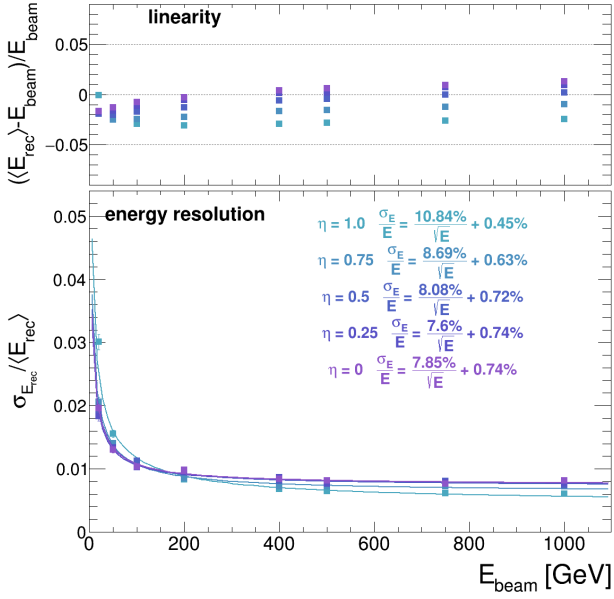
Energy resolution - corrections

Energy resolution for up to $\eta = 1$, B = 4 T

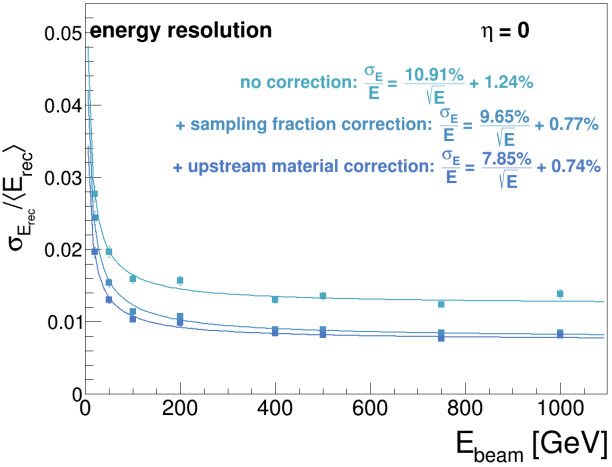
- correction for the varying sampling fraction and for the upstream material
- first layer of 2 cm for upstream material correction
  - + 7 layers of 9 cm,
  - making total of 65 cm.
- for larger η the resolution degrades especially for low energies slide 11



Impact of corrections on energy resolution, $\eta = 0$, B = 4 T

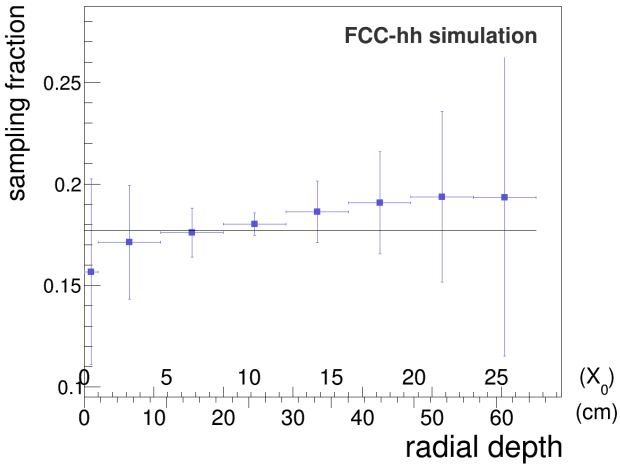
- no correction → just scaled energy deposits (to E_{beam})
- sampling fraction correction → calibration of deposited energy with sampling fraction calculated for 8 layers
- upstream material correction → additional to sampling fraction correction

▸ plots for more η values



Sampling fraction in 8 layers, B = 4 T

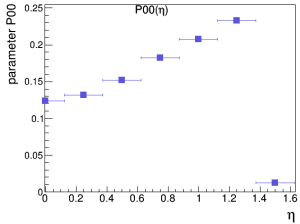
- 1 x 2 cm + 7 x 9 cm layers
- calculation for 80k e^- with the energy 50 – 200 GeV

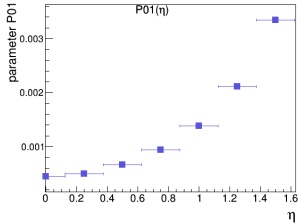


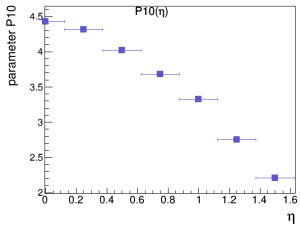
Upstream material correction, B = 4 T

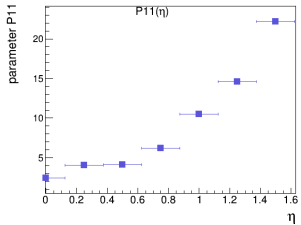
$$E_{rec} = E_{upstream} + E_{cluster}$$

$$\begin{aligned} E_{upstream} &= P_0 + P_1 \cdot E_{firstLayer} \\ &= P_{00} + P_{01} \cdot E_{beam} \\ &+ (P_{01} + \frac{P_{11}}{\sqrt{E_{beam}}}) \cdot E_{firstLayer} \end{aligned}$$





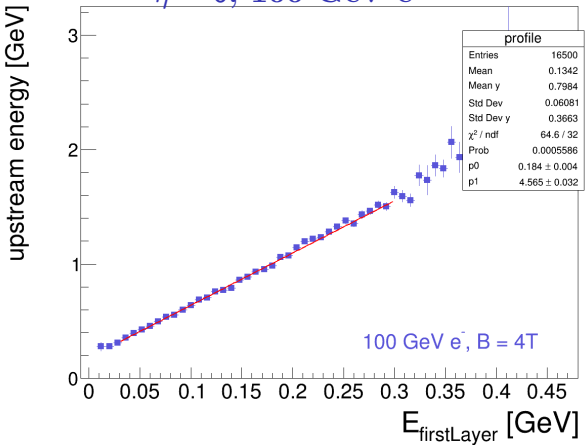




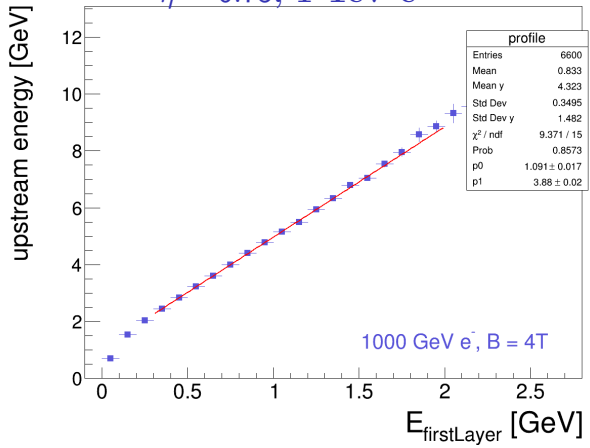
Details

Fit parameters: $E_{upstream} = P0(E) + P1(E) \cdot E_{firstLayer}$

$\eta = 0$, **100 GeV e$^-$**



$\eta = 0.75$, **1 TeV e$^-$**



- first layer of 2 cm
- linear fit
- fit range set individually for each energy and eta value

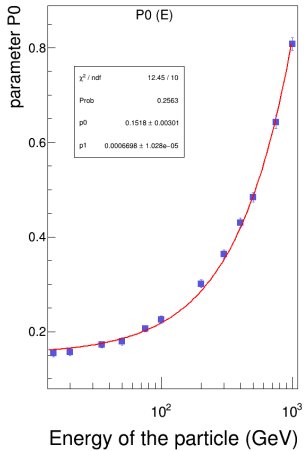
Upstream material correction, B = 4 T

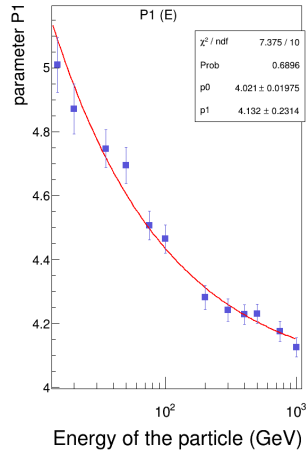
$$E_{rec} = E_{upstream} + E_{cluster}$$

$$E_{upstream} = P_0 + P_1 \cdot E_{firstLayer}$$

right plot for $\eta = 0.5$

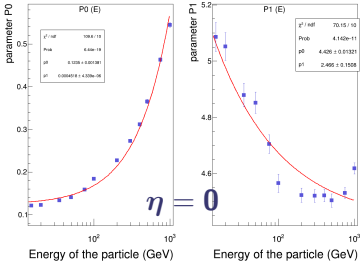
- plots for more η values
- how P_0 and P_1 are obtained



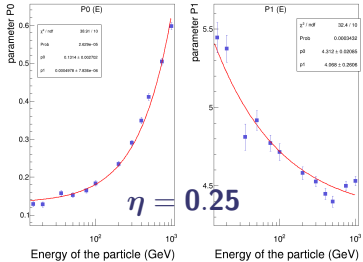


Upstream material correction parameters

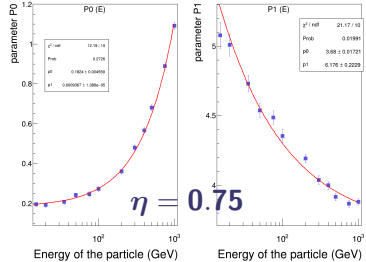
◂ $\eta = 0.5$



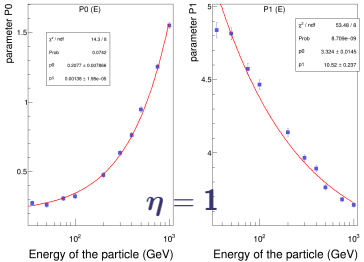
$\eta = 0$



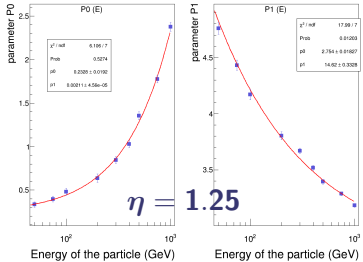
$\eta = 0.25$



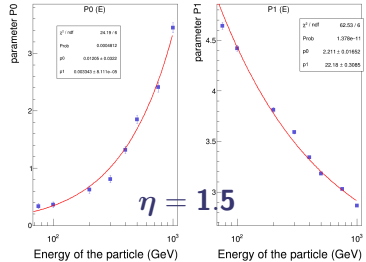
$\eta = 0.75$



$\eta = 1$



$\eta = 1.25$

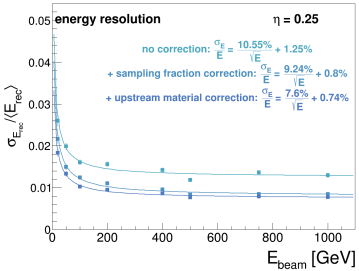


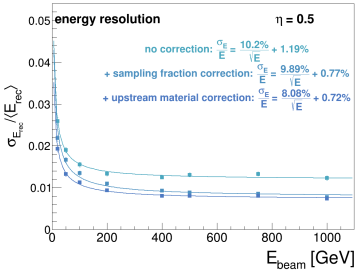
$\eta = 1.5$

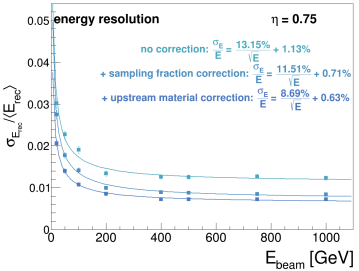
Impact of corrections on energy resolution

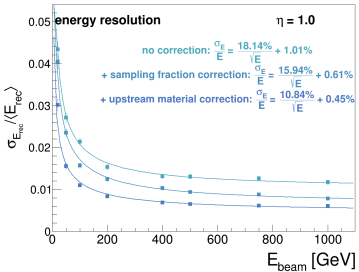
$\eta = 0$

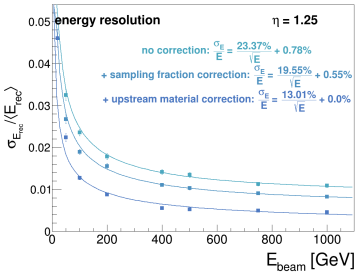
Little improvement from sampling fraction correction for higher η - should the sampling fraction be η dependent?

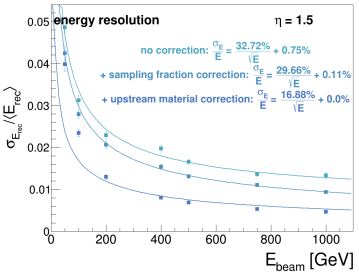












Energy resolution: after corrections, B = 4 T

- for $\eta > 1$ the upstream material correction parameters are extracted for energies larger than:
  - 30 GeV (for $\eta = 1.25$)
  - 50 GeV (for $\eta = 1.5$)
- large nonlinearity for lower energies

◂ only $\eta < 1$