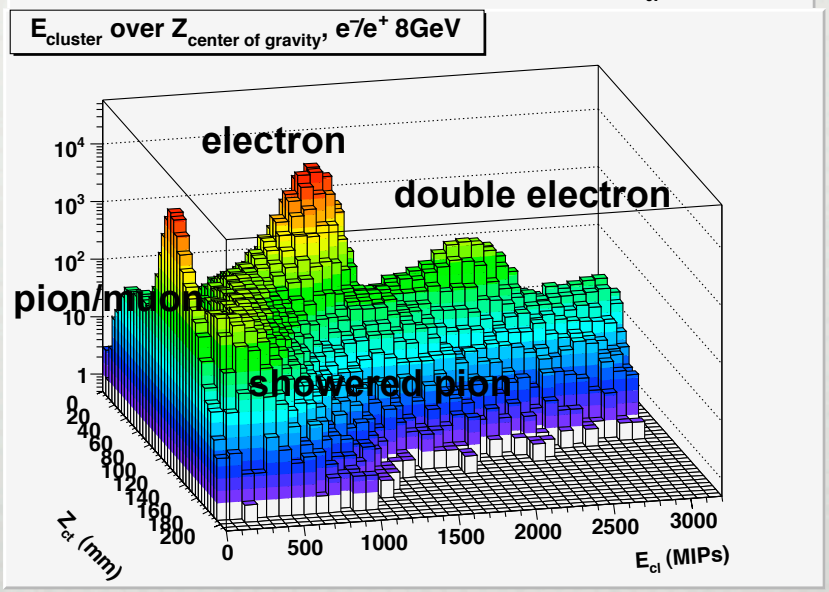
ELECTRON SELECTION

- Cluster Energy over Center of Gravity Z: 8GeV e-/e+ as an example



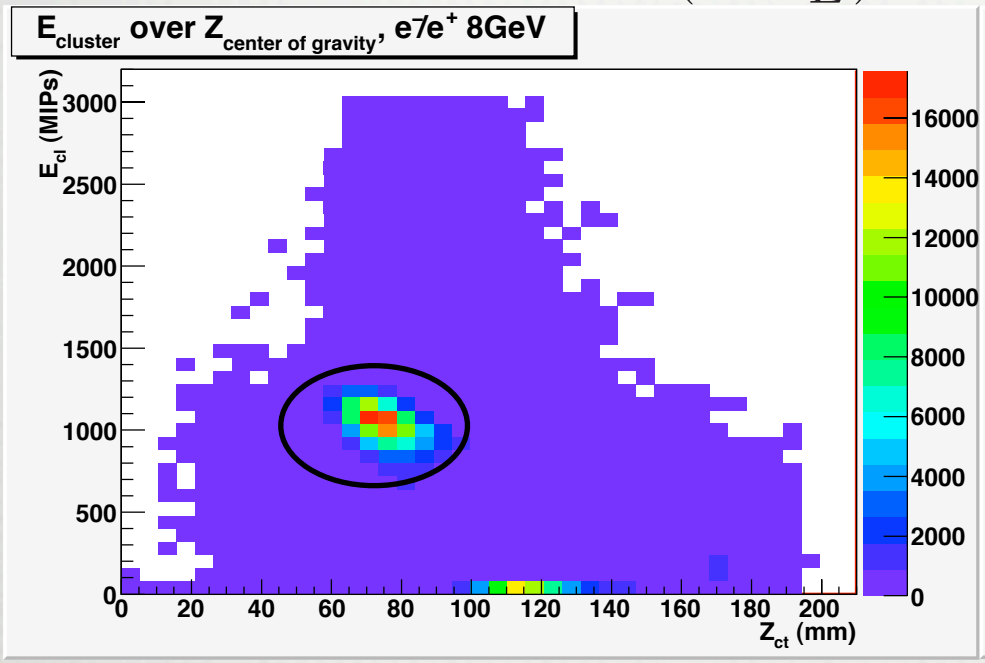


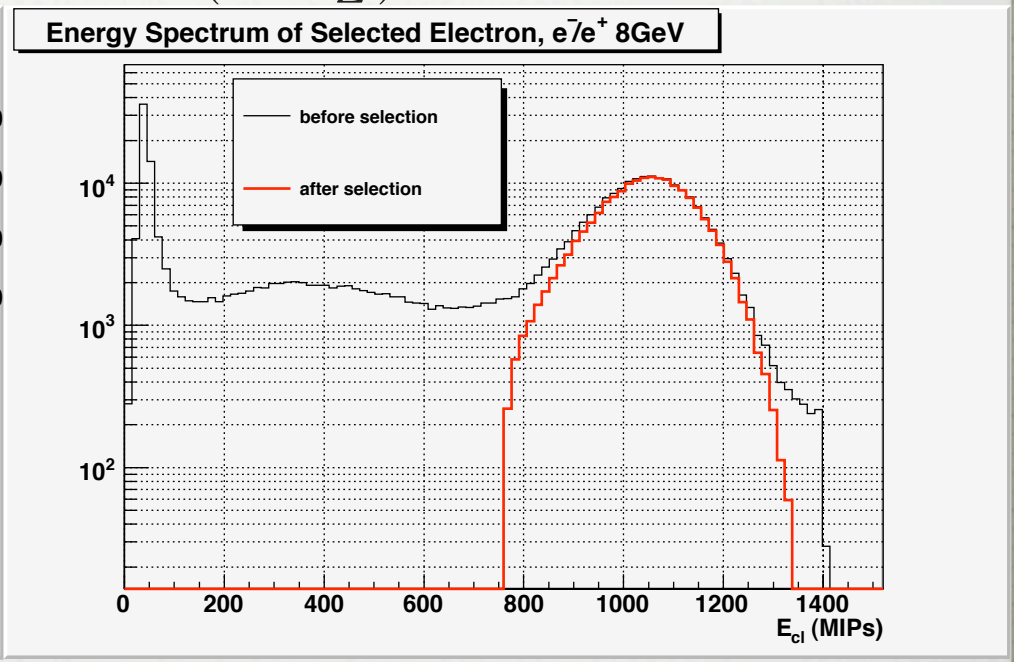




ELECTRON SELECTION

- Define Ellipse: $\frac{(E_{cl}-E_{mean})^2}{(3\times\sigma_E)^2}+\frac{(Z_{cg}-Z_{mean})^2}{(3\times\sigma_Z)^2}<1$



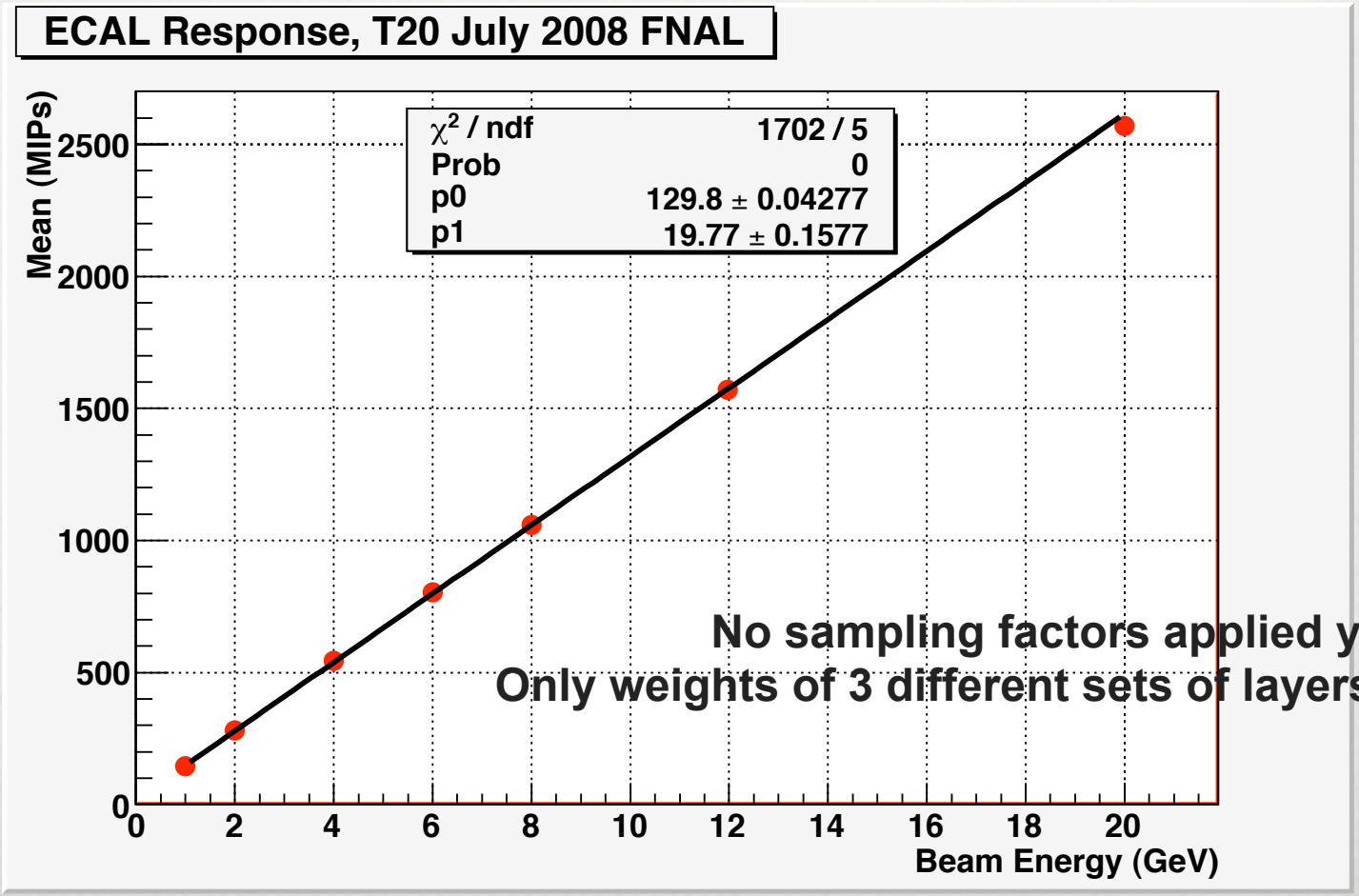


- Fitting Results:

	Before selection	After Selection
E mean (MIPs)	1051.37	1054.36
E sigma (MIPs)	96.59	93.64

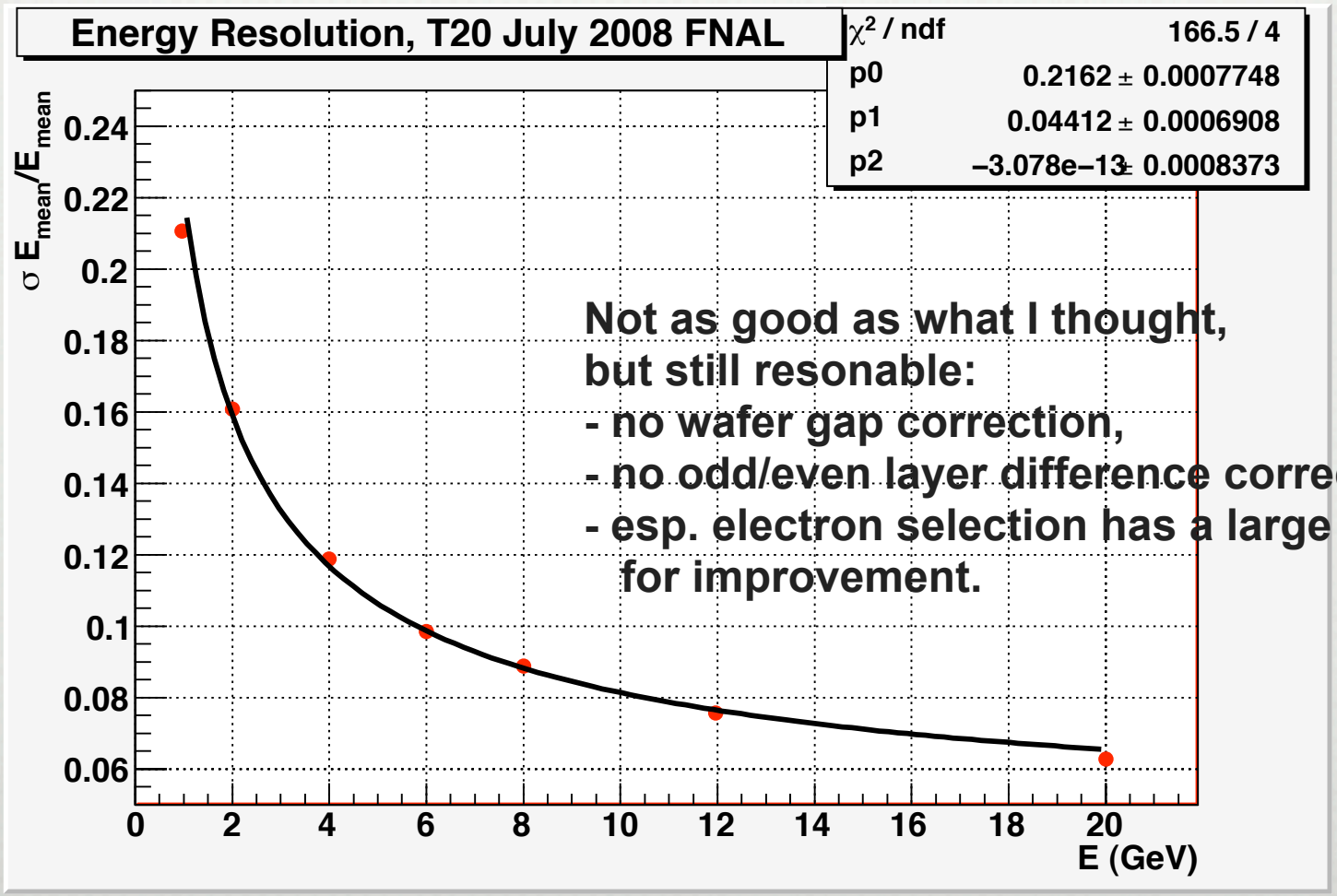
RESPONSE

- Fit Result: $E_{mean}(MIP) = 129.8 E_{beam}(GeV) + 19.77$



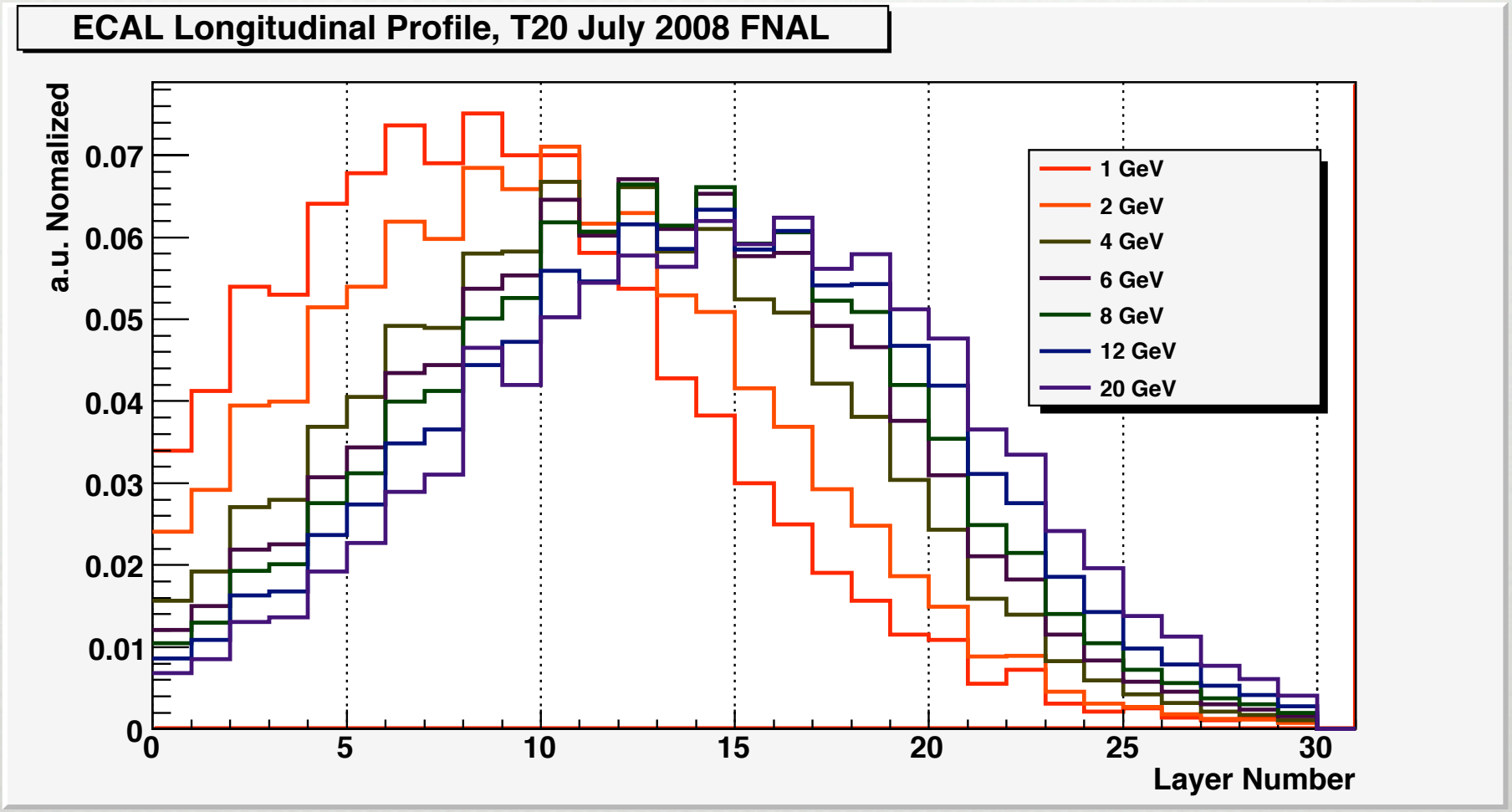
RESOLUTION

- Fit Result: $\frac{\sigma E_{mean}}{E_{mean}} = \frac{21.62\%}{\sqrt{E_{beam}}} \oplus 4.412\%$



LONGITUDINAL PROFILE

- Note: difference between odd / even layer number: due to the different positions of odd/even active layers within one slab.



CONCLUSION

- 20x20 trigger works well for ECAL
- MIP calibration constants: need to be applied in reconstruction
- Electron selection method was studied, using only ECAL information, without using information of HCAL and cherenkov : Works and seems to be not bad.
- ECAL response and energy resolution are fine: large space for improvement in analysis.
  - sampling factors should be applied: layers of odd/event numbers
  - wafer gaps should be considered
  - electron selection should be refined: lateral profile, cherenkov, HCAL
- Longitudinal Profile is reasonable
- A lot of works are waiting for us!