Electromagnetic showers energy estimation

LAPP – Annecy
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Réunion de groupe 06/04/2012

Reminder : physics performance of current tool to estimate shower energy

- MC electron 4 GeV – scanning efficiency « low »

	Mean E_{REC} (GeV)	RMS (E_{REC} – E_{MC})/E_{MC}	BT in the TS volume		BT in Shower
Strasbourg Meeting	5.2		M:264	RMS:169	745 showers M:83 RMS:40
Reprocessed From AL/SH current OpR(StdQC+MidEff)	5.5 3.7	0.50	Mean 150 146	RMS 80 80	744 showers M:82 RMS:39 M:49 RMS:25
Reproc. From LK with current OpR (StdQC+MidEff)	3.0	0.38	Mean 147	RMS 80	731 showers M:49 RMS:25
Reproc. From AL/SH with «May2011»OpR(StdQC+MidEff)	4.1	0.49	Mean 147	RMS 80	729 showers M:49 RMS:25
Reproc. From LK with «May2011»OpR(xxxQC+xxxEff)	4.1	0.49	Mean 147	RMS 80	729 showers M:49 RMS:25
Reproc.FromLKwith«May2011»OpR+fedra 1265					
Reproc. From LK with current OpR + fedra 1265					

Discrepancy Old tool between 4 GeV electron (nov 2011) & new MC production (jan 2012)

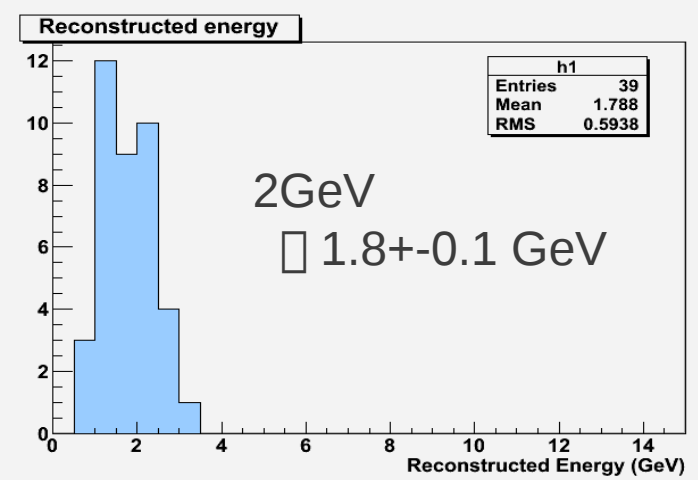
- Aki should use the same routine to reconstruct showers of the TB data as the one implement in OpEmuRec BEING DONE
- Flo is implementing the routine used in Bern data analysis in OpEmuRec BEING DONE
- Flo is checking if the number of plate used to estimate the energy is the same in both the old and the new MC samples. OK

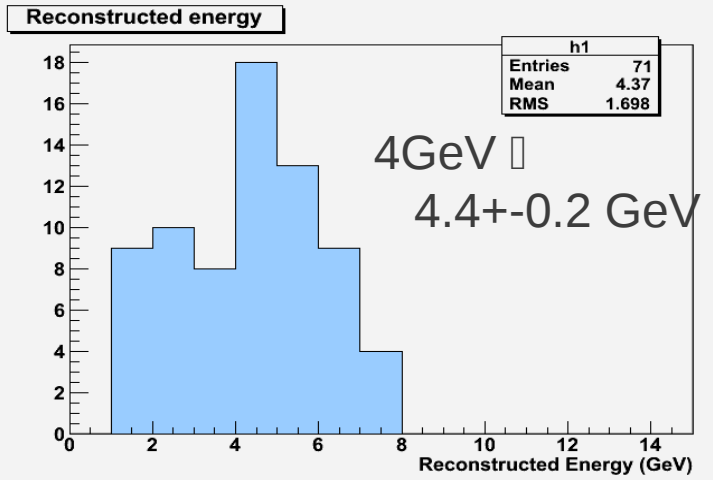
EWG meeting
05/04/2012

Aki

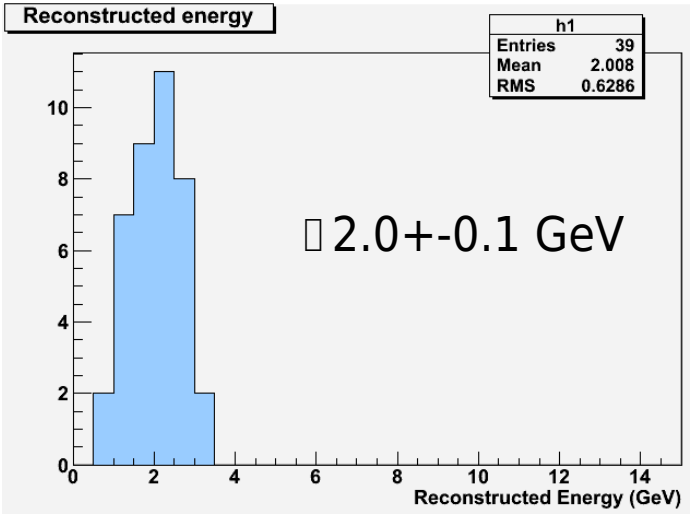
2, 4 GeV TB sample is reprocessed.

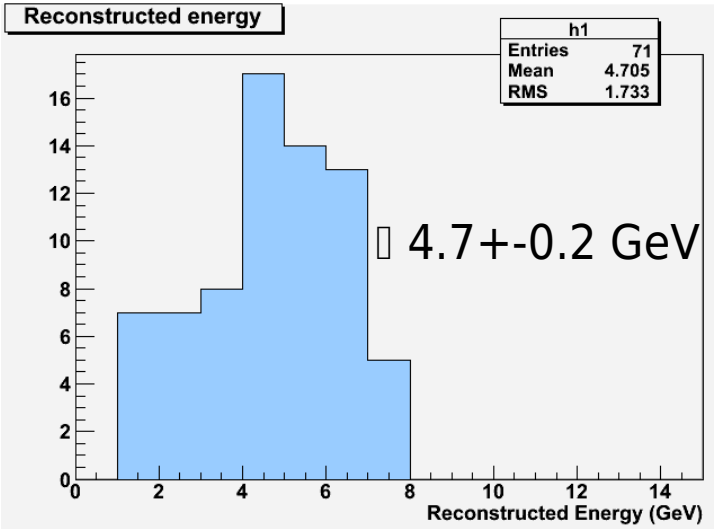
800 micron
20 mrad





700 micron
25 mrad



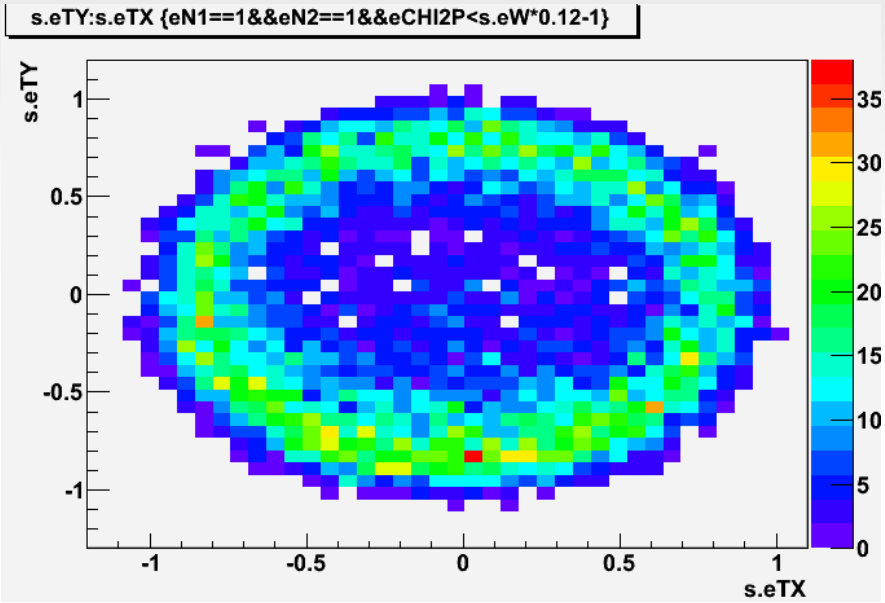


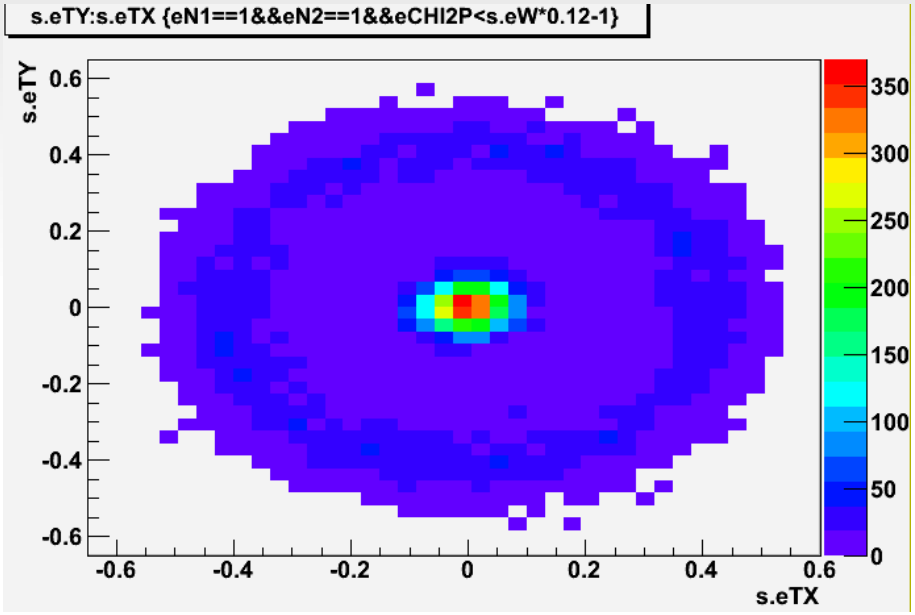
Mean value is ~10% increased.

Aki

Need a quality control

BT density (BG density) depends strongly on the angle and microscopes.





Need quality control BT density angle by angle

OIL (Frascati)

Dry (Bern)

For electron reconstruction, BT density < 15 BT/cm2/(-0.4<θx,y<0.4) is required. = 23BT/cm2/steradian (here tanθ ~= θ). by Frederic.

Aki

Re-computation being done.

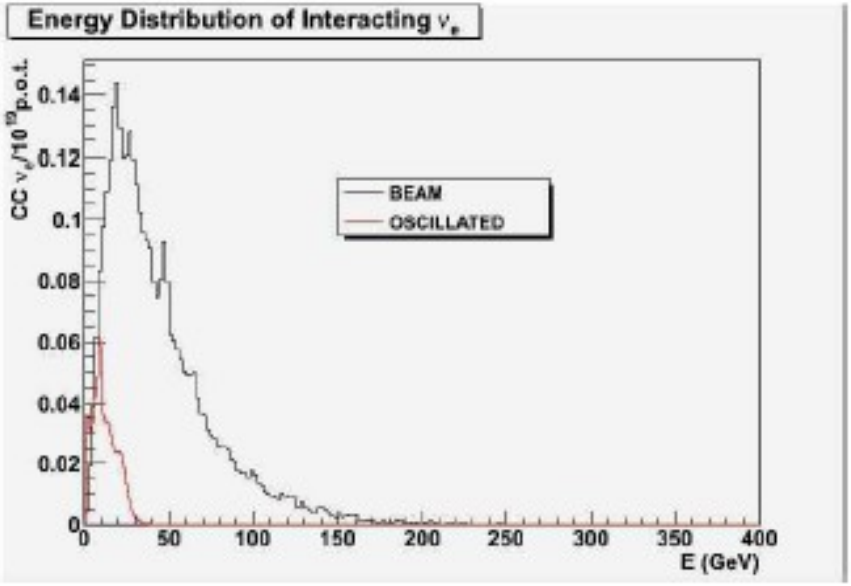
BrickID	Lab	Publication	Volume published	Energy	Error	E 2011	Eerr 2011
96038	Bern	5000000029161524	38-57	6.95	3.07	7.36	2.51
142415	Bern	5000000027460061	7-30			4.81	1.52
98472	Bern	5000000026420151	39-57	2.30	1.16	1.73	0.83
112293	Bern		41-57	5.21	2.82		
40009	Napoli	6000010000028441	24-50			11.4	2.17
48483	Napoli	6000010000044777	34-57	2.27	1.63	1.94	1.27
84000	Napoli		not published but data available				
154798	Napoli	6000010000055390	45-57	1.79	1.29	1.04	0.72
5538	Bologna	7000000023030082	download failed				
30202	Bologna	not published	not published				
93347	LNF	12000000000001024	27-57 done	17.3	27.1 ?	12.9	0.2

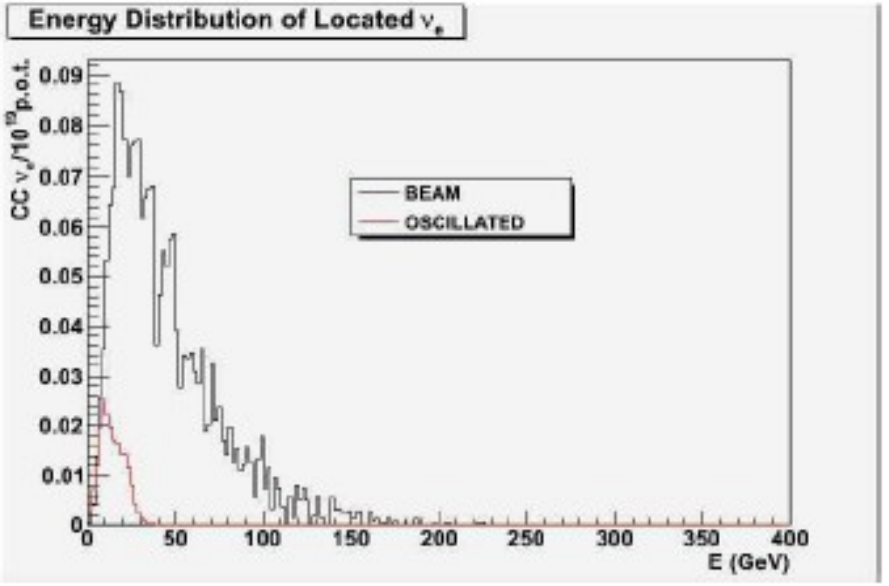
This time ago

Some time

Matteo

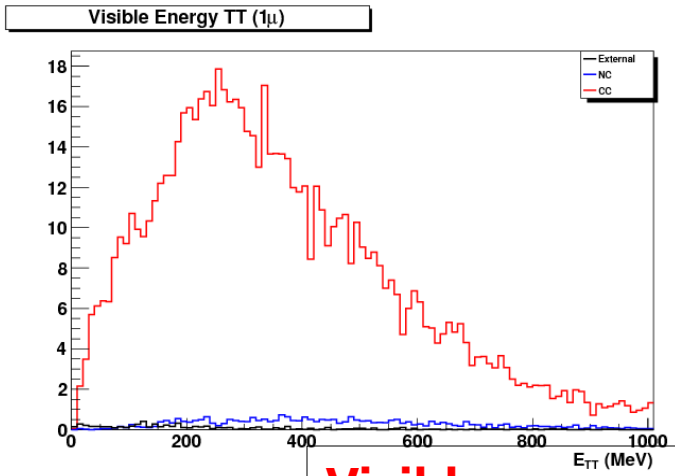
ν_e Location Efficiency

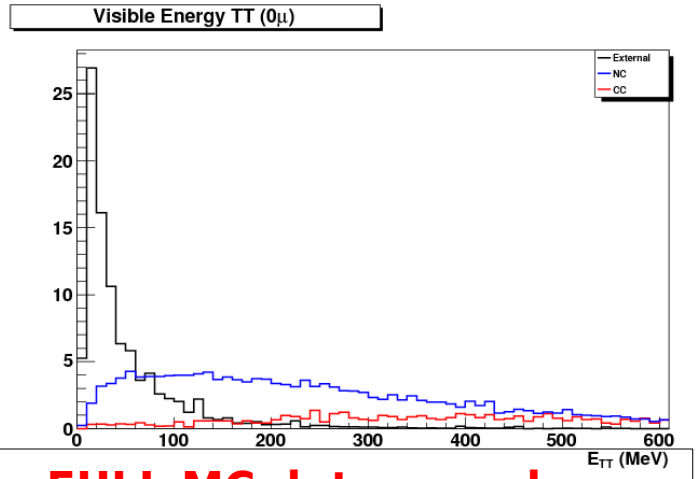




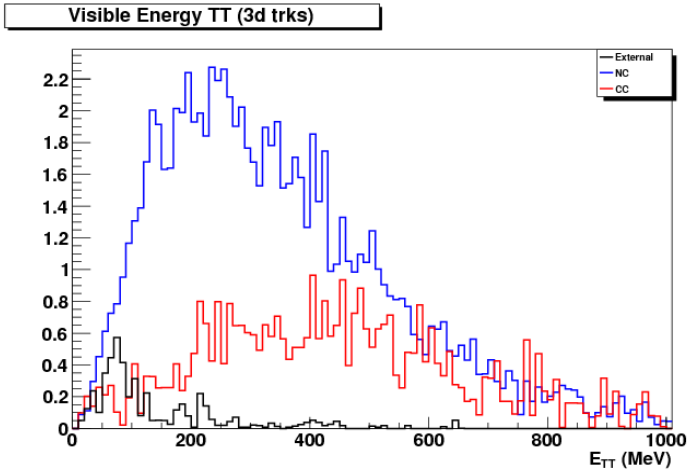
Interacting beam ν_e events (10^{19} p.o.t.): 6.88
Interacting osc ν_e events (10^{19} p.o.t.): 0.837

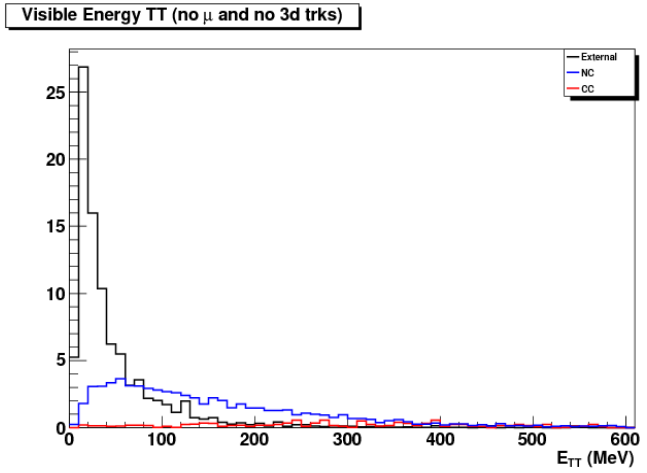
Located beam ν_e events (10^{19} p.o.t.): 4.12
Located osc ν_e events (10^{19} p.o.t.): 0.403



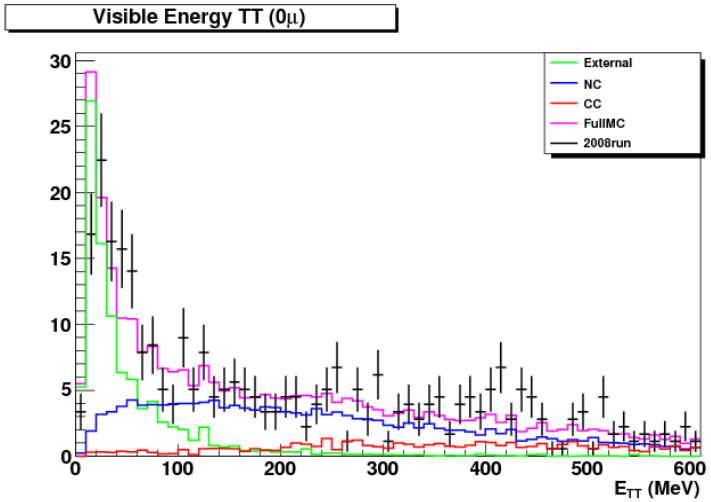


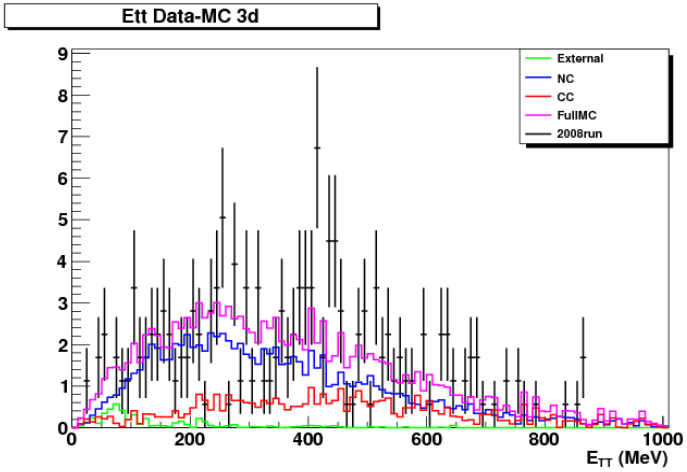
Visible energy in TT for FULL MC data sample

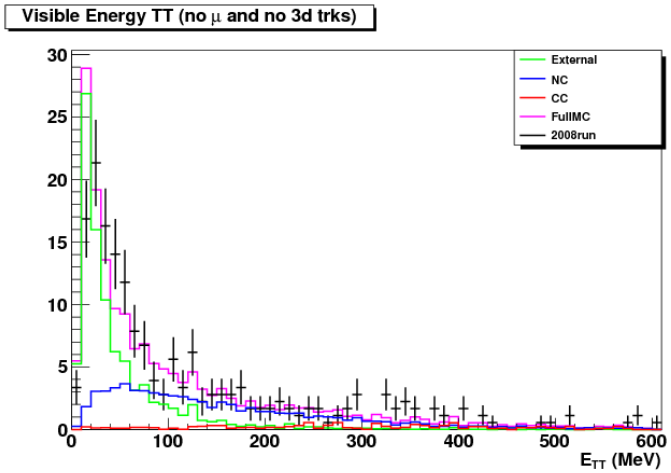




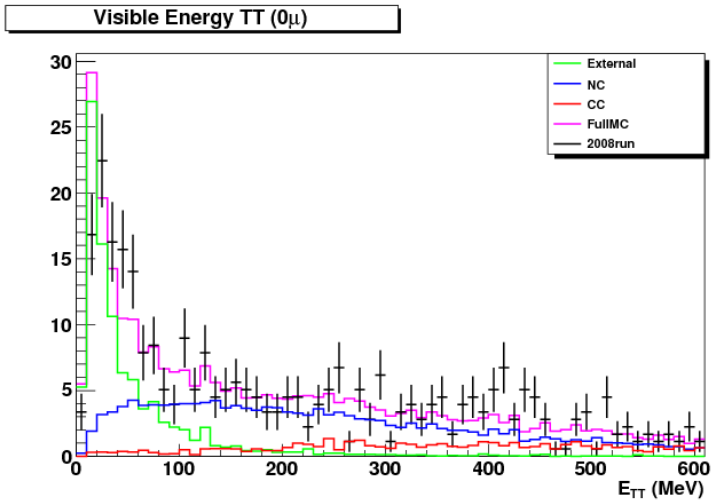
Umut

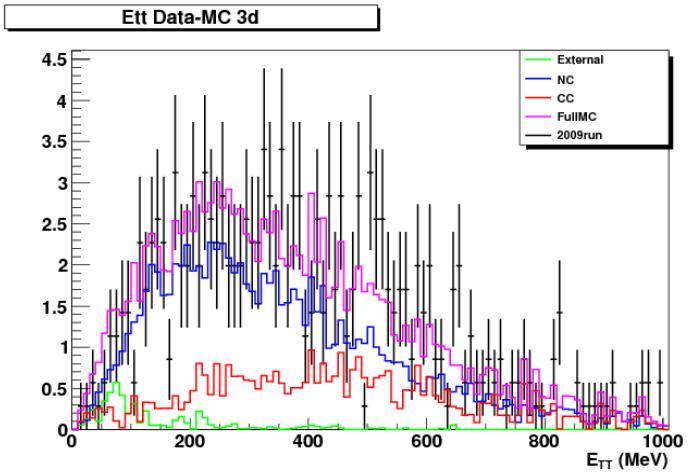

Visible Energy TT (0μ)
External
NC
CC
FullMC
2008run
E_{TT} (MeV)

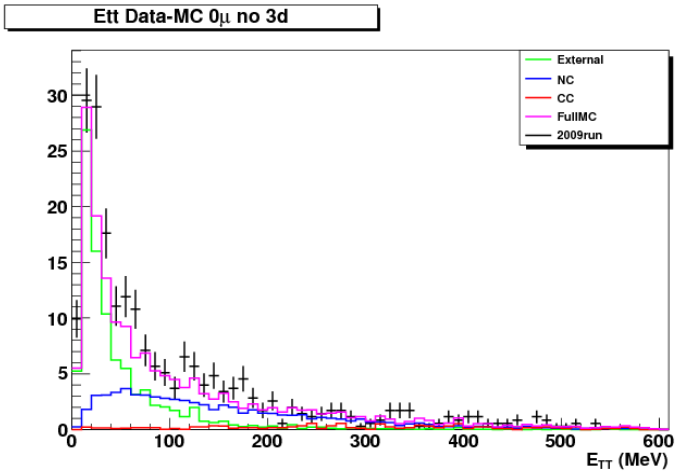

Ett Data-MC 3d
External
NC
CC
FullMC
2008run
E_{TT} (MeV)


Visible Energy TT (no μ and no 3d trks)
External
NC
CC
FullMC
2008run
E_{TT} (MeV)

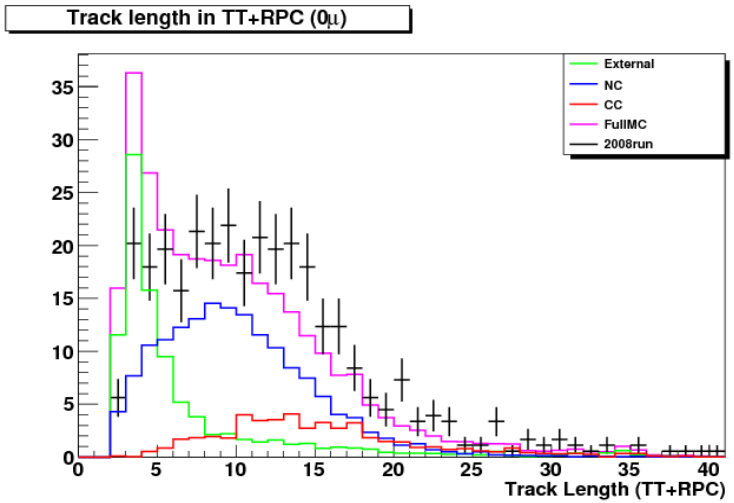
Umut

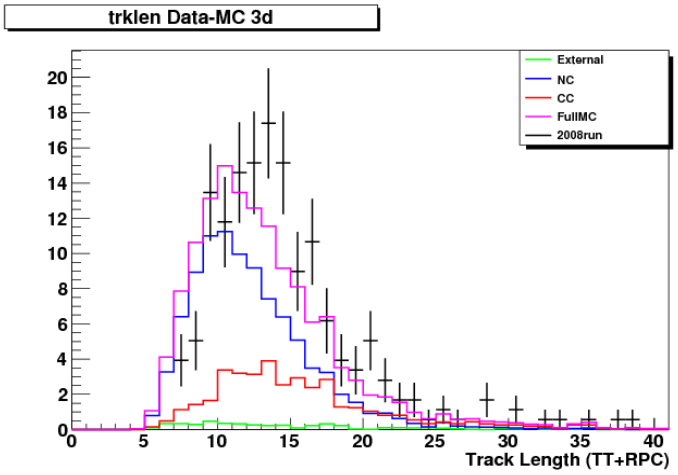

Visible Energy TT (0μ)
External
NC
CC
FullMC
2008run
E_{TT} (MeV)

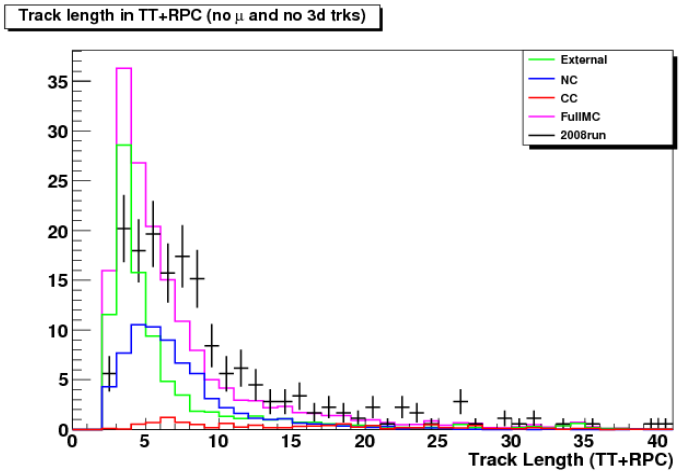

Ett Data-MC 3d
External
NC
CC
FullMC
2009run
E_{TT} (MeV)


Ett Data-MC 0μ no 3d
External
NC
CC
FullMC
2009run
E_{TT} (MeV)

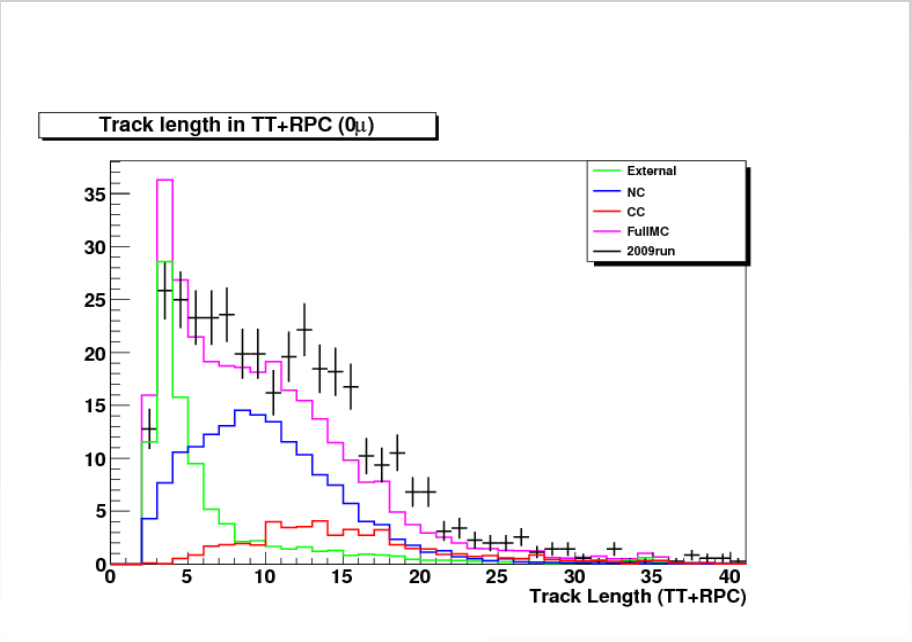
Umut

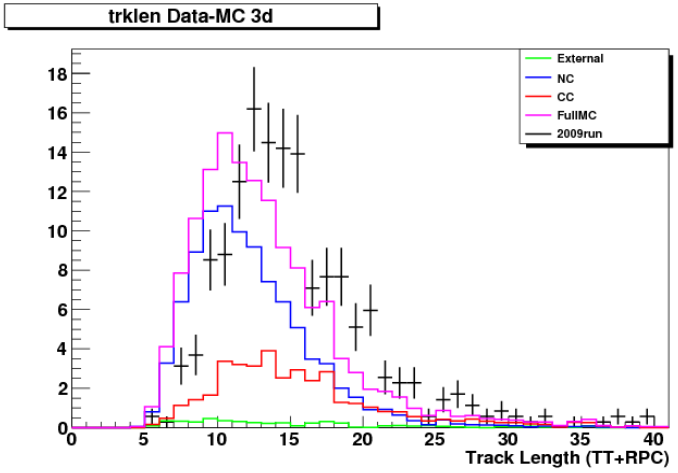

Track length in TT+RPC (0μ)
External
NC
CC
FullMC
2008run
Track Length (TT+RPC)

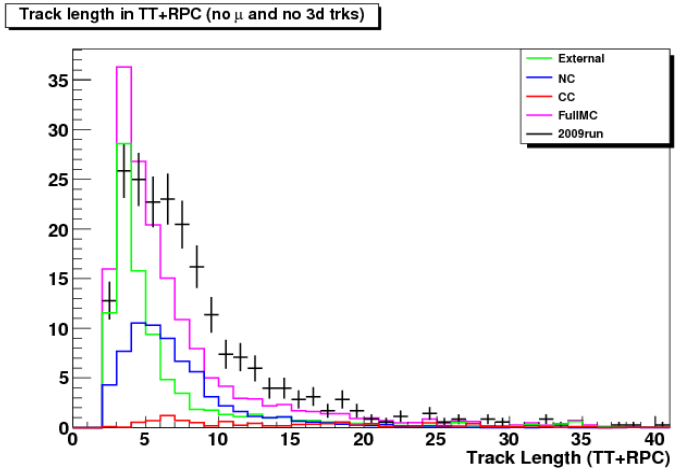

trklen Data-MC 3d
External
NC
CC
FullMC
2008run
Track Length (TT+RPC)


Track length in TT+RPC (no μ and no 3d trks)
External
NC
CC
FullMC
2008run
Track Length (TT+RPC)

Umut


Track length in TT+RPC (0μ)
External
NC
CC
FullMC
2009run
Track Length (TT+RPC)


trklen Data-MC 3d
External
NC
CC
FullMC
2009run
Track Length (TT+RPC)


Track length in TT+RPC (no μ and no 3d trks)
External
NC
CC
FullMC
2009run
Track Length (TT+RPC)

Outlook

1/ Electron Energy estimation

a/ solve the discrepancy between old and new energy estimation of 2 differents MC sample

b/ build a new tool to estimate the energy of showers

→ check/tune my functions for single showers

c/ Calibration of shower tool with electron data

→ MC sample in the same conditions to be analyzed

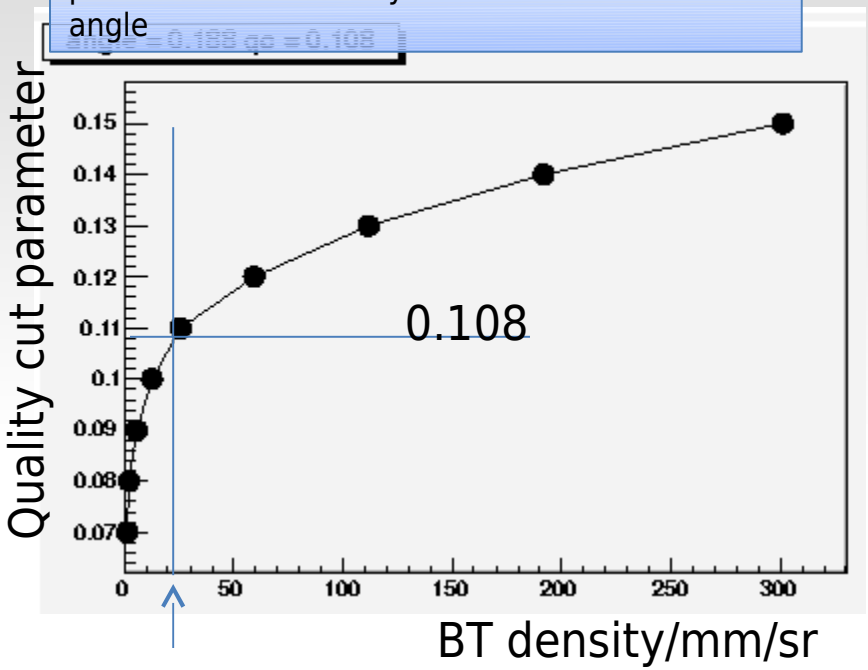
d/ production of new MC sample for building a new energy tool

→ 40k remaing events

Backup slides

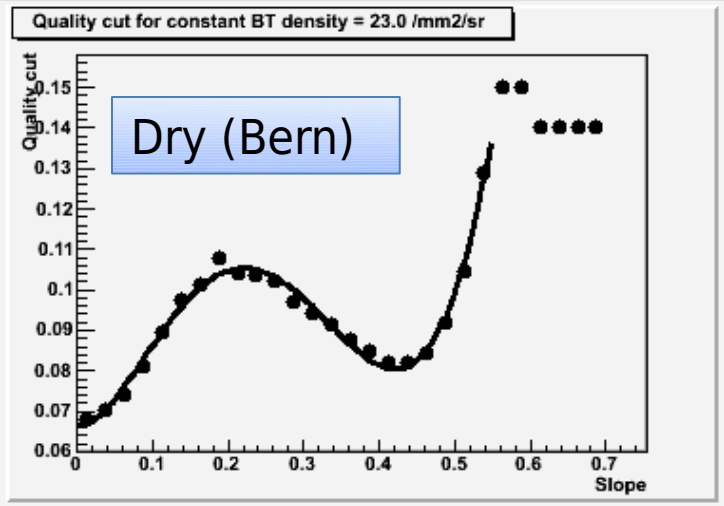
Find quality cut param for constant BT density

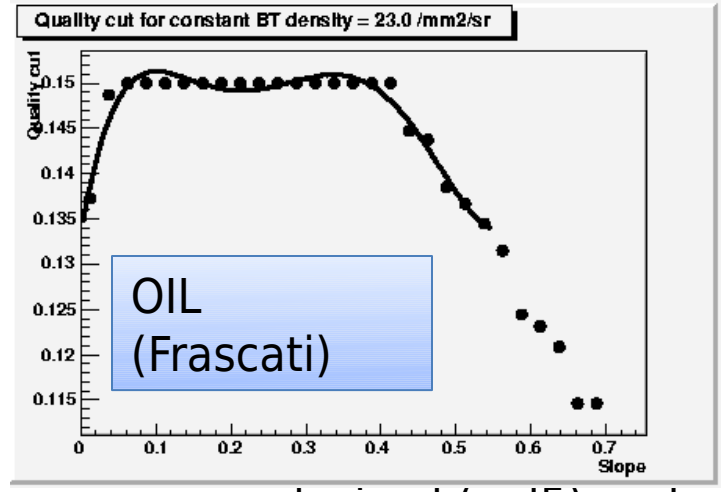
parameter – BT density relation in a certain angle



For each angle, find a quality cut parameter corresponds BT density = 23/mm/sr

chosen parameter and angle relation in a cp file.



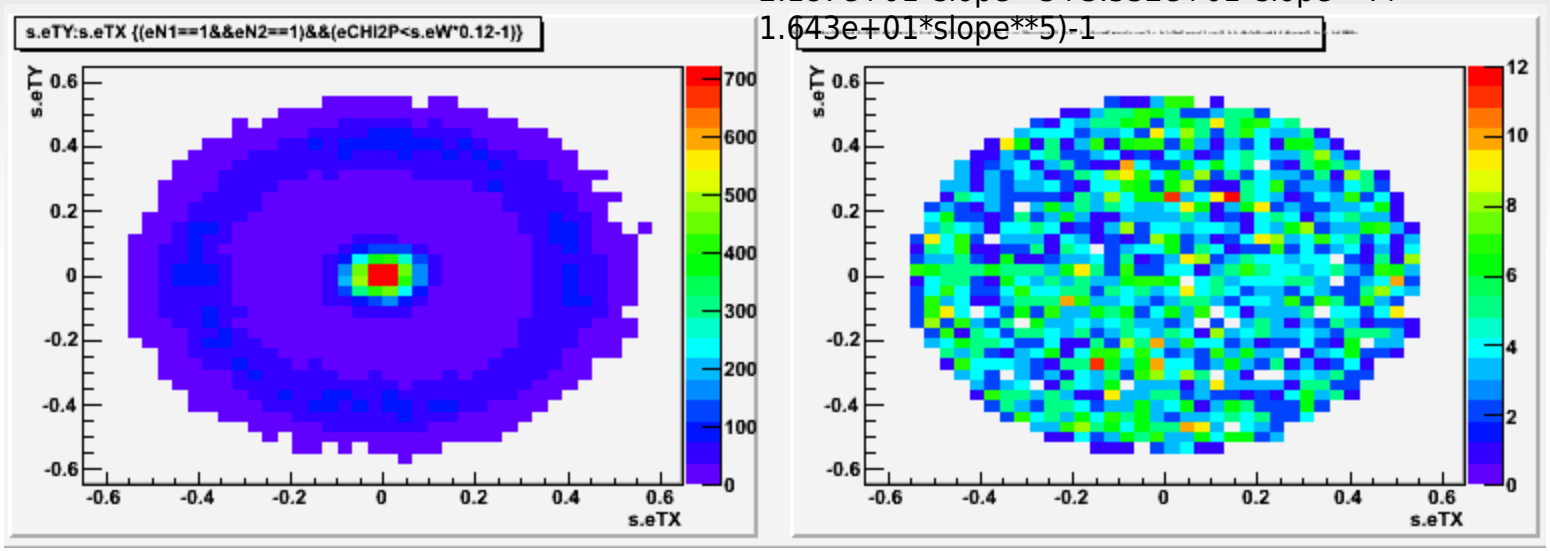


cuts are parameterized (pol5) and **written in par file.**

BT angular distribution

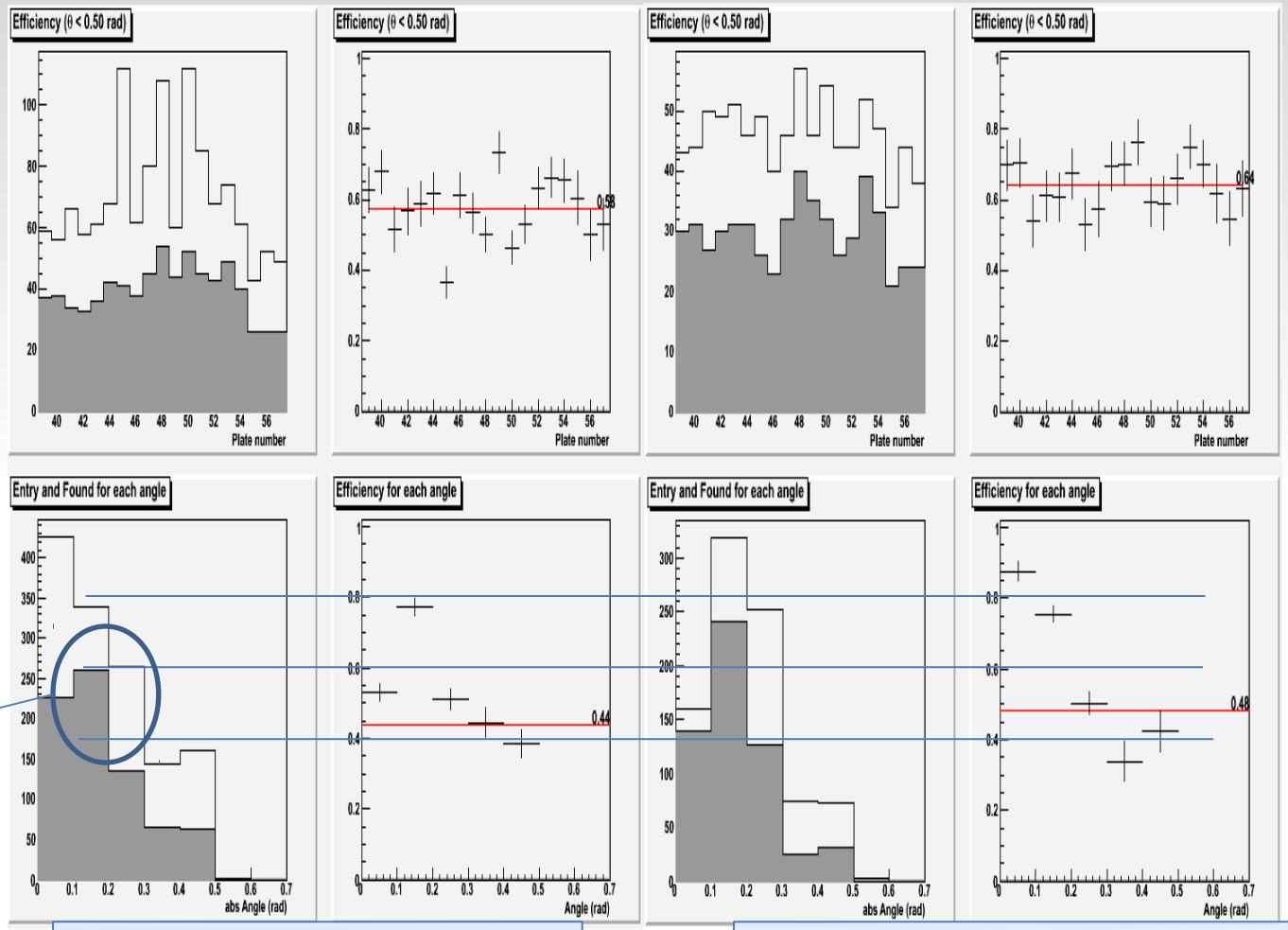
Standard Cut
eCHI2P<s.eW*0.12-1

Constant BT Cut
ex) eCHI2P<s.eW*(6.868e-02+-1.242e-01*slope+4.518e+00*slope**2+-2.187e+01*slope**3+3.532e+01*slope**4+-1.643e+01*slope**5)-1



BT angular distribution is flat, as expected.

Efficiency



efficiency is wrongly calculated by fake tracks

Standard cuts
eCHI2P<s.eW***0.12**-1

after QC (BT deinsity = 23/mm/sr)
eCHI2P<s.eW***F(θ)***-1

minor decrease of efficiency