

Influence of geometrical acceptance and reconstruction efficiency on the π^0 phase-space

Ruslan Akhunzyanov

JINR

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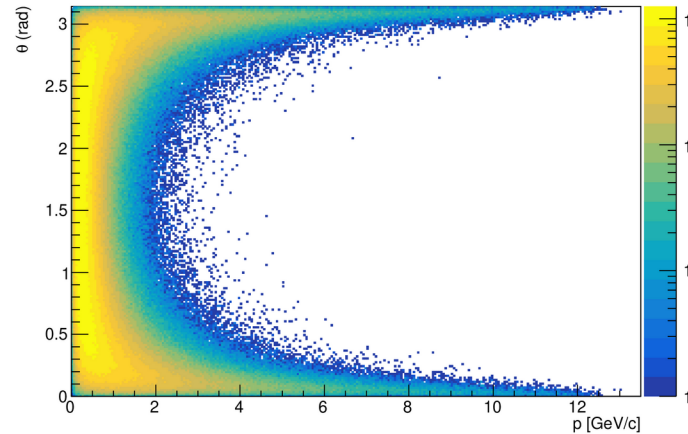
Part I. Influence of geometrical acceptance and reconstruction efficiency on the π^0 phase-space

I look at how the π^0 kinematical distributions (in p - θ , x_F - p_T , η - p_T variables) change when different requirements related to the acceptance / reconstruction procedure are successively applied.

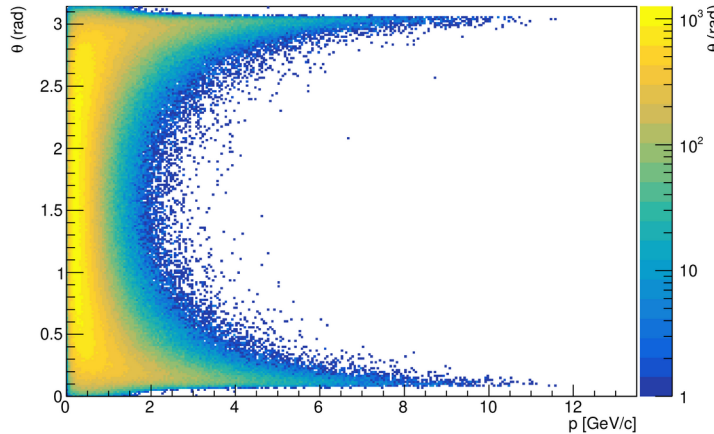
- 1) All π^0 from MC simulation
- 2) Require that both photons from π^0 decay reached ECAL
- 3) Require ≥ 2 different clusters from these photons in ECAL.
- 4) Exclude multi-particle clusters associated with charged particles.
- 5) Apply cut on the clusters minimal energy ($E > 0.3$ GeV).
- 6) Exclude π^0 with reconstructed mass outside $\mu \pm 3\sigma$ range.

π^0 phase-space: p - θ

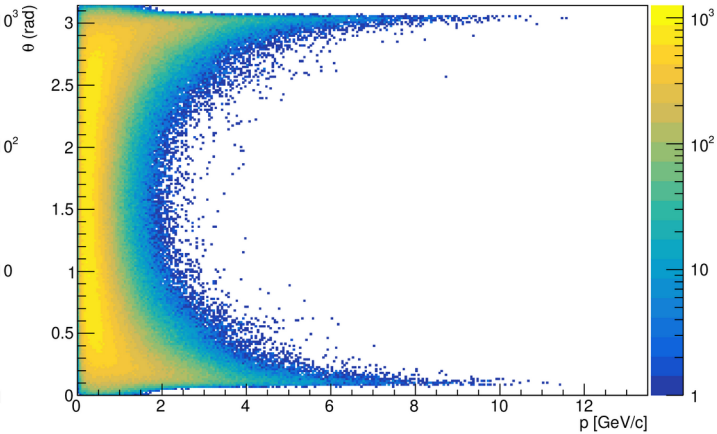
p vs θ :



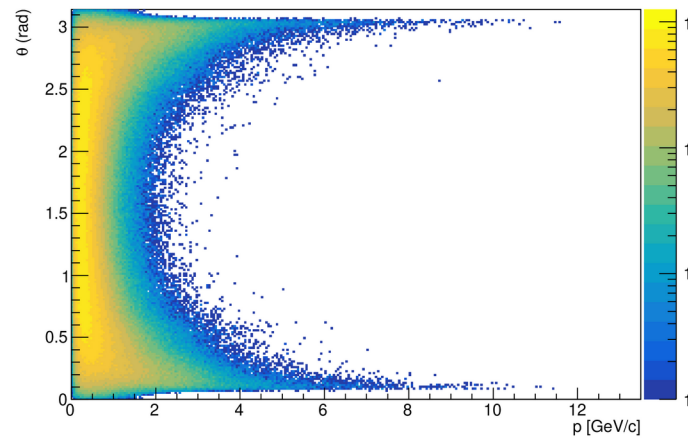
p vs θ : two_gamma_in_ecal



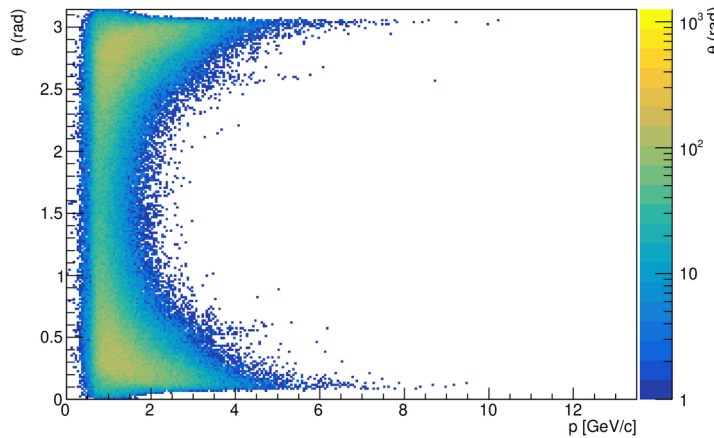
p vs θ : two_or_more_ecal_clusters



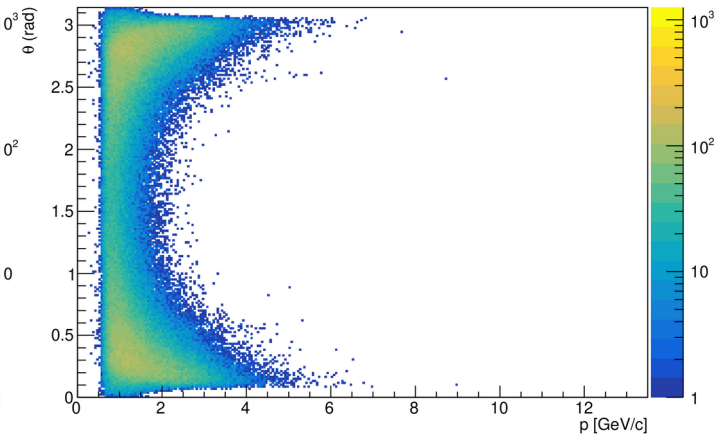
p vs θ : x_charged_mp_clusters



p vs θ : x_chmpcl_and_egammarc_ok

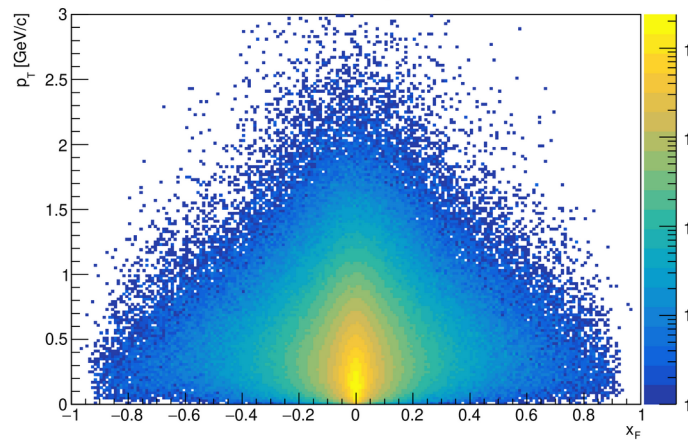


p vs θ : final_inv_mass_ok

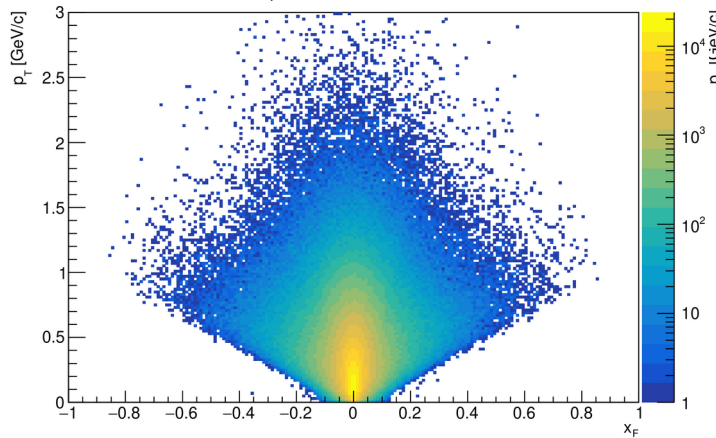


π^0 phase-space: x_F - p_T

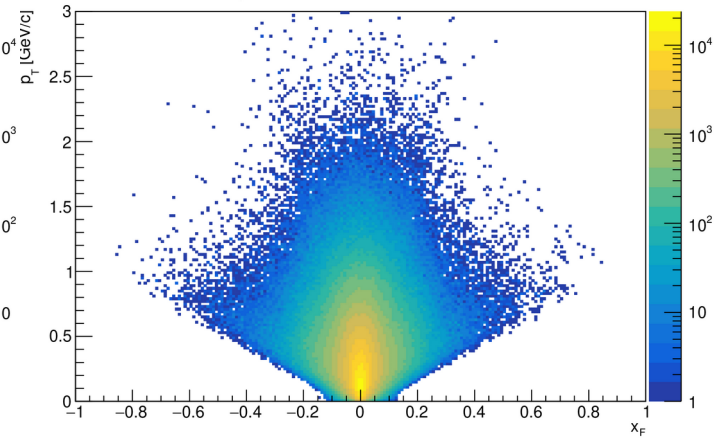
x_F vs p_T :



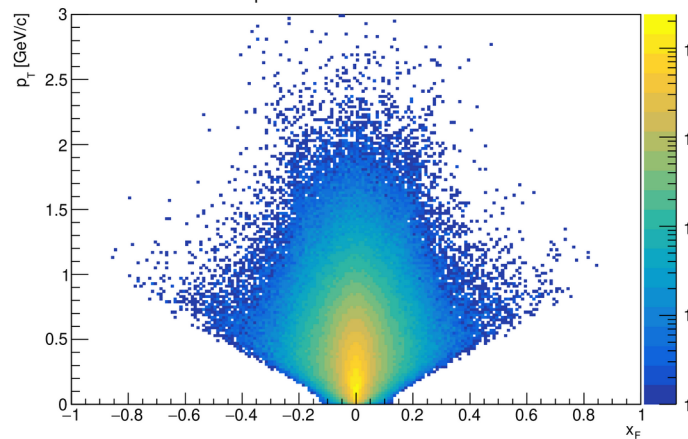
x_F vs p_T : two_gamma_in_ecal



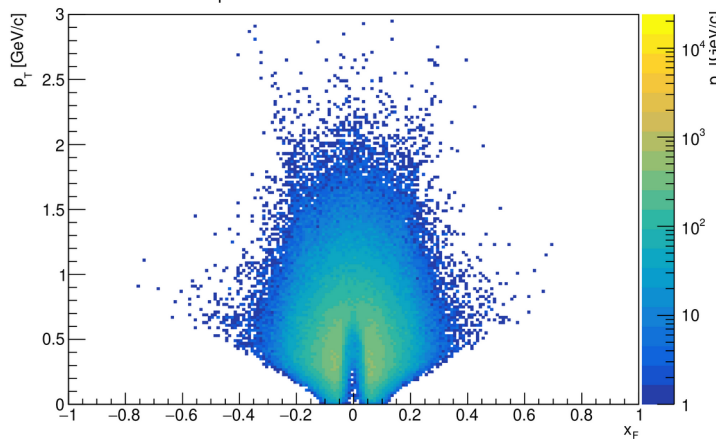
x_F vs p_T : two_or_more_ecal_clusters



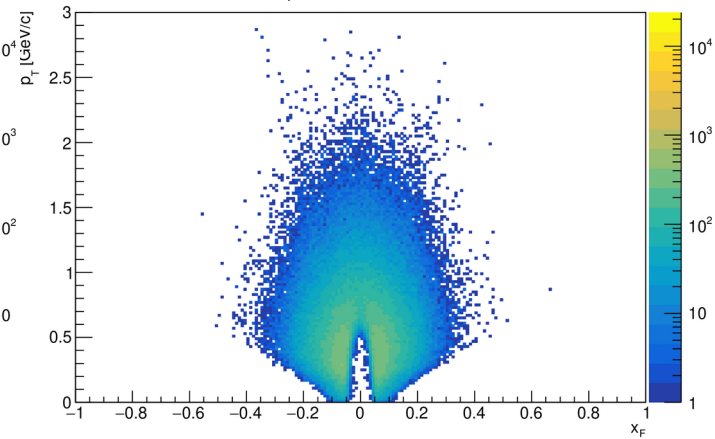
x_F vs p_T : x_charged_mp_clusters



x_F vs p_T : x_chmpcl_and_egammarc_ok

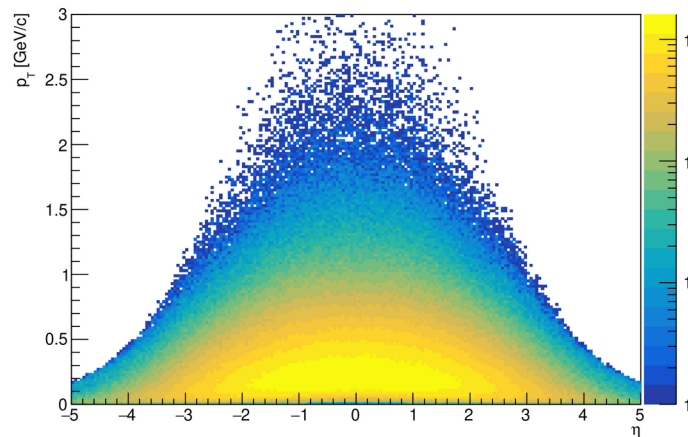


x_F vs p_T : final_inv_mass_ok

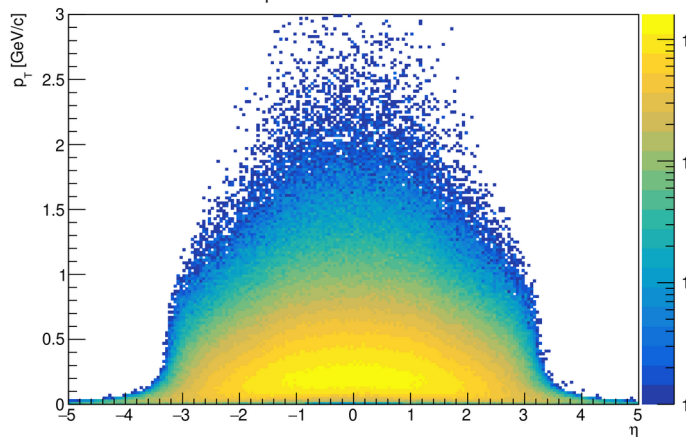


π^0 phase-space: η - p_T

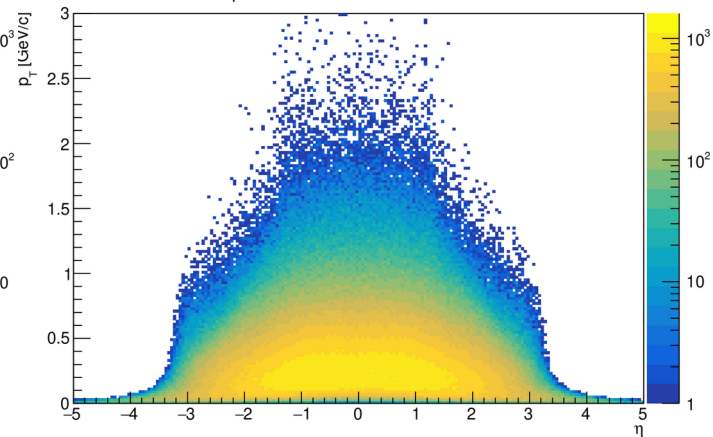
η vs p_T :



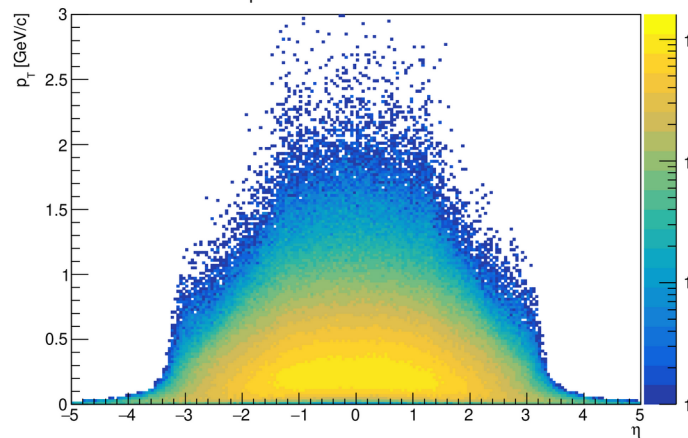
η vs p_T : two_gamma_in_ecal



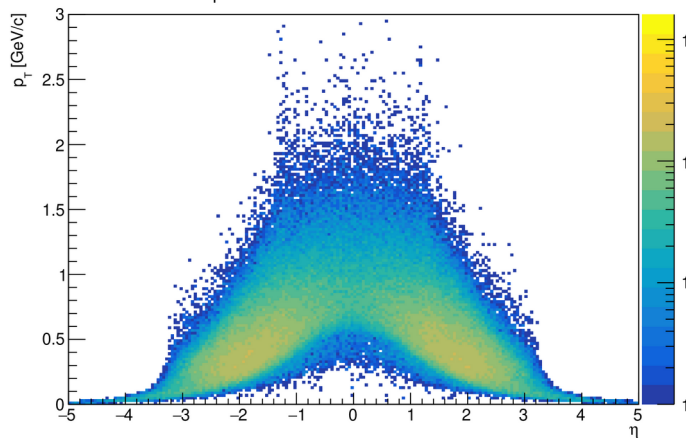
η vs p_T : two_or_more_ecal_clusters



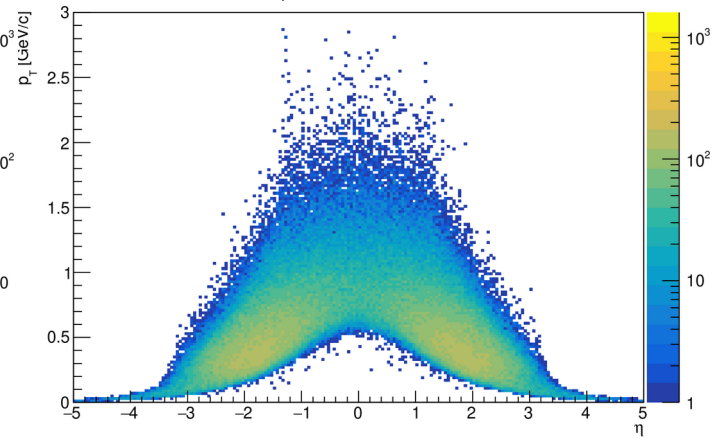
η vs p_T : x_charged_mp_clusters



η vs p_T : x_chmpcl_and_egammarc_ok



η vs p_T : final_inv_mass_ok



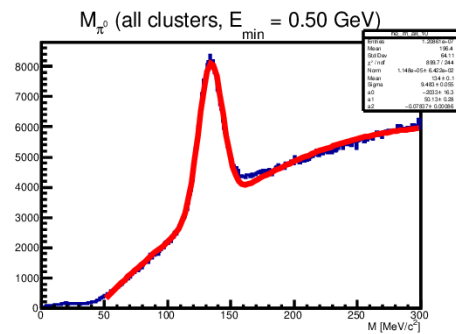
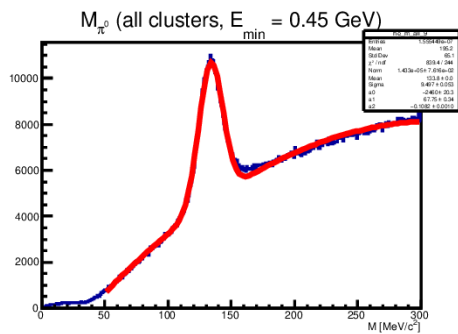
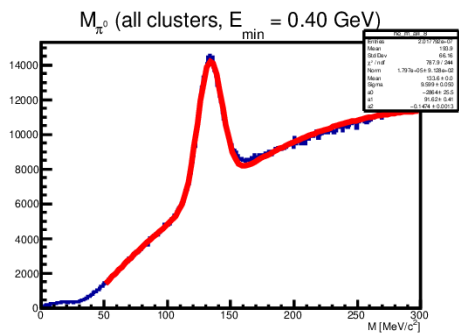
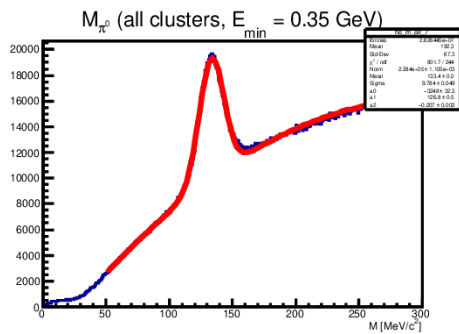
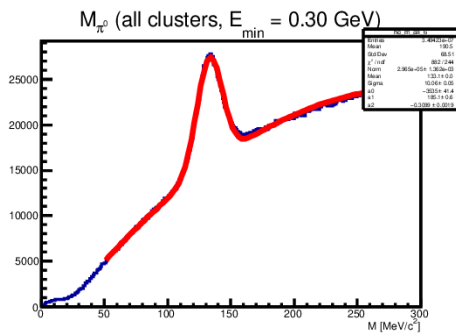
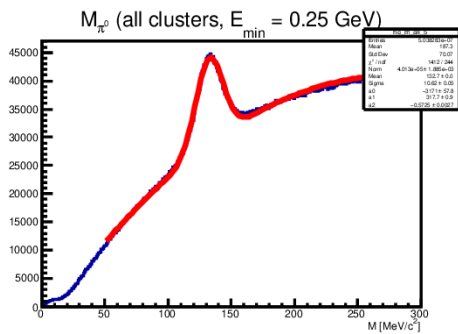
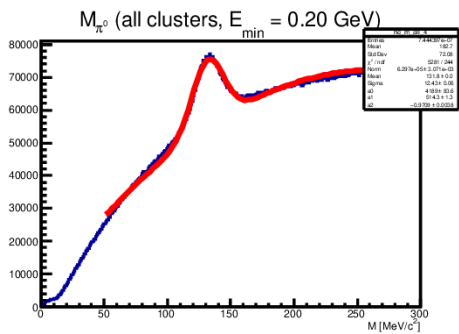
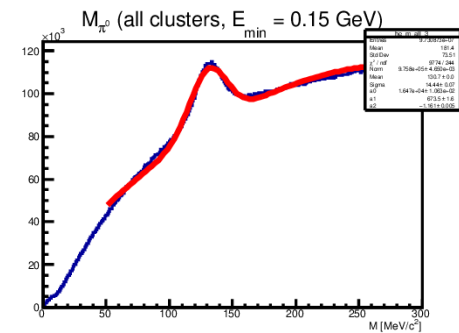
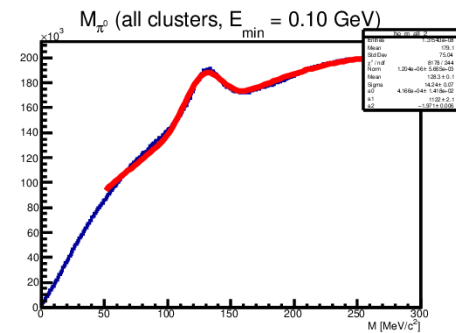
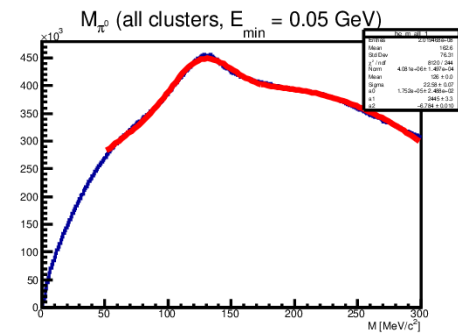
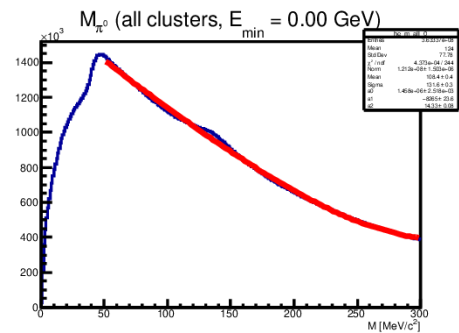
Part II. Influence of the cut on the minimal energy of cluster (E_{\min}) on fit parameters and signal / background

- The distribution of the invariant mass of pairs of ECAL clusters with $E > E_{\min}$ is fitted by function:

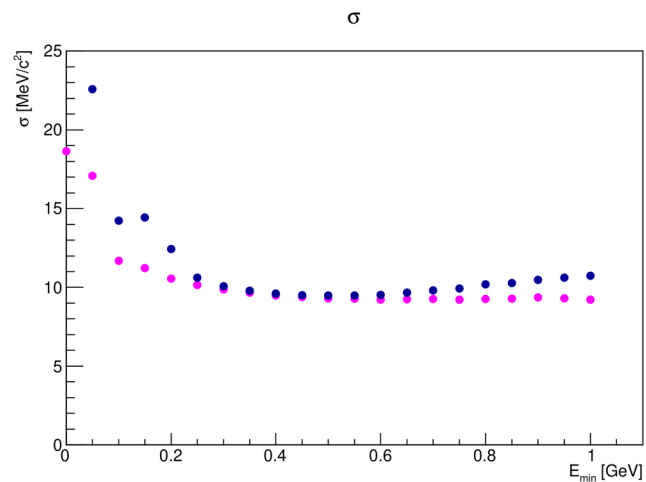
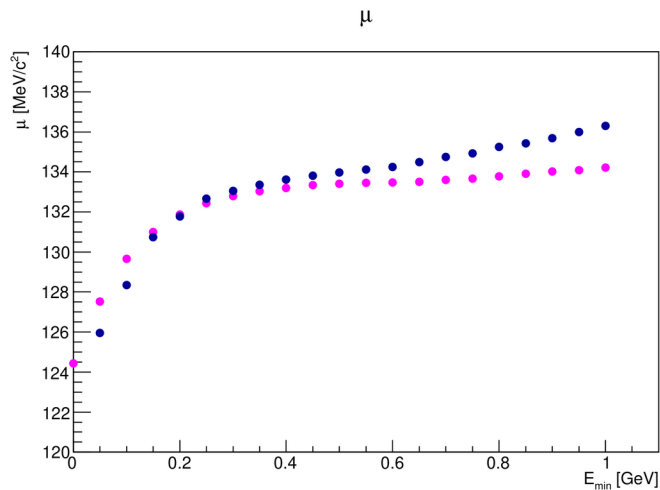
$$f(m) = \frac{I}{\sigma\sqrt{2\pi}} \exp\left[-\frac{(m-\mu)^2}{2\sigma^2}\right] + \underbrace{(a_0 + a_1 m + a_2 m^2)}_{\text{background}}$$

- This procedure is applied for different values of E_{\min} from 0 to 1 GeV with step 0.05 GeV.

Invariant mass distribution for different E_{\min} : all clusters



Dependence of fit parameters, S/B ratio, and FoM on E_{\min}



neutral clusters only

all clusters (neutral & charged)

S, B - in $\mu \pm 2\sigma$ range

