



High Energy Isolate Charged Particle Identification

Samples: isolated particles

π^+ , μ^- , e^-

Energy: 70GeV

Events: 10000

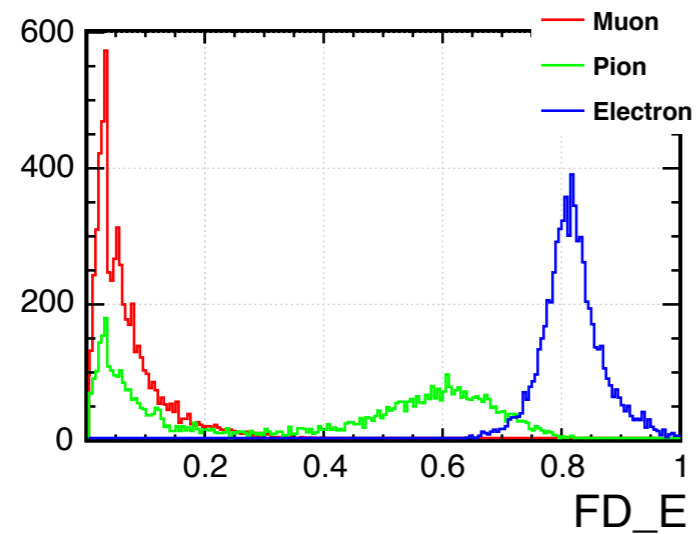
Model: ILD_o2_v06 (SDHCAL)

Reconstruction: ArborPFA

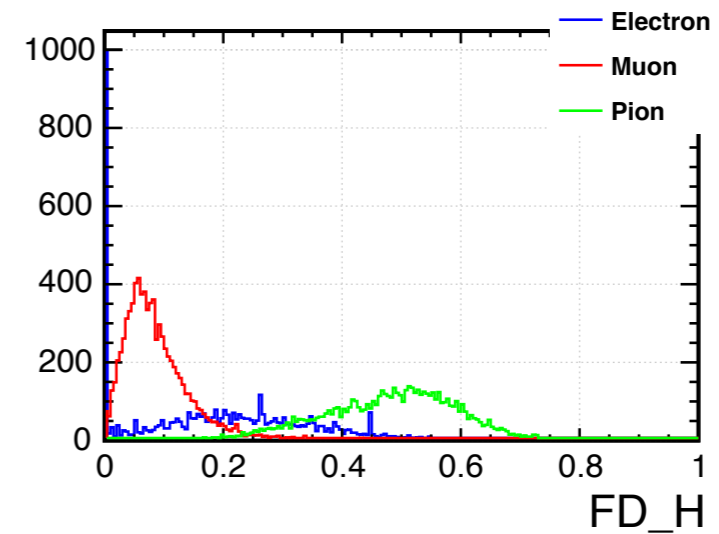
Angle cut: $\cos\Theta < 0.7$ (Barrel)

Input Variables

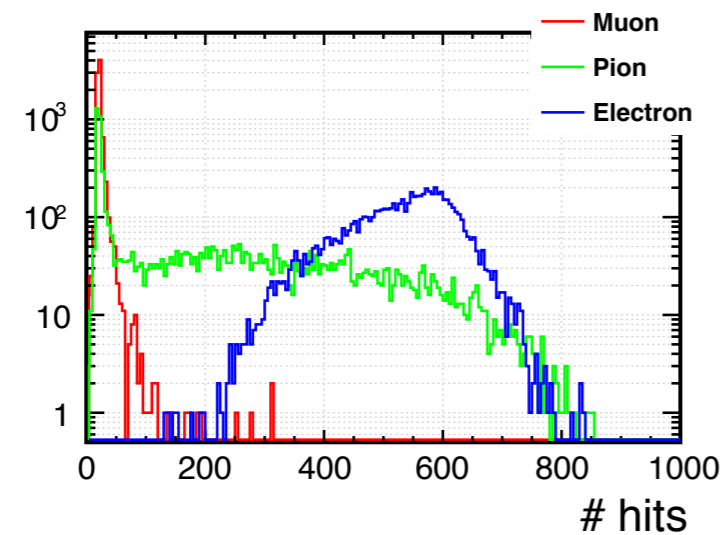
ECAL FD



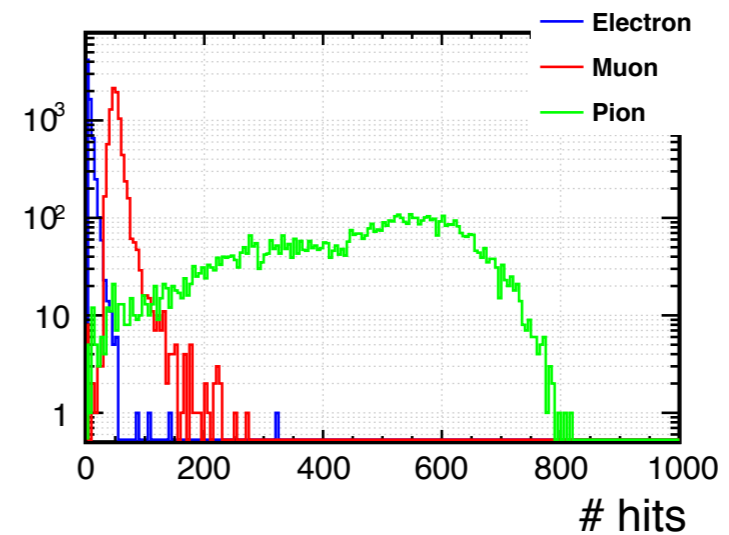
HCAL FD



ECAL hits number

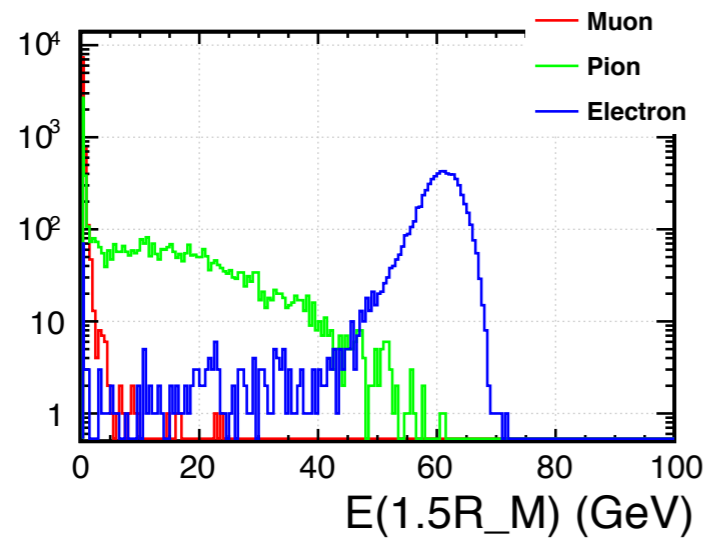


HCAL hits number

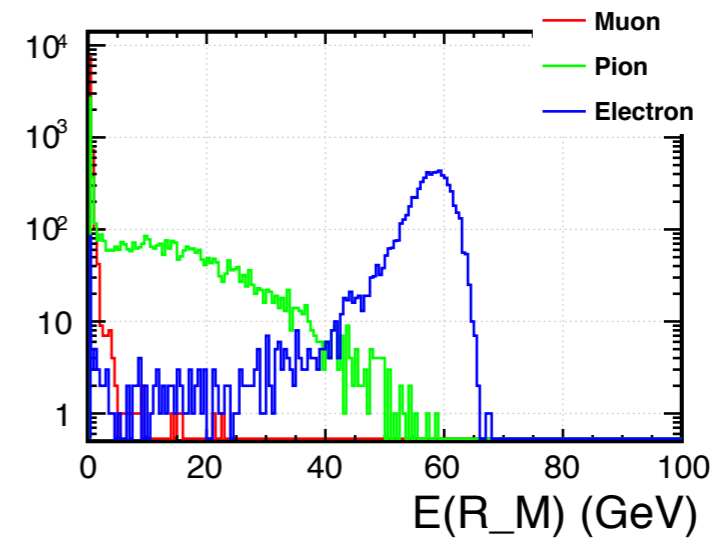


Input Variables

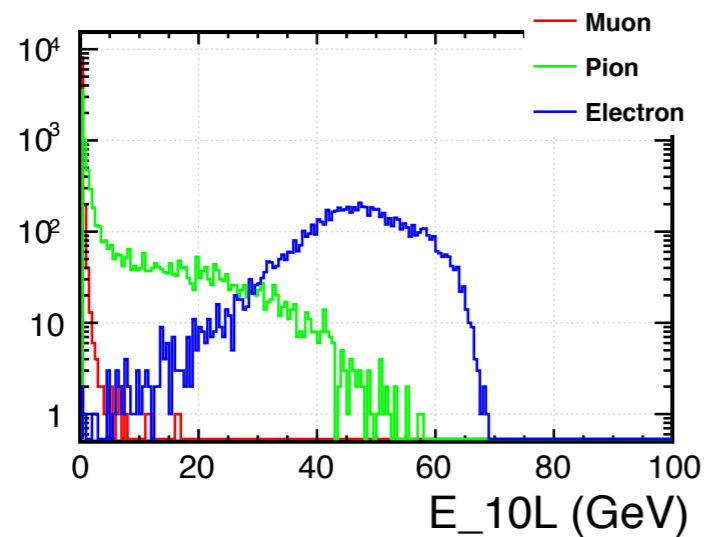
ECAL Energy in 1.5 R_M



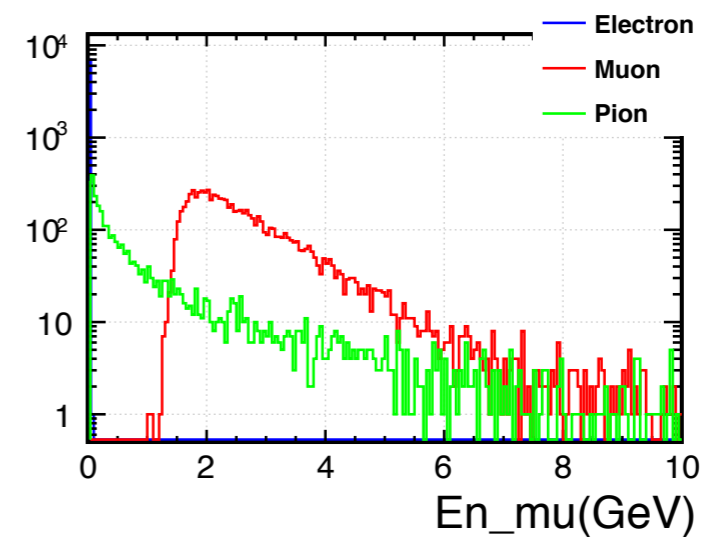
ECAL Energy in 1 R_M



ECAL Energy in first 10 layer

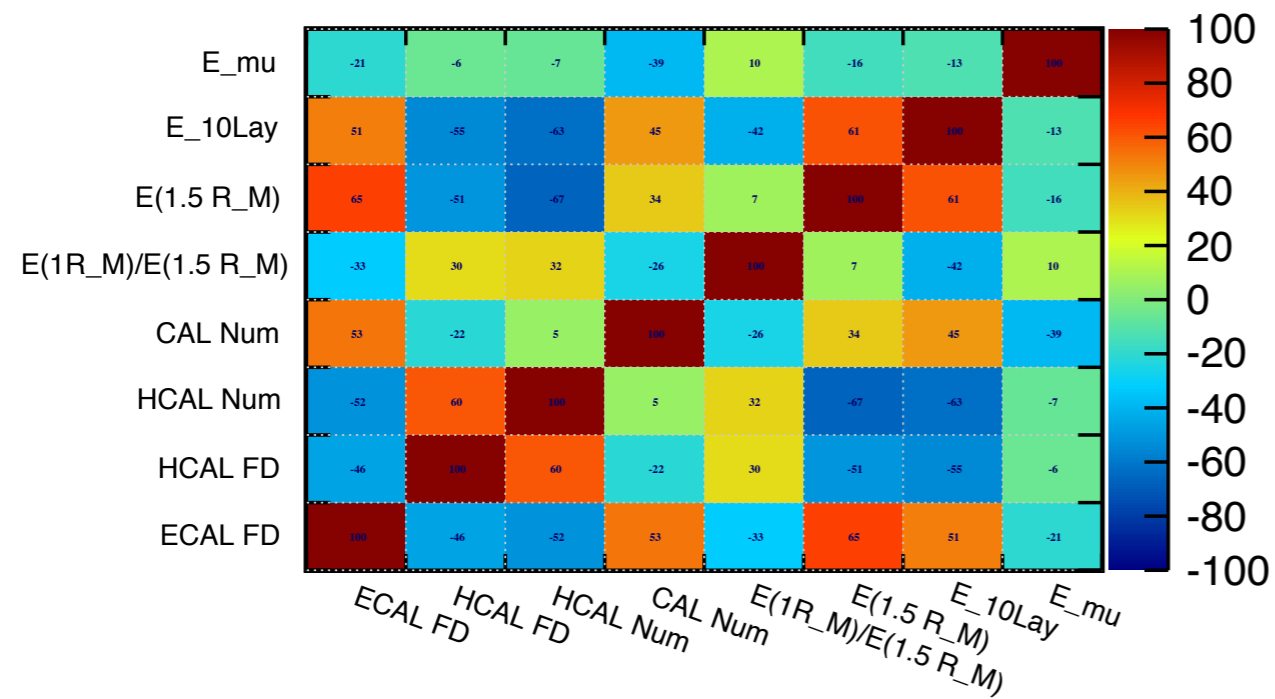


muon chamber energy

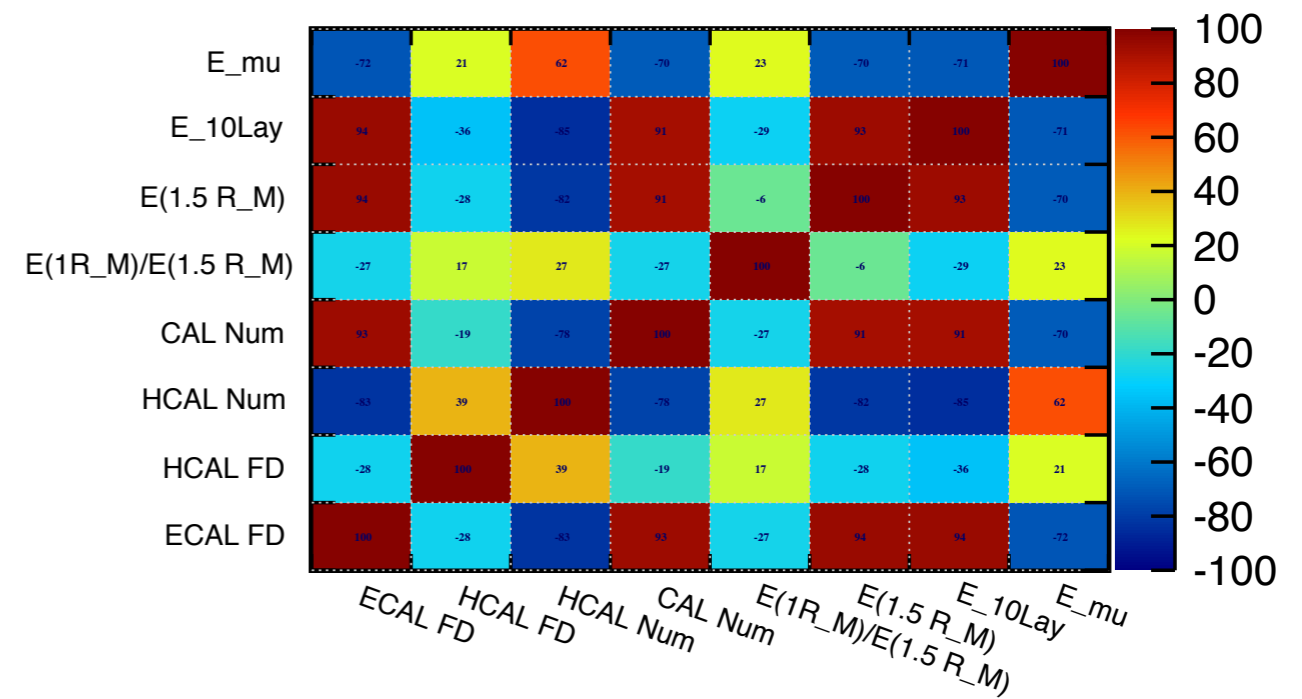


Correlation Matrix (pi+)

Correlation Matrix (signal)

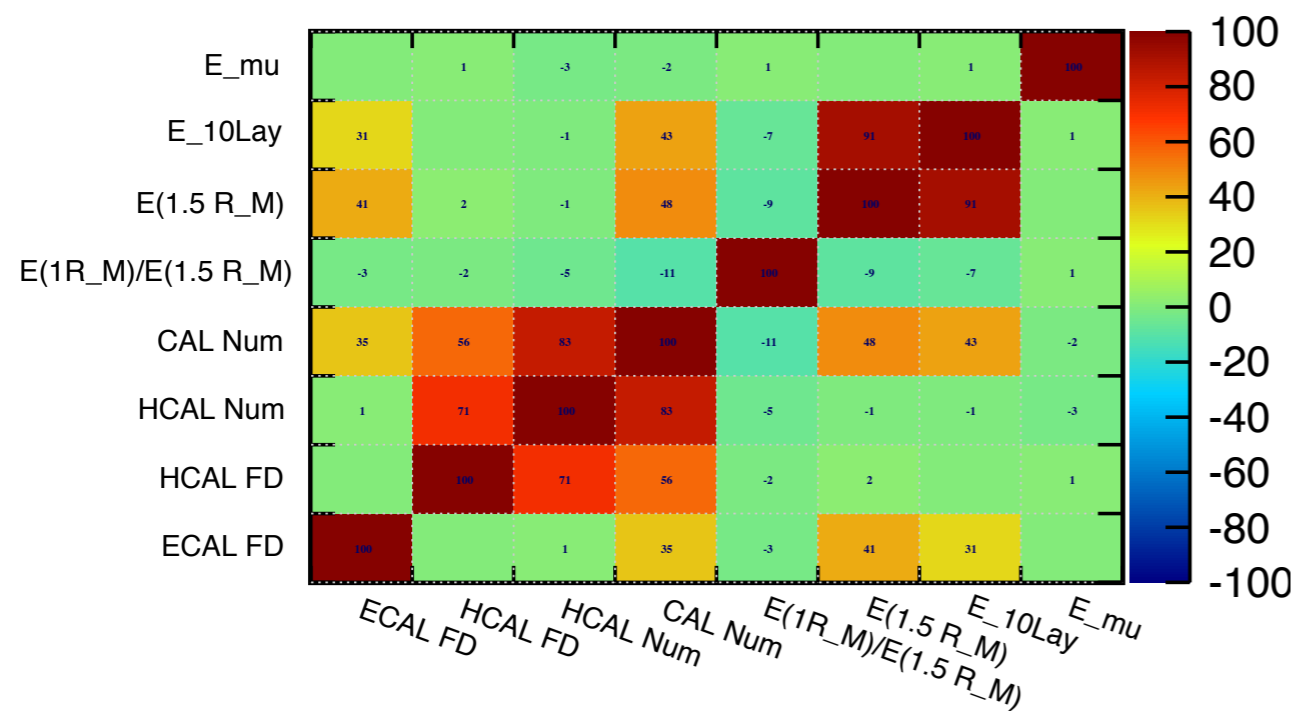


Correlation Matrix (background)

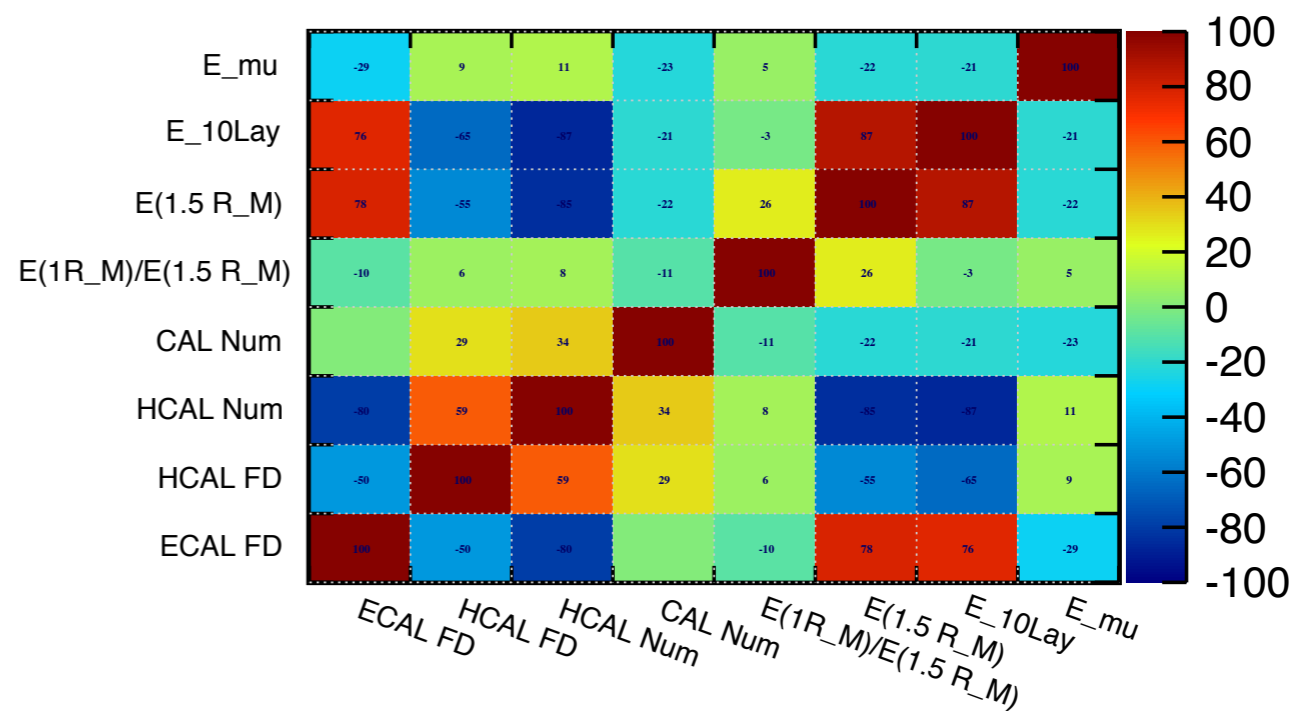


Correlation Matrix (mu-)

Correlation Matrix (signal)

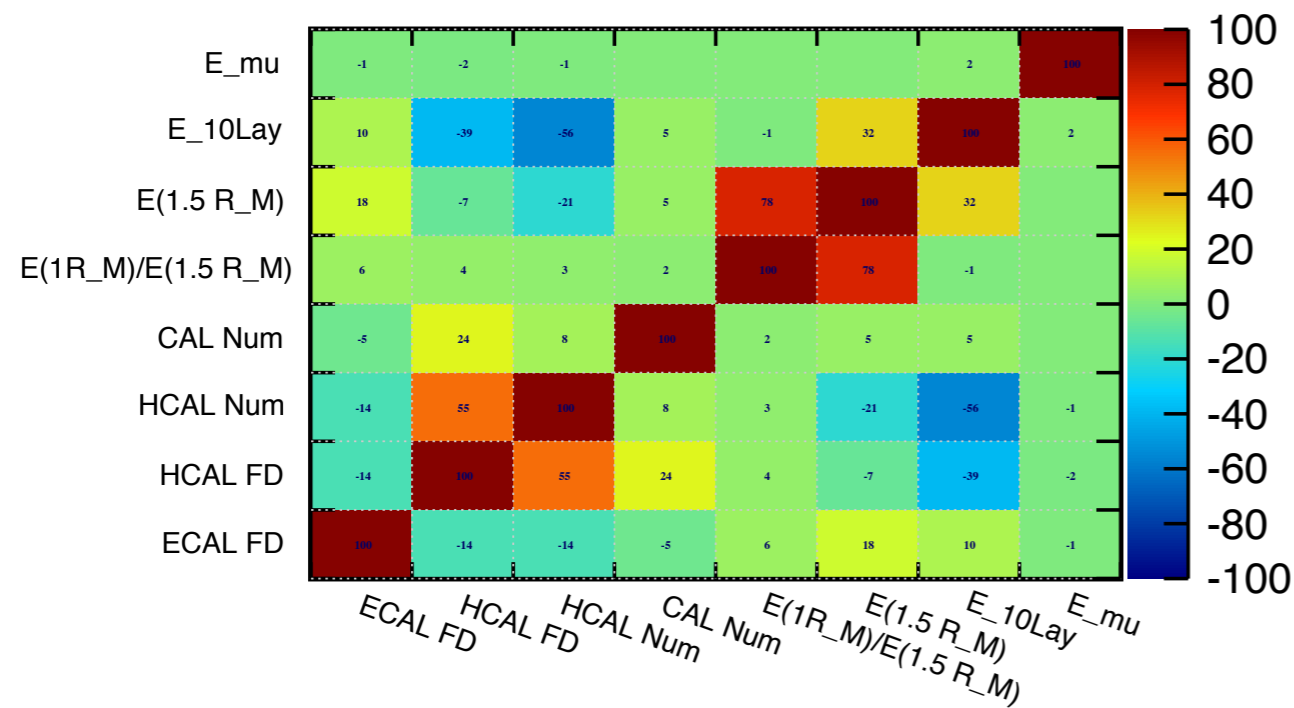


Correlation Matrix (background)

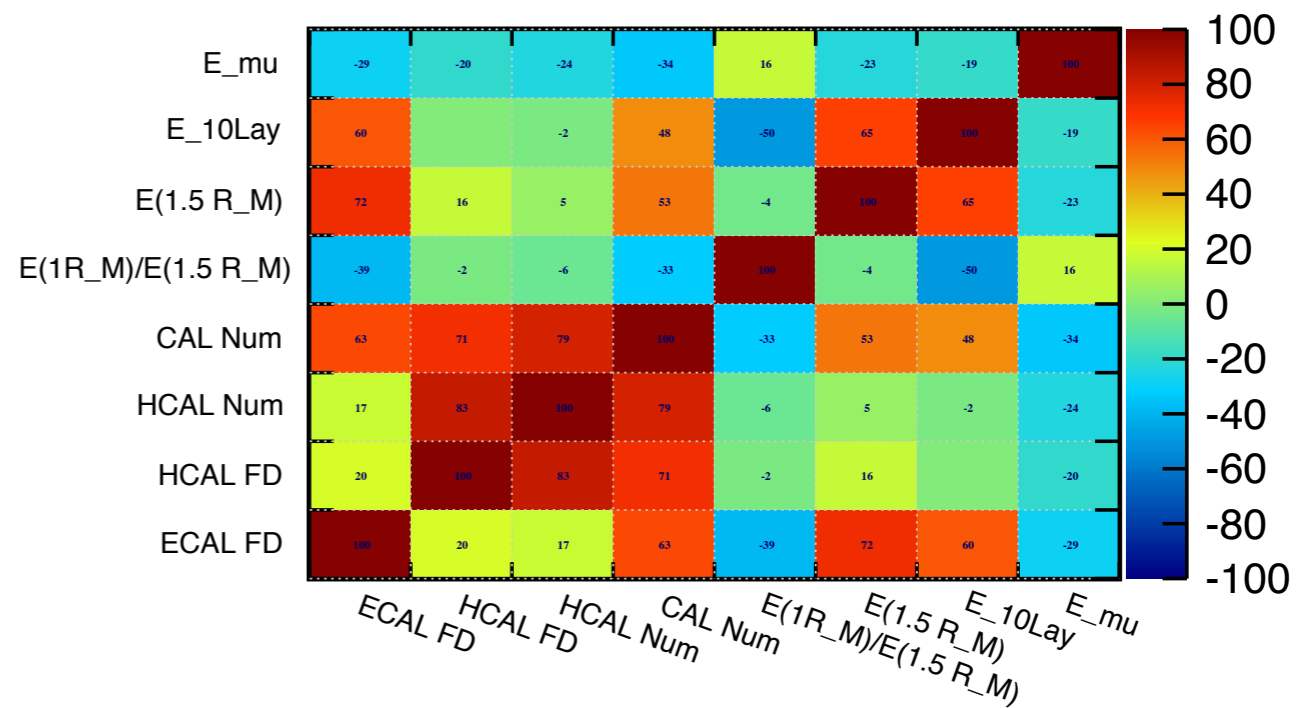


Correlation Matrix (e-)

Correlation Matrix (signal)

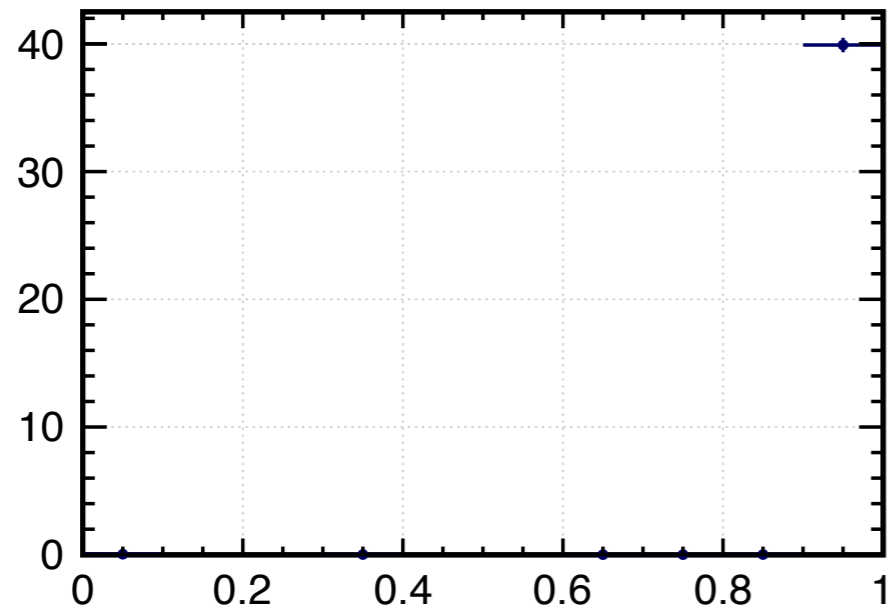


Correlation Matrix (background)

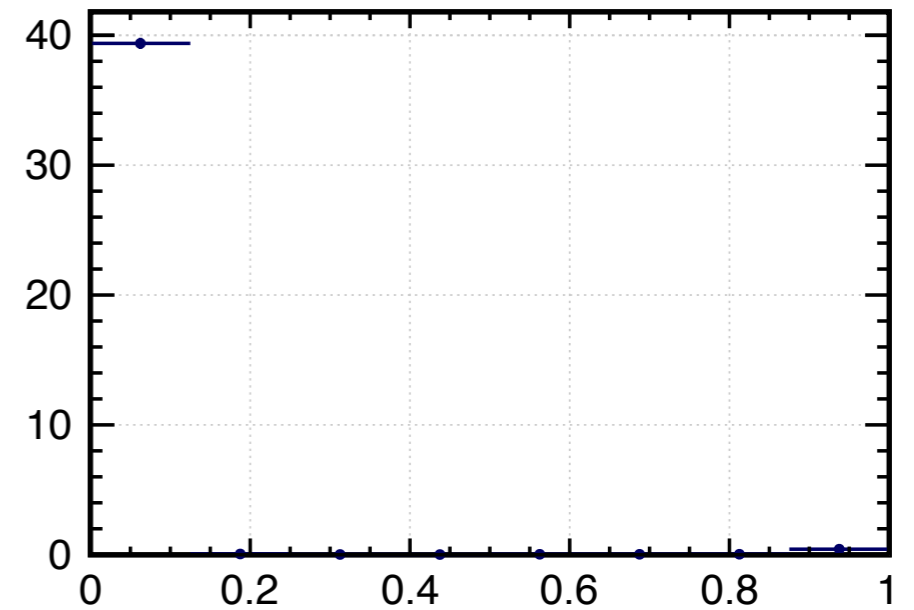


Likelihood PCA (mu)

MVA_LikelihoodPCA_S



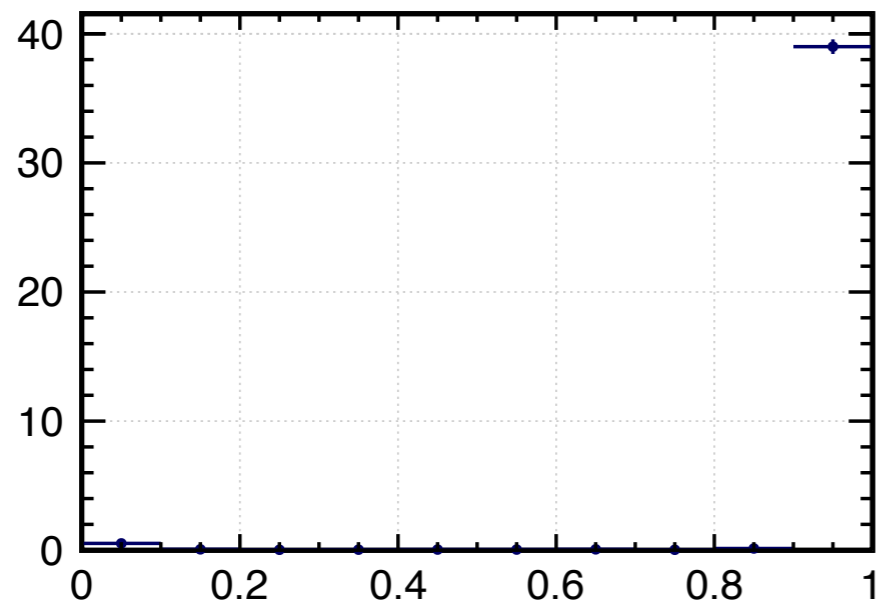
MVA_LikelihoodPCA_B



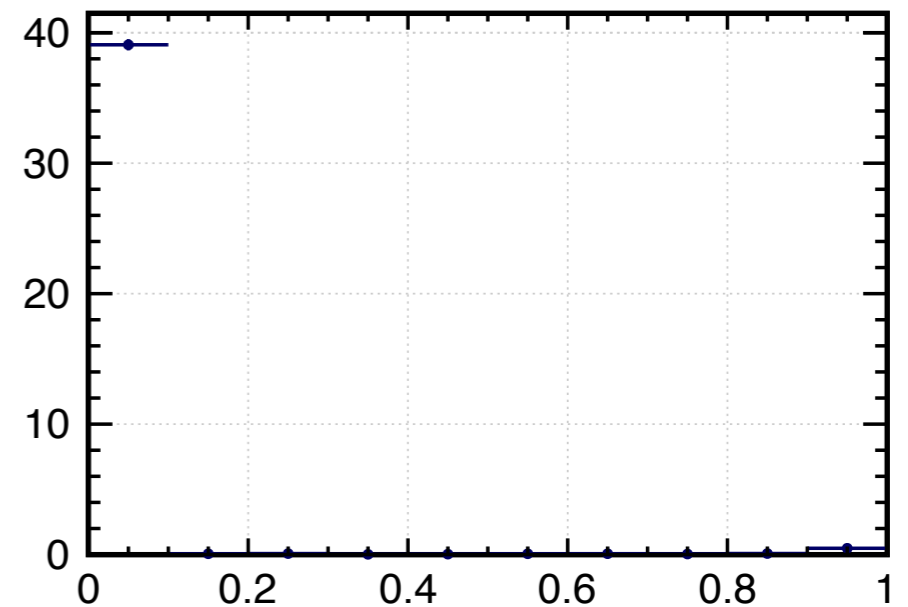
Cut mu: LikelihoodPCA > 0.5
Cut eff: 99.889 ± 0.033

Likelihood PCA (π)

MVA_LikelihoodPCA_S



MVA_LikelihoodPCA_B

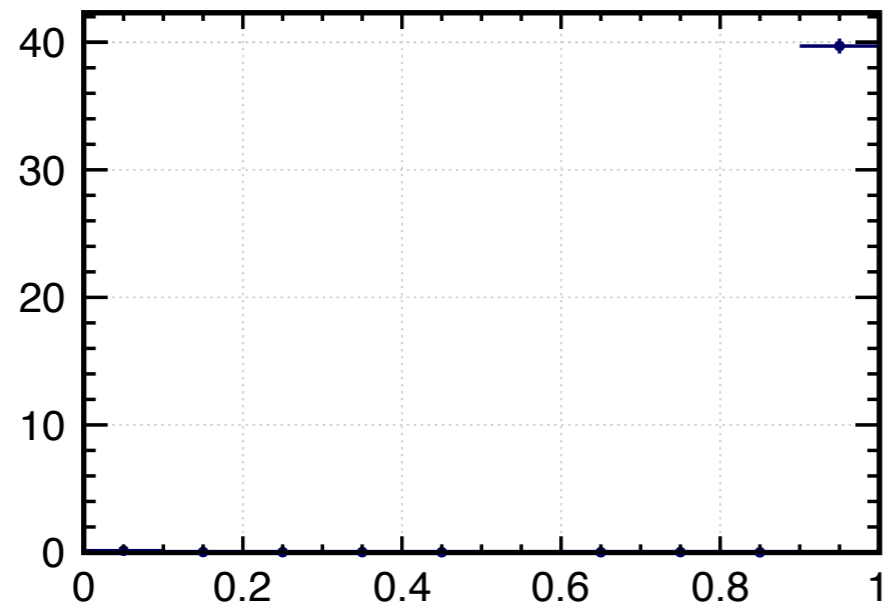


Cut π : LikelihoodPCA > 0.5

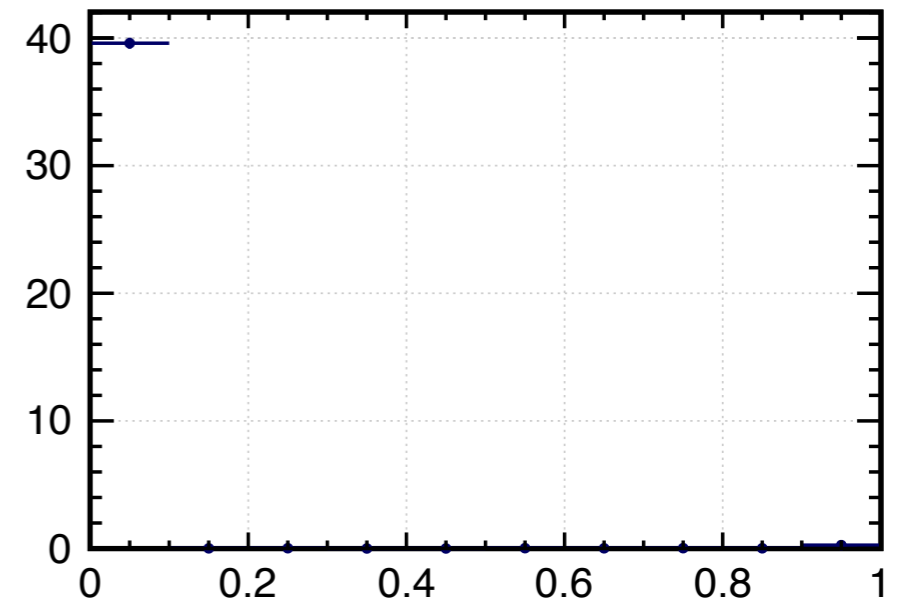
Cut eff: 98.144 ± 0.135

Likelihood PCA (e)

MVA_LikelihoodPCA_S



MVA_LikelihoodPCA_B

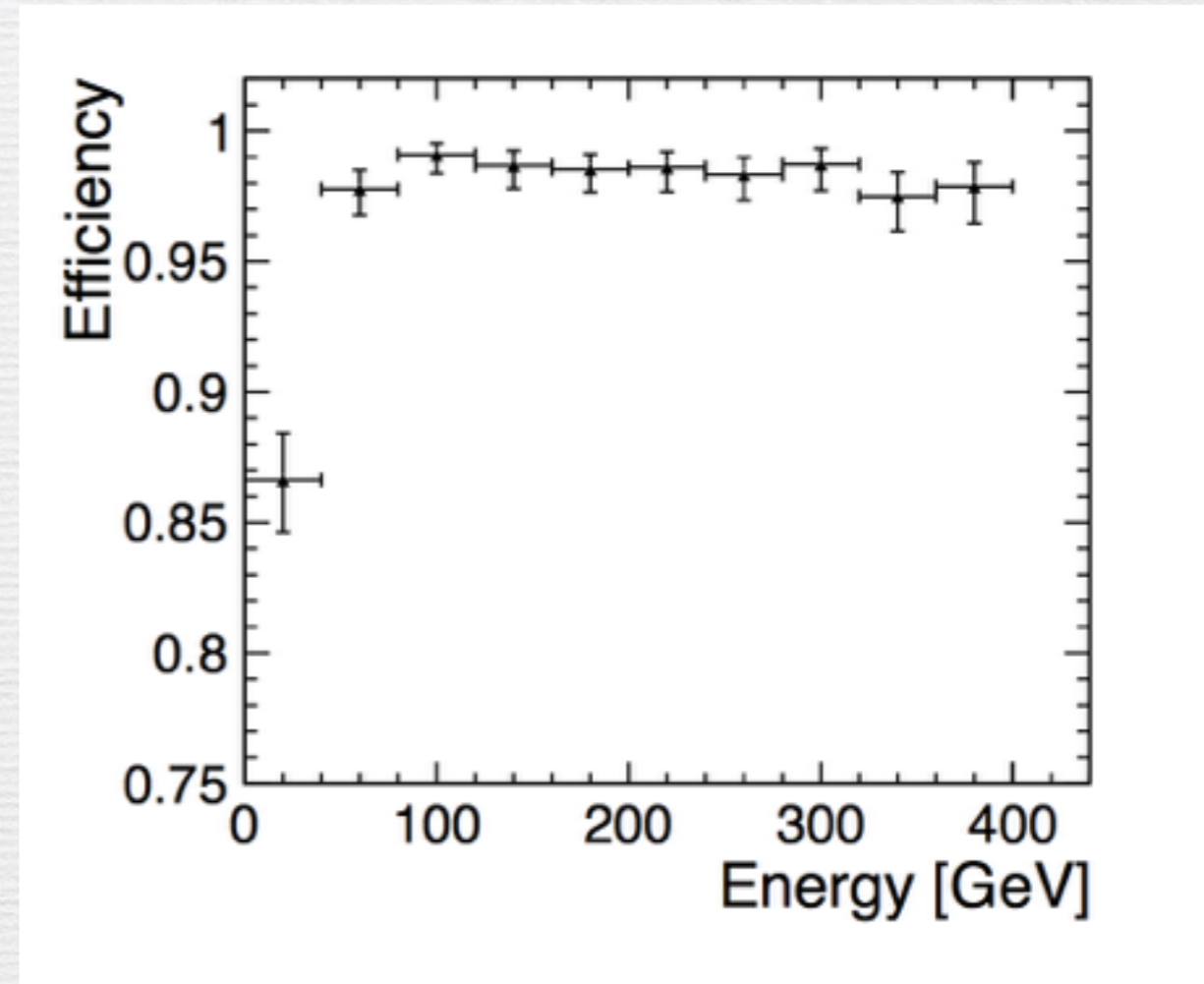
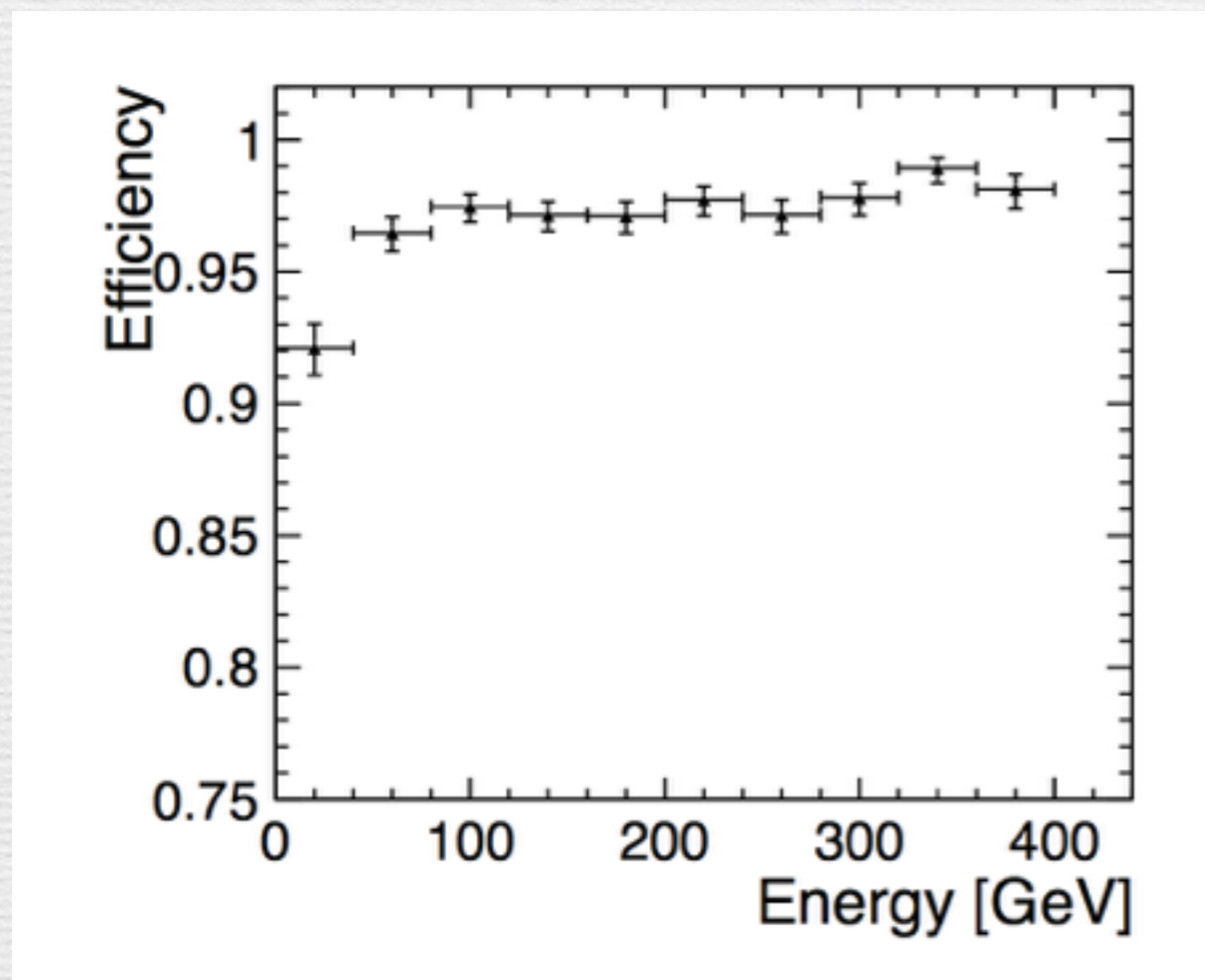


Cut e⁻: LikelihoodPCA > 0.5
Cut eff: 99.372 ± 0.079

Cut Efficiency

Eff(%)	pi+ cut	mu- cut	e- cut
pi+	98.144 ± 0.135	1.776 ± 0.132	0.080 ± 0.028
mu-	0.110 ± 0.033	99.889 ± 0.033	0.001 ± 0.003
e-	0.556 ± 0.075	0.072 ± 0.026	99.372 ± 0.079

Comparison



Particle ID efficiency for single electrons (left) and pi generated particle energy

* From CLIC_CDR 2012

Thank for your attention !