Likelihood for combined truncated mean and cluster counting

Used 2d gaussian function as likelihood function for likelihood of muons or pions

$$L_{\mu}^{i} = \frac{1}{2\pi\sigma_{N_{cl}^{\mu}}\sigma_{Q^{\mu}}} e^{-\left[\frac{\left(N_{cl}^{i}-\bar{N_{cl}^{\mu}}\right)^{2}}{2\sigma^{2}_{N_{cl}^{\mu}}}+\frac{\left(Q^{i}-\bar{Q^{\mu}}\right)^{2}}{2\sigma^{2}_{Q^{\mu}}}\right]}$$

Likelihood ratio R defined as

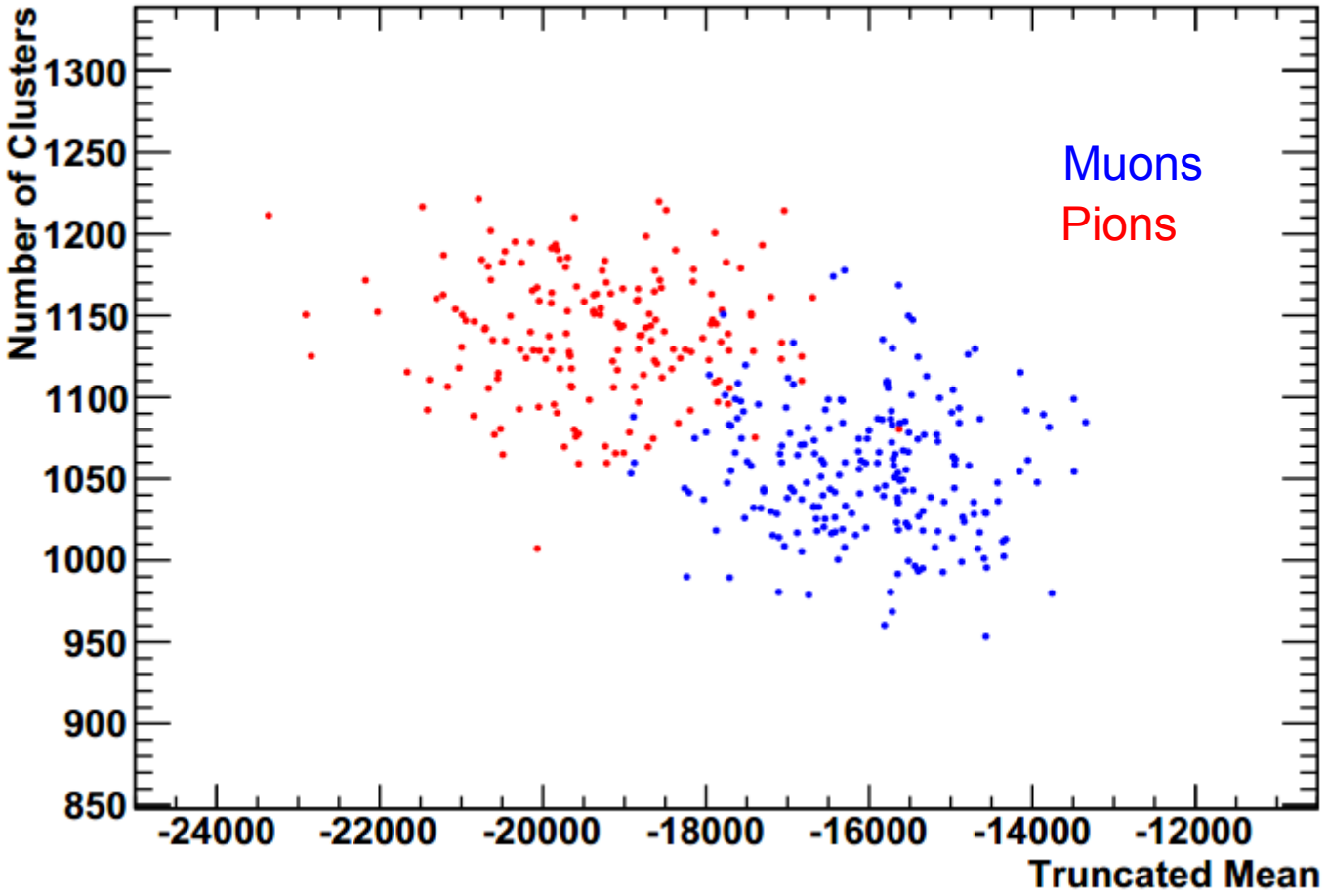
$$R = \frac{L_{\mu}}{L_{\mu}+L_{\pi}}$$

If R>some cut, event is a muon, below it is a pion

Efficiency = #of muon events tagged as muons/#of events that are muons

Fake efficiency = #of pion events tagged as muons/#of muon events

Truncated mean vs Cluster counting



Muon Efficiency vs Fake Efficiency