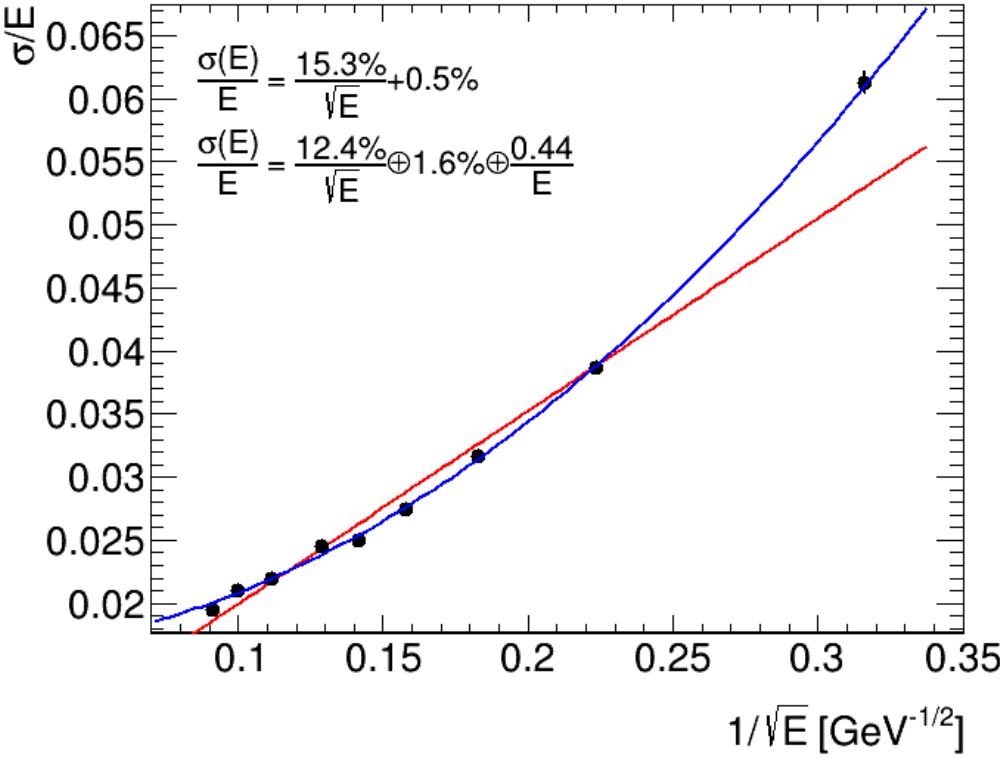
# Preliminary work towards study of calo resolution

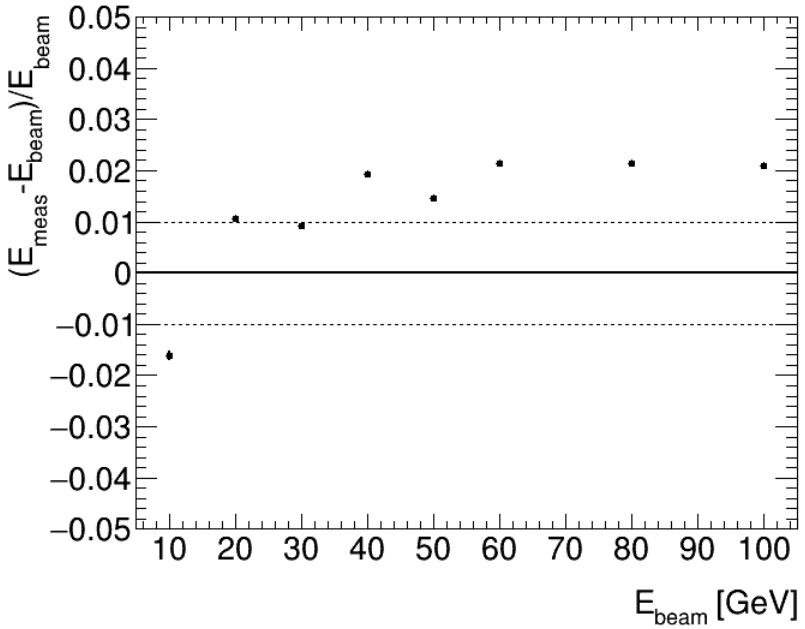
Giacomo Polesello

# Out of the box, Iacopo's production

```
double SPMTraw=evt->SPMTenergy;
double CPMTraw=evt->CPMTenergy;
double SSiPMraw=evt->totSiPMSene;
double CSiPMraw=evt->totSiPMCene;

totallr->Fill((0.5*(CSiPMraw+CPMTraw)+0.5*(SSiPMraw+SPMTraw)));
```

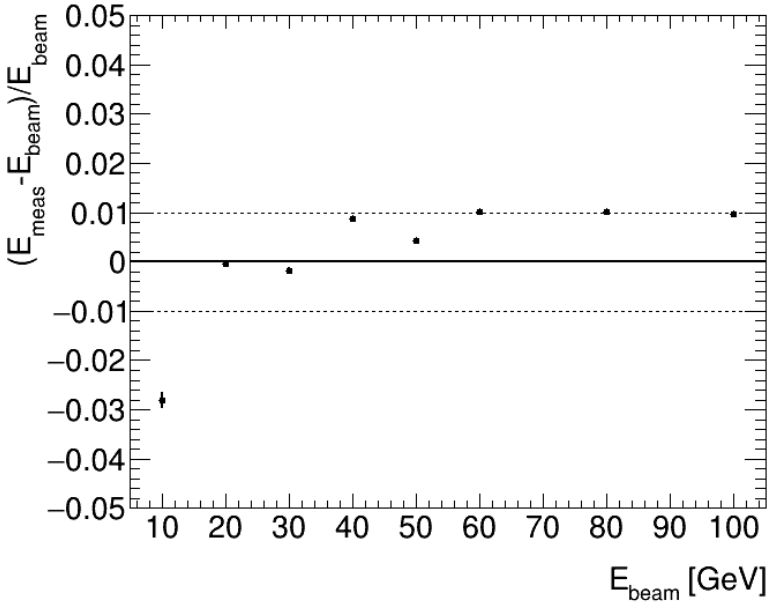


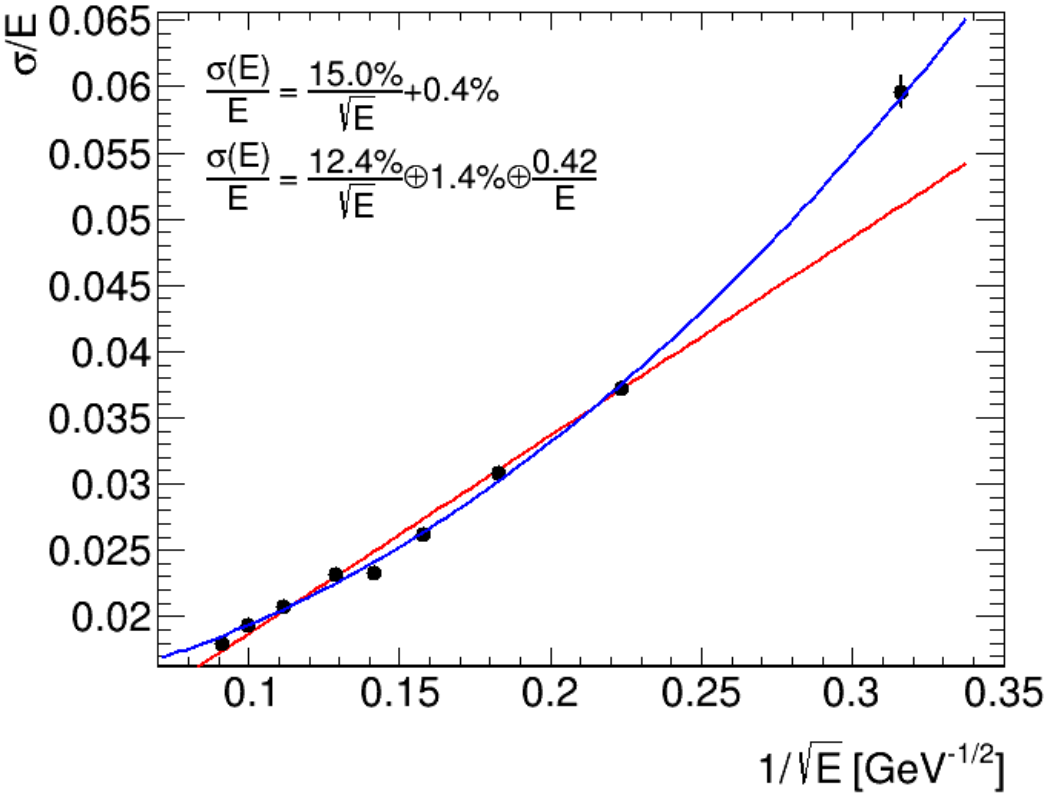



# Try to improve:

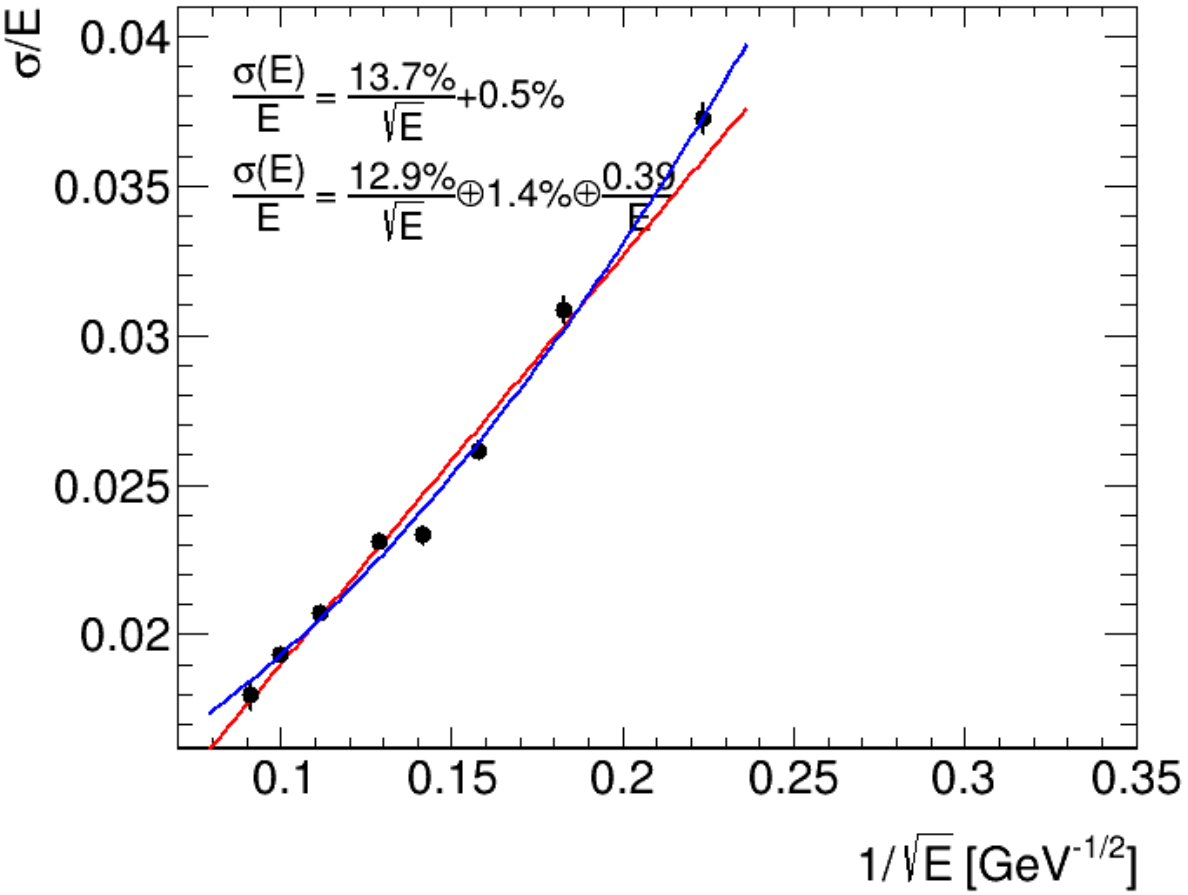
- Set an electron definition for beam
- Set a beam fiducial
- For a 20 GeV positron set the energy which should be measured in the central cell and in the sum of external cells corresponding to this fiducial
- Scale the average of the total energy measured in the central cell and in the sum of PMT cells to the values of previous bullet for both scintillator and  Cerenkov, obtaining 4 scale factors.
- Scale to 20 GeV to correct for leakage, obtaining an additional scale factor.
- Use the 5 obtained scale factors to calculate energy and resolution for all the energies

# Results

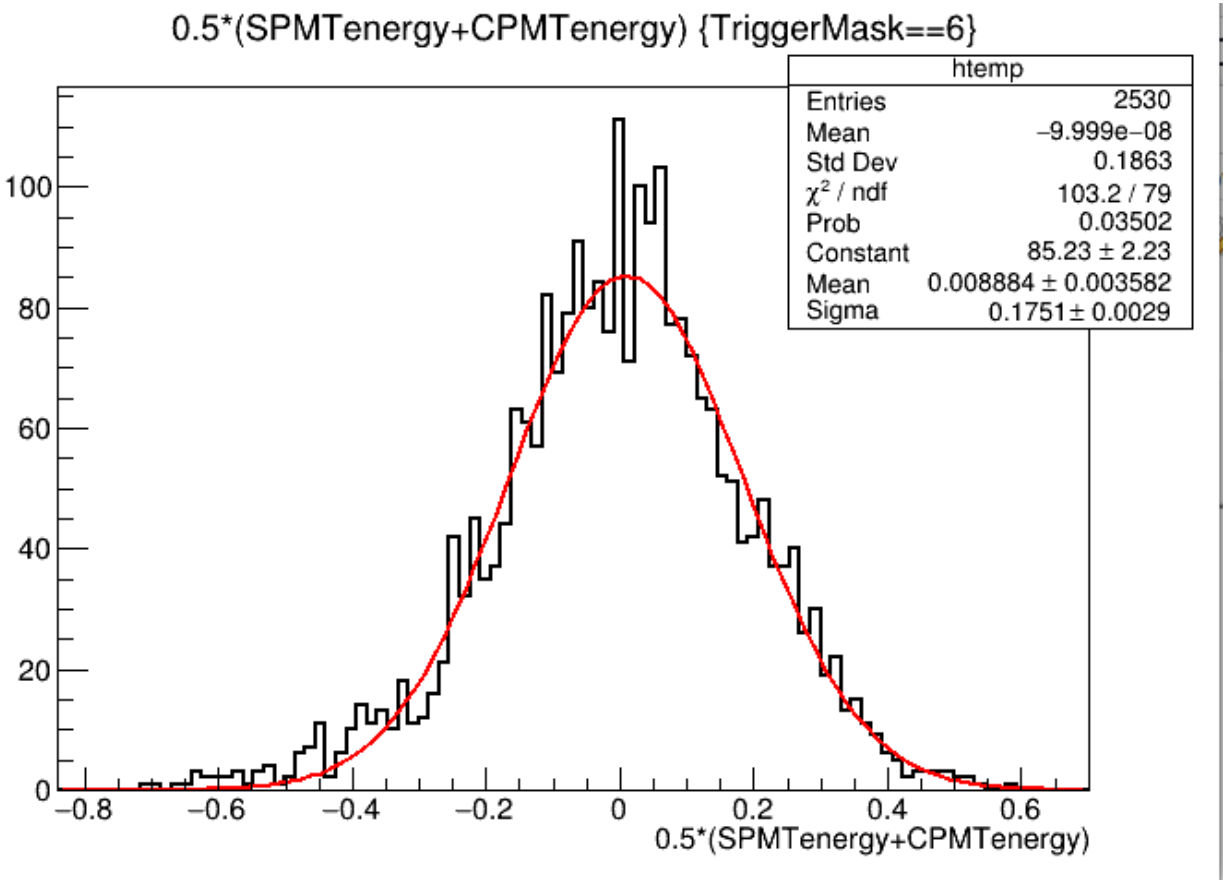

$(E_{meas}-E_{beam})/E_{beam}$
0.05
0.04
0.03
0.02
0.01
0
−0.01
−0.02
−0.03
−0.04
−0.05
10
20
30
40
50
60
70
80
90
100
$E_{beam}$ [GeV]


σ/E
0.065
0.06
0.055
0.05
0.045
0.04
0.035
0.03
0.025
0.02
$\frac{\sigma(E)}{E} = \frac{15.0\%}{\sqrt{E}} + 0.4\%$
$\frac{\sigma(E)}{E} = \frac{12.4\%}{\sqrt{E}} \oplus 1.4\% \oplus \frac{0.42}{E}$
0.1
0.15
0.2
0.25
0.3
0.35
$1/\sqrt{E}$ [GeV$^{-1/2}$]

# Omitting the 10 GeV point

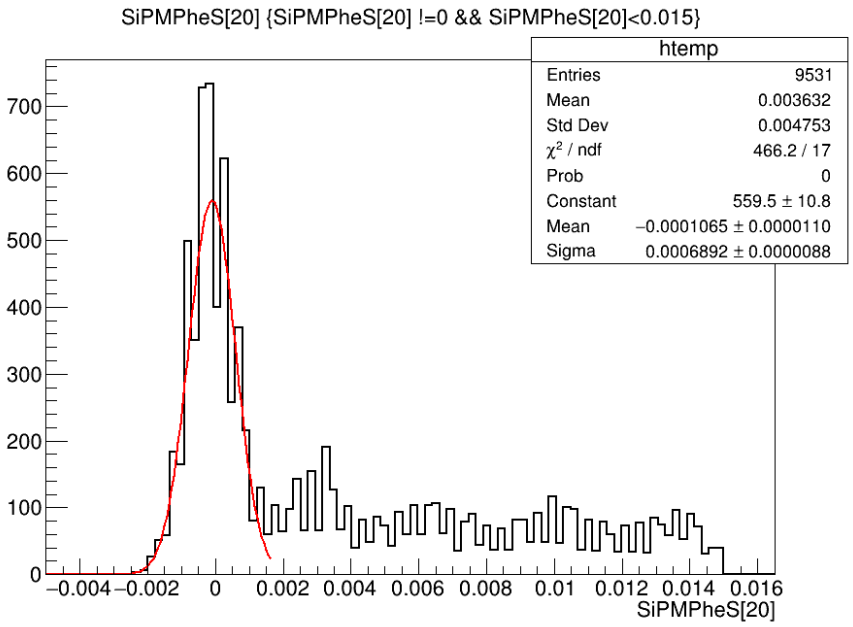


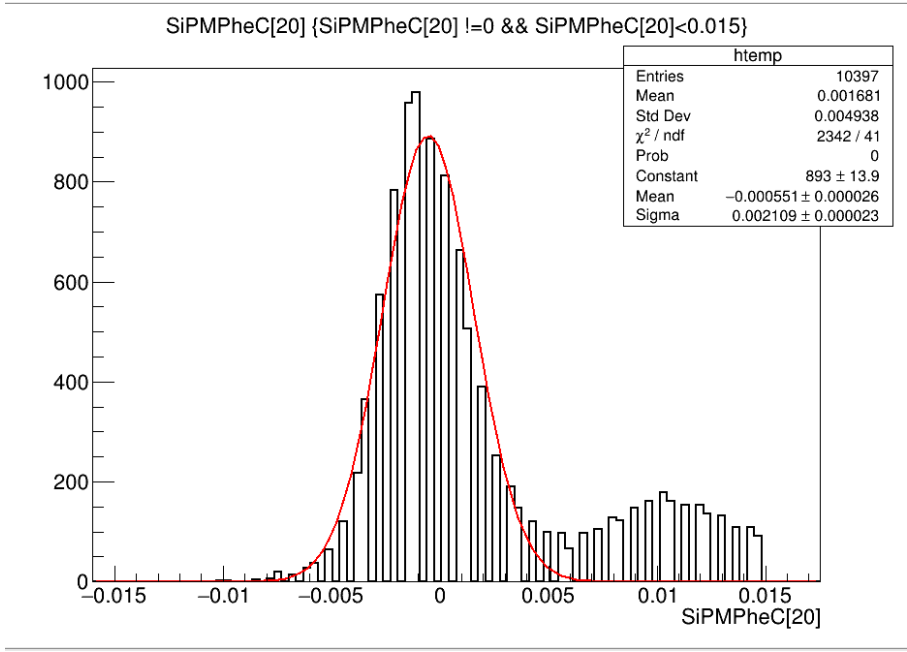
# Noise from PMTS




175 MeV, dominated by ~300 MeV of Cerenkov Tower 1

# Noise from SiPMs




~0.6/MeV/chan Scintillator

~2 MeV/chan Cerenkov

Only channels for which at least one SiPM in a FERS is above pedestal are read out.

I haven't tried to look if there is any noisy channel

# Backup