

CNNs FOR ELECTRON IDENTIFICATION

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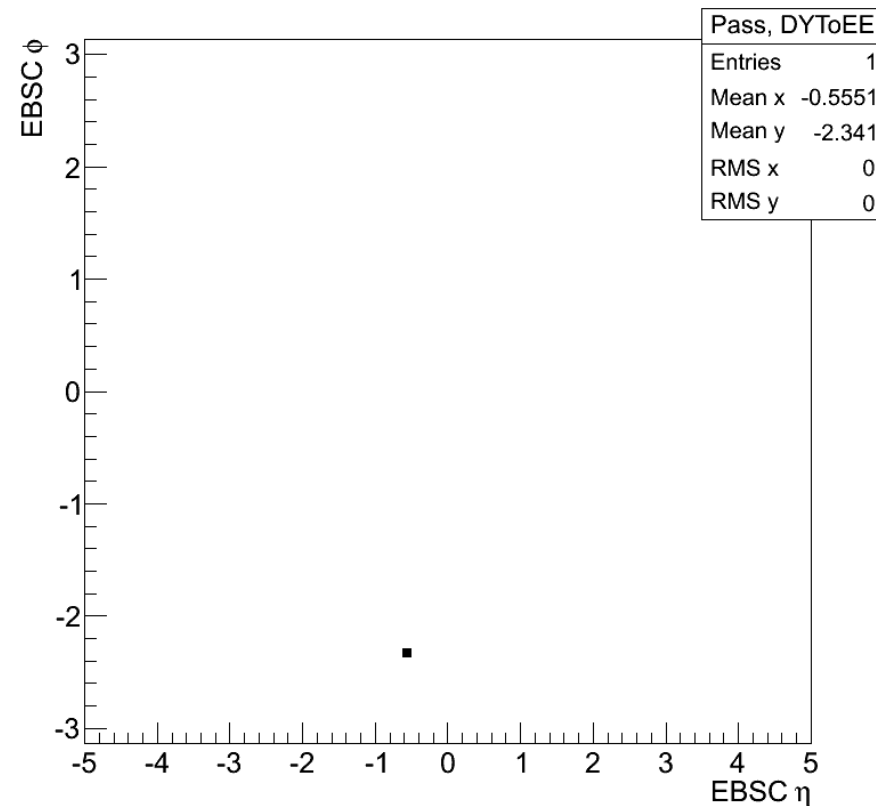
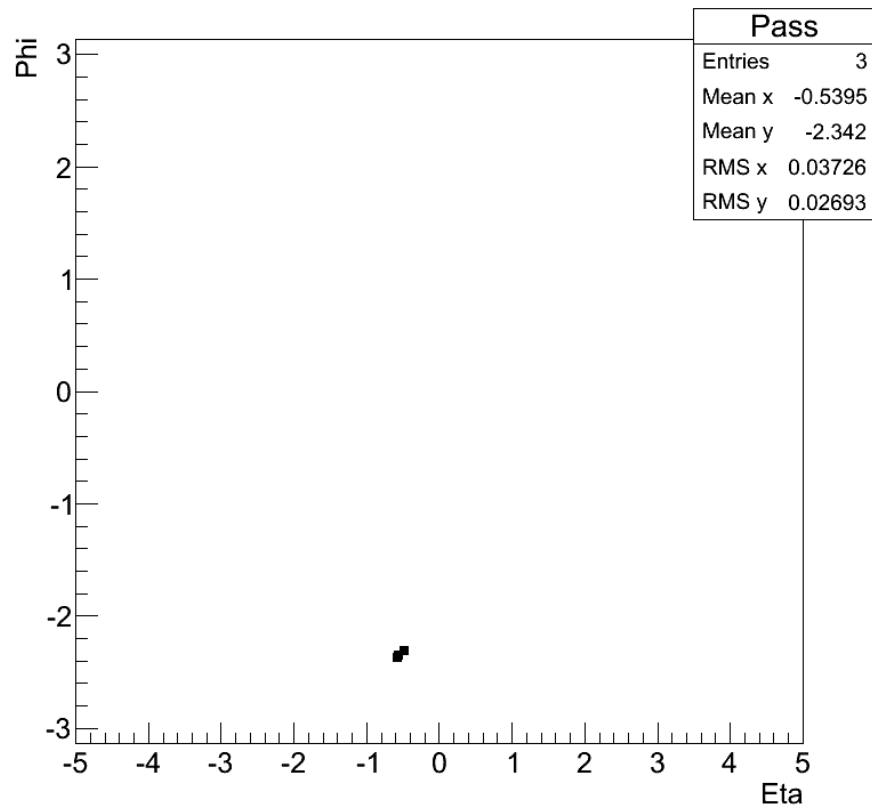
STRATEGY

- **Aim:** We want access to collection of cal deposits which will allow us to have images of highest resolution.
- Here, we explore different collections and plot their attributes in order to achieve the above objective
- **Content:** Plots of CaloTower, SuperCluster attributes and Electron Hcal Isolation Plots.
- **Pass:** Electrons which pass medium ID.
- **Fail:** Electrons which fail medium ID.
- $dR < 0.1$ and $dR < 0.2$ for CaloTowers and SuperClusters respectively.
- **Some Facts:**
 - A CaloTower is made of 5x5 crystals.
 - ECAL crystal size in eta-phi space is 0.0174×0.0174
 - HCAL crystal size is 0.087×0.087 in barrel and 0.17×0.17 in endcap.
 - SuperCluster is combination of calotowers.

η vs ϕ of CaloTower and EBSuperCluster

Both the collections match the same electron of DYToEE

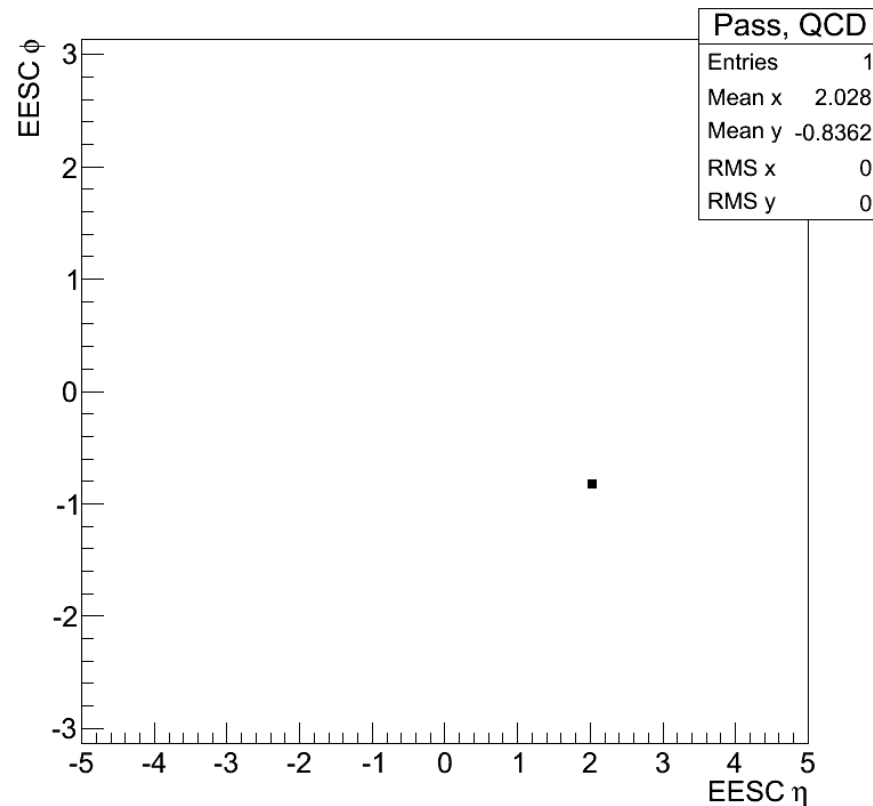
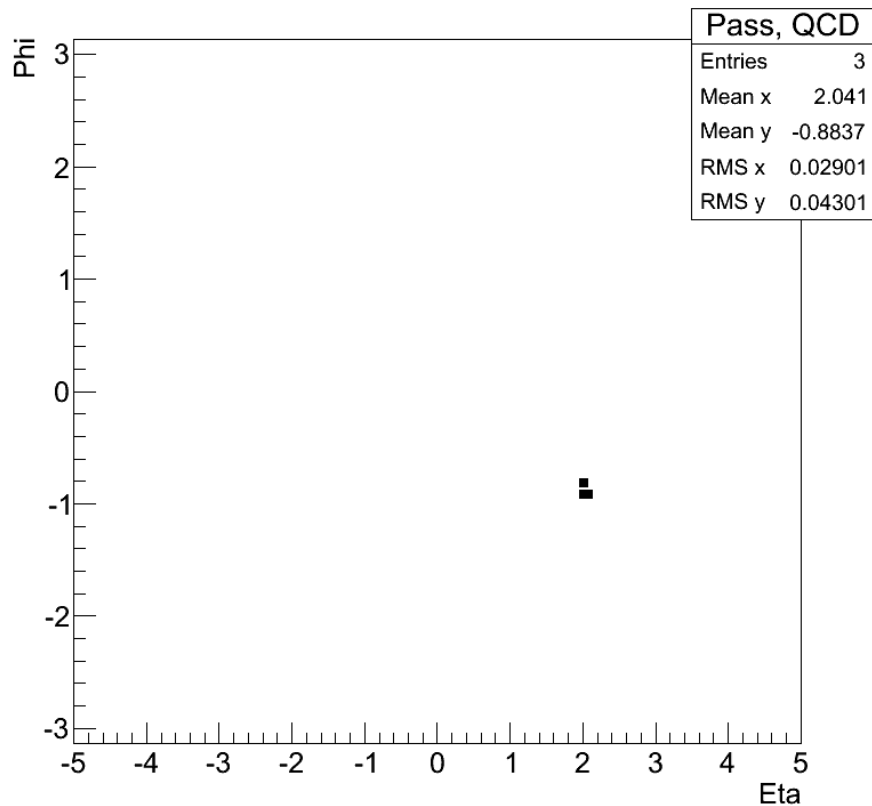
Bin size 0.0174x0.0174



η vs ϕ of CaloTower and EESuperCluster

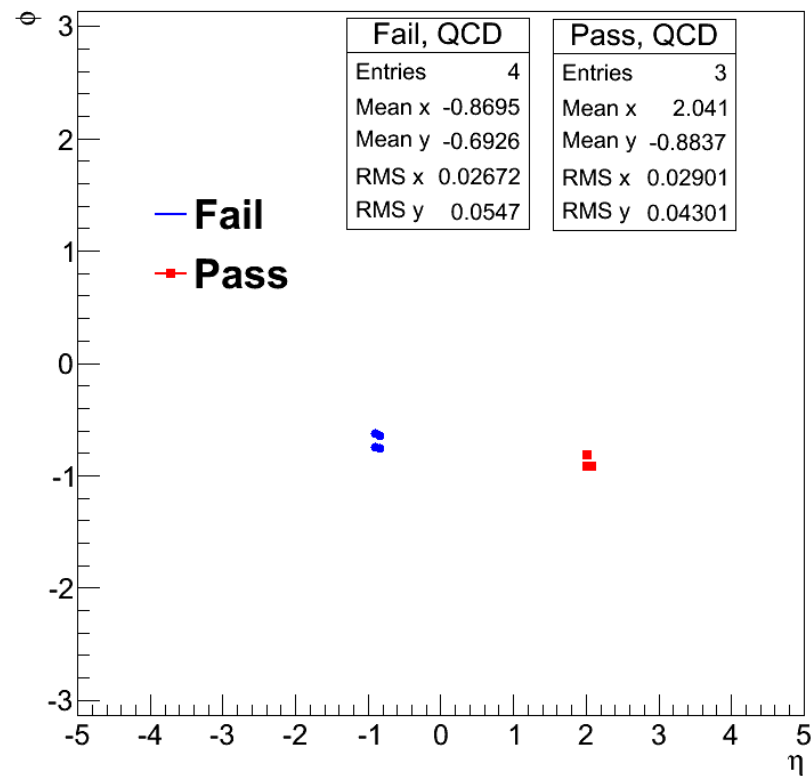
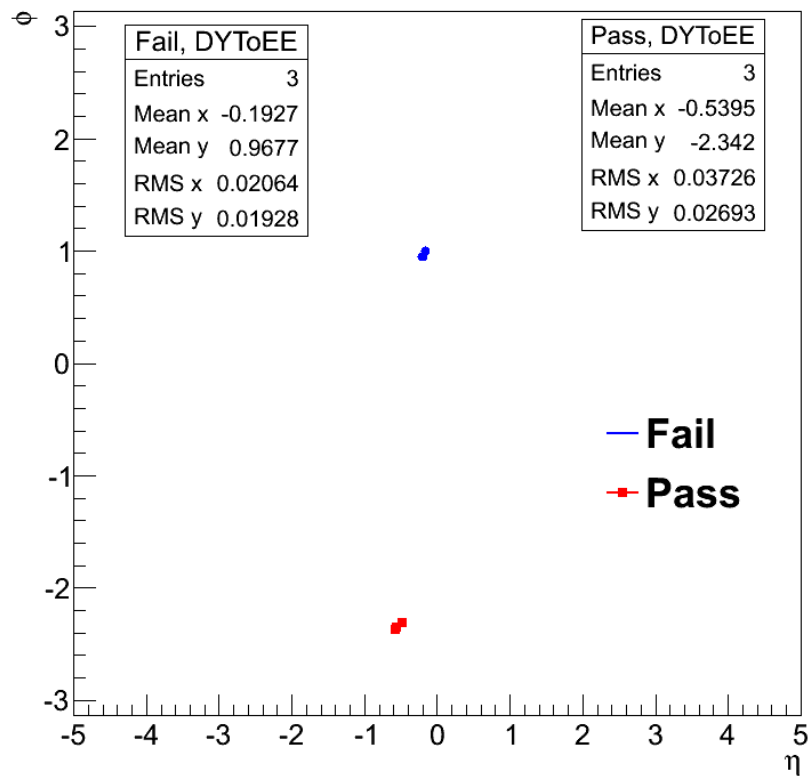
Both the collections match the same electron of QCD

Bin size 0.0174x0.0174



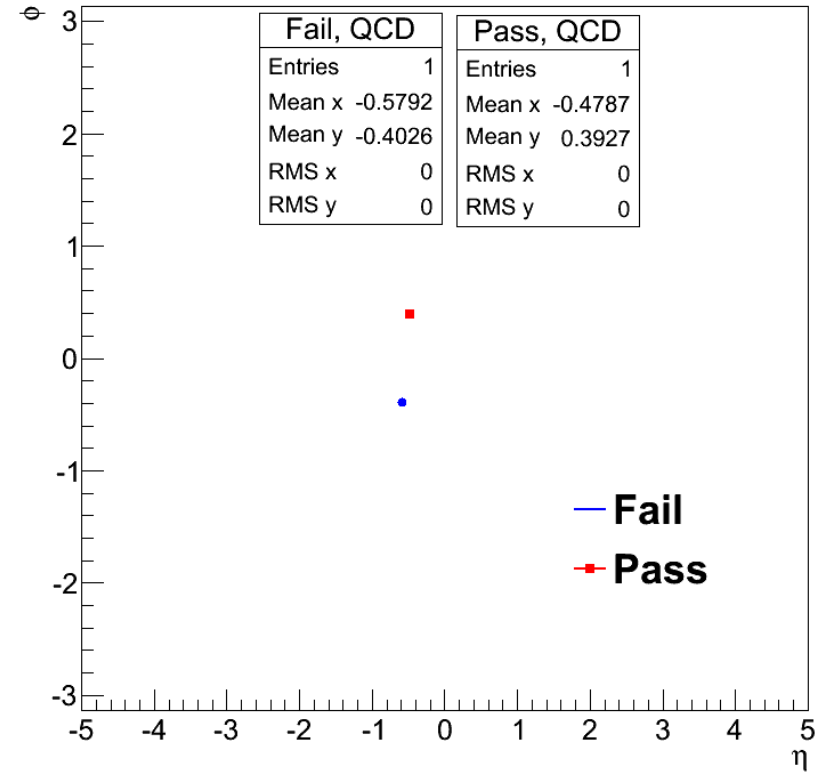
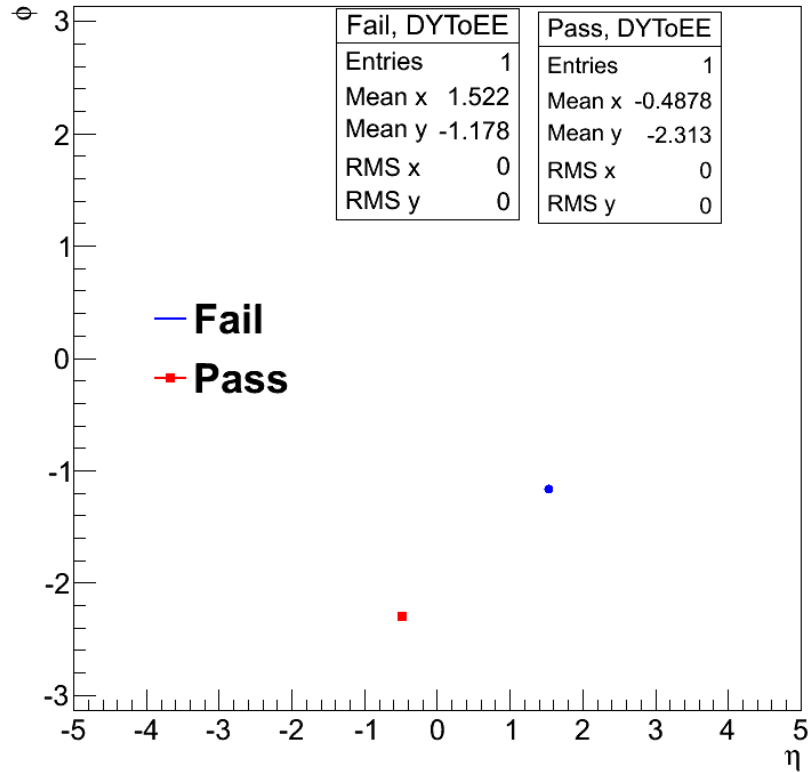
η vs ϕ of CaloTowers

Bin size 0.0174x0.0174



η vs ϕ of CaloTowers

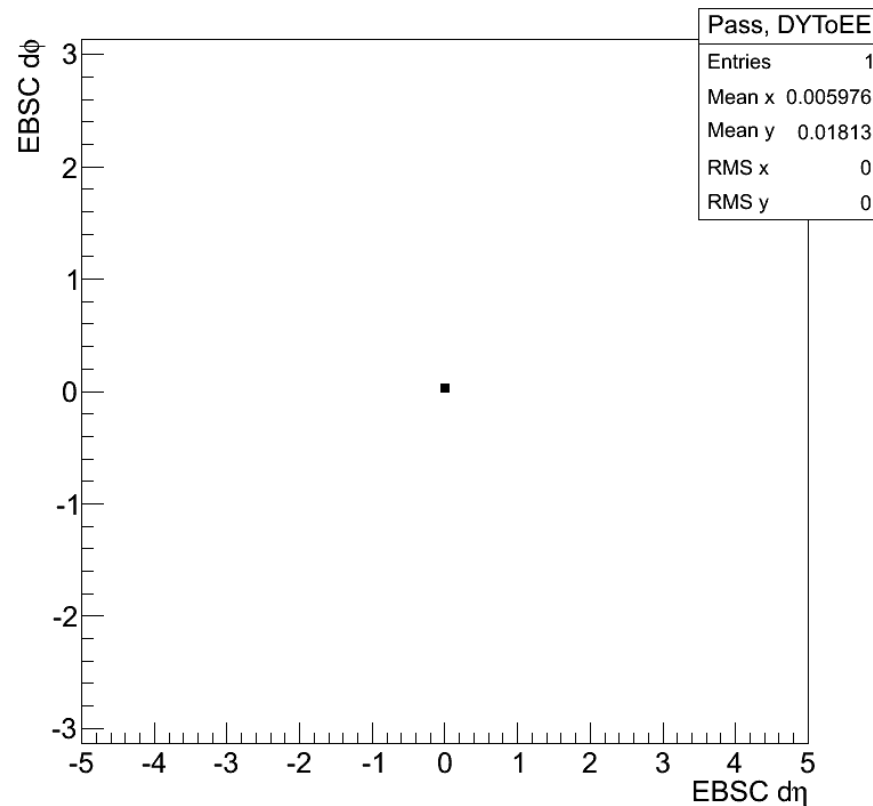
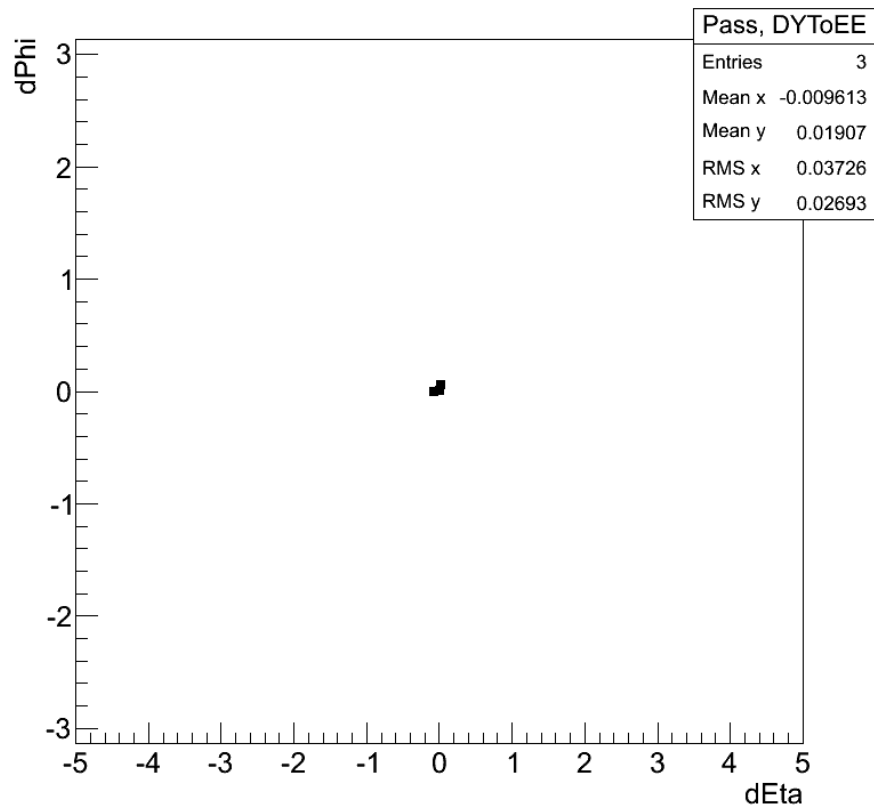
Condition on CaloTower: HcalEnergy>EcalEnergy
Bin size 0.0174x0.0174



$d\eta$ vs $d\phi$ of CaloTower and EBSuperCluster

Both the collections match the same electron of DYToEE

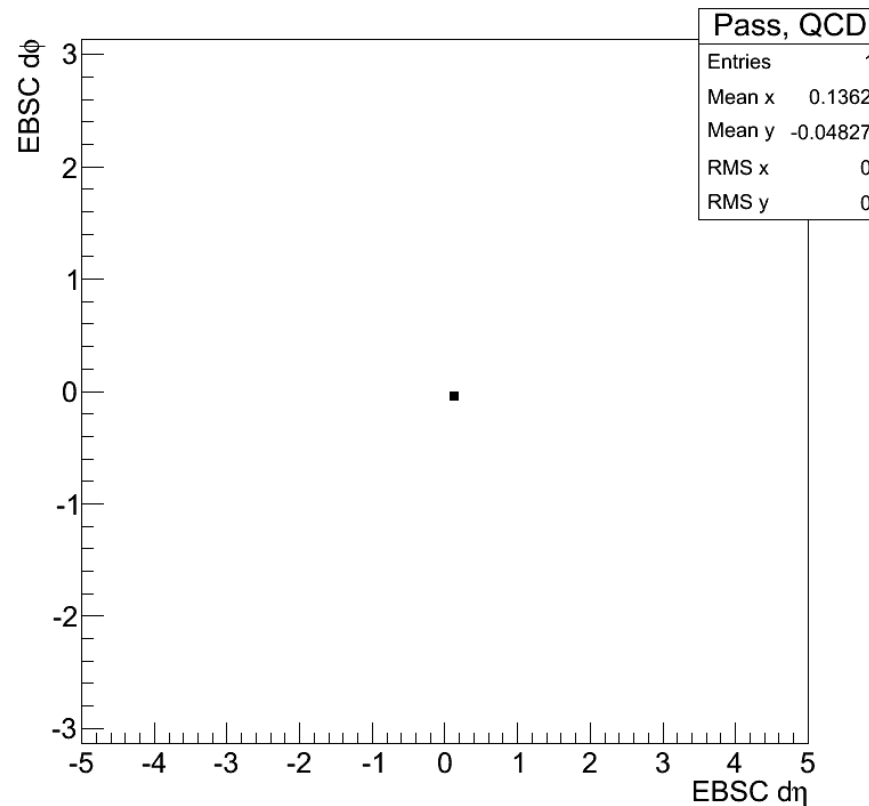
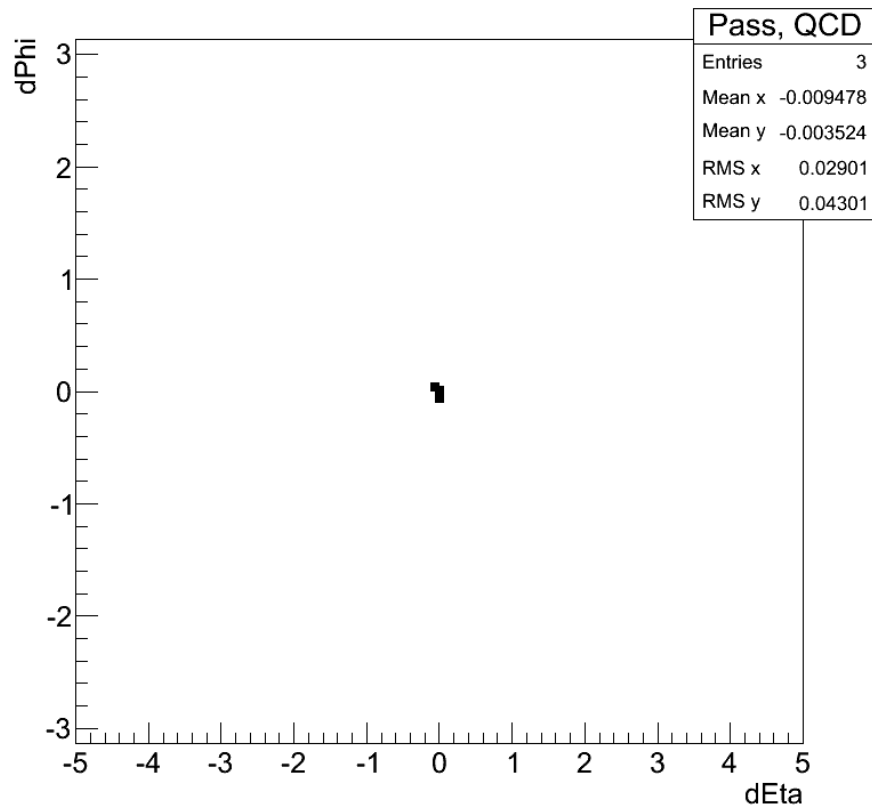
Bin size 0.0174x0.0174



$d\eta$ vs $d\phi$ of CaloTower and EBSuperCluster

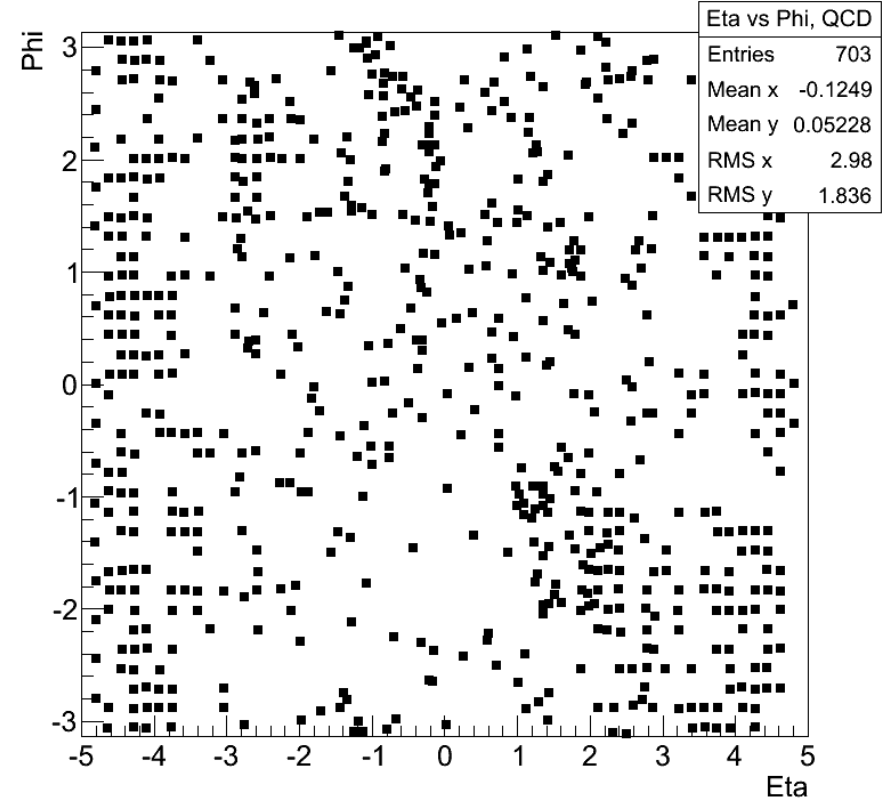
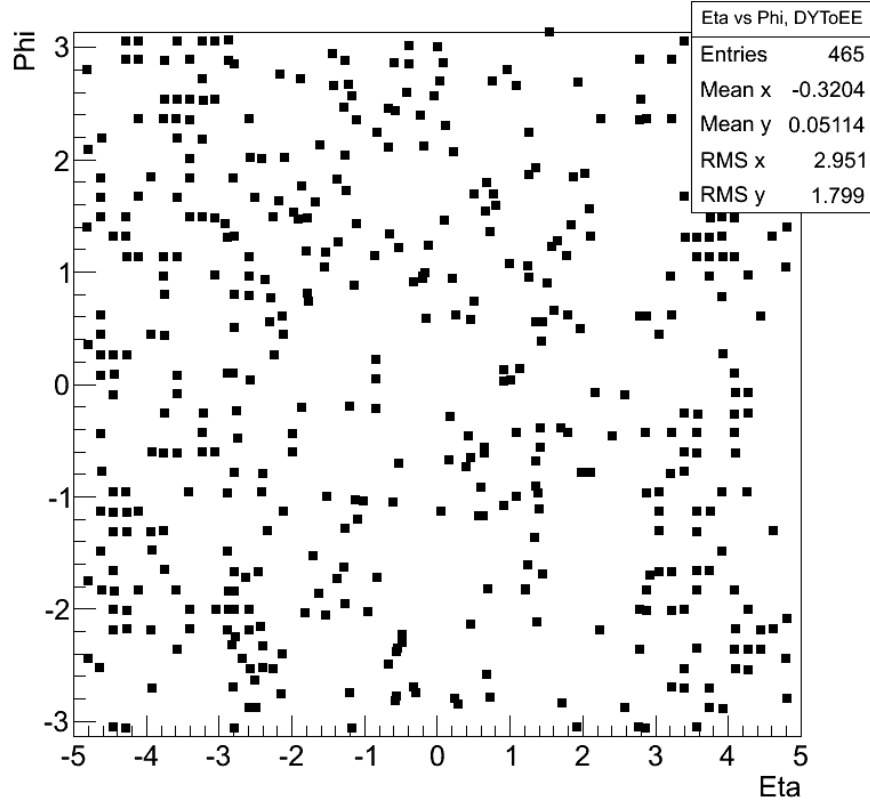
Both the collections match the same electron of QCD

Bin size 0.0174×0.0174



η vs ϕ of CaloTower

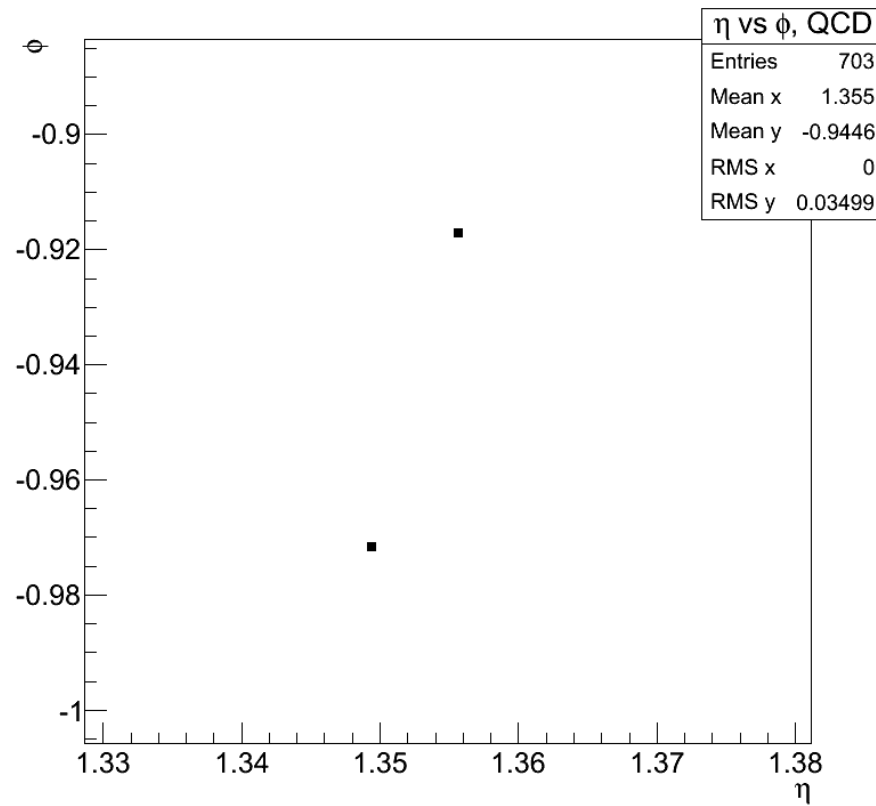
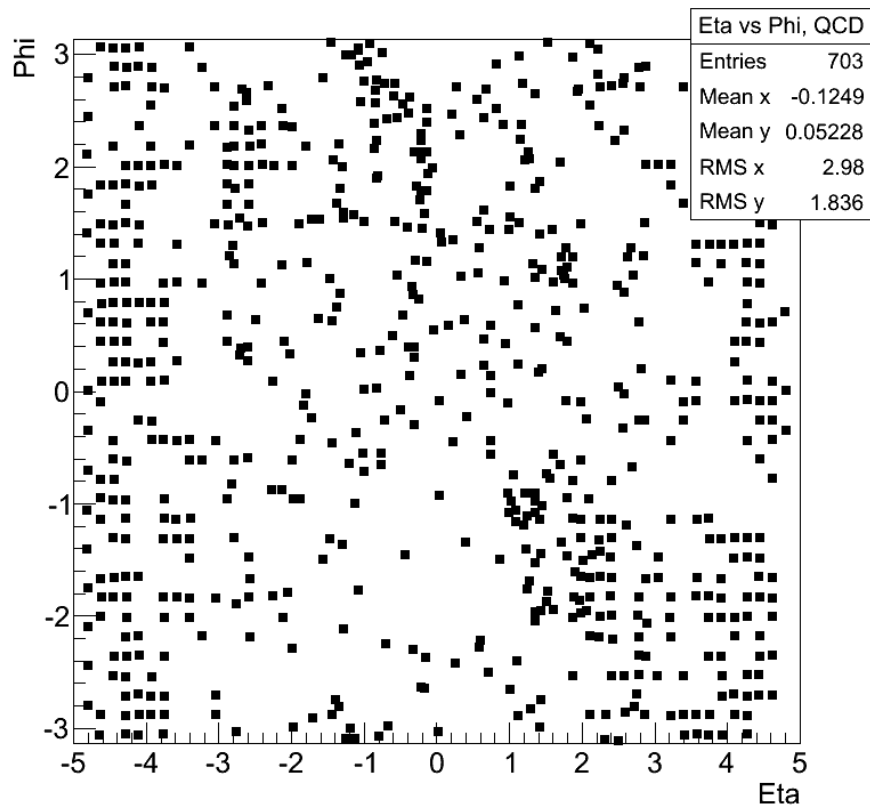
Just looped over all calotowers and plotted
Bin size 0.0174x0.0174



η vs ϕ of CaloTowers and Zoomed Version

Looped over all calotowers in an event

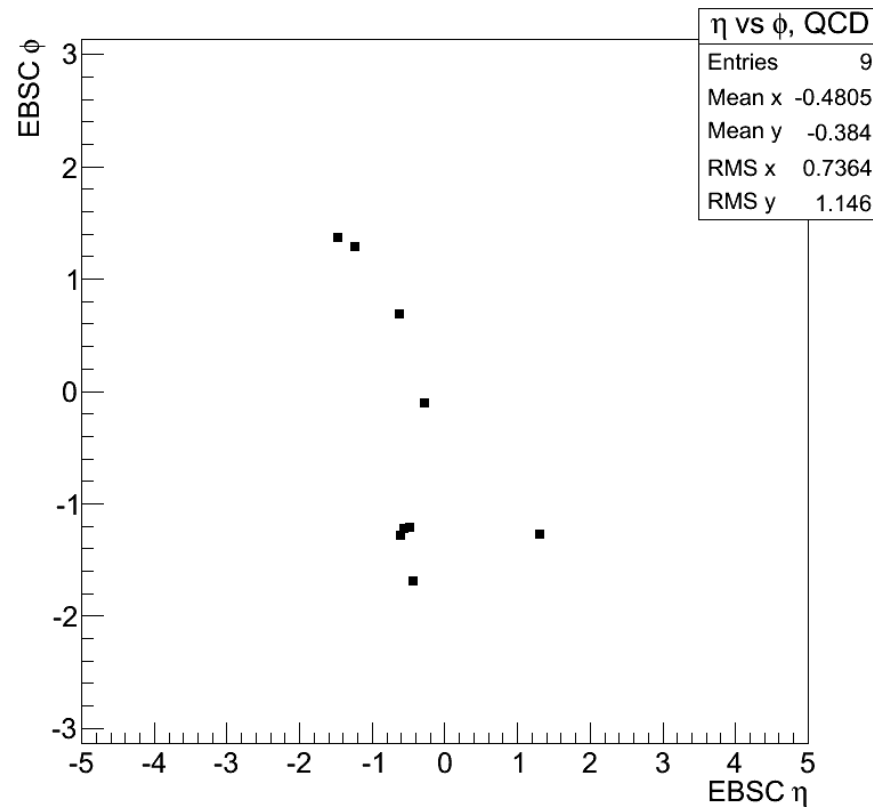
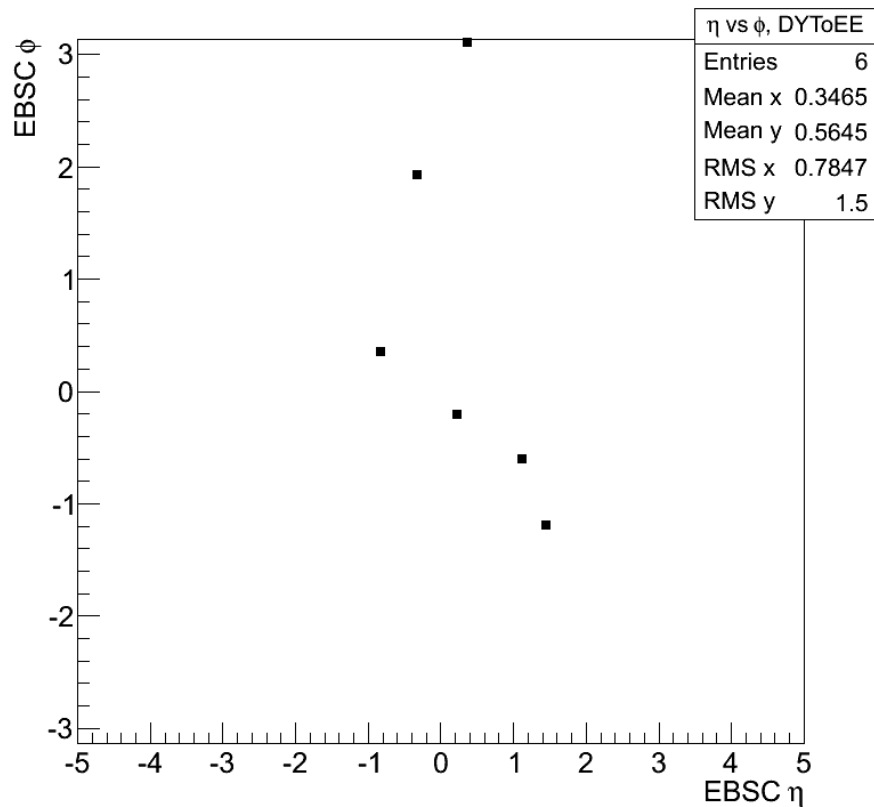
Bin size 0.0174x0.0174



η vs ϕ of EcalBarrel SuperClusters

Looped over all EcalBarrel Superclusters in an event

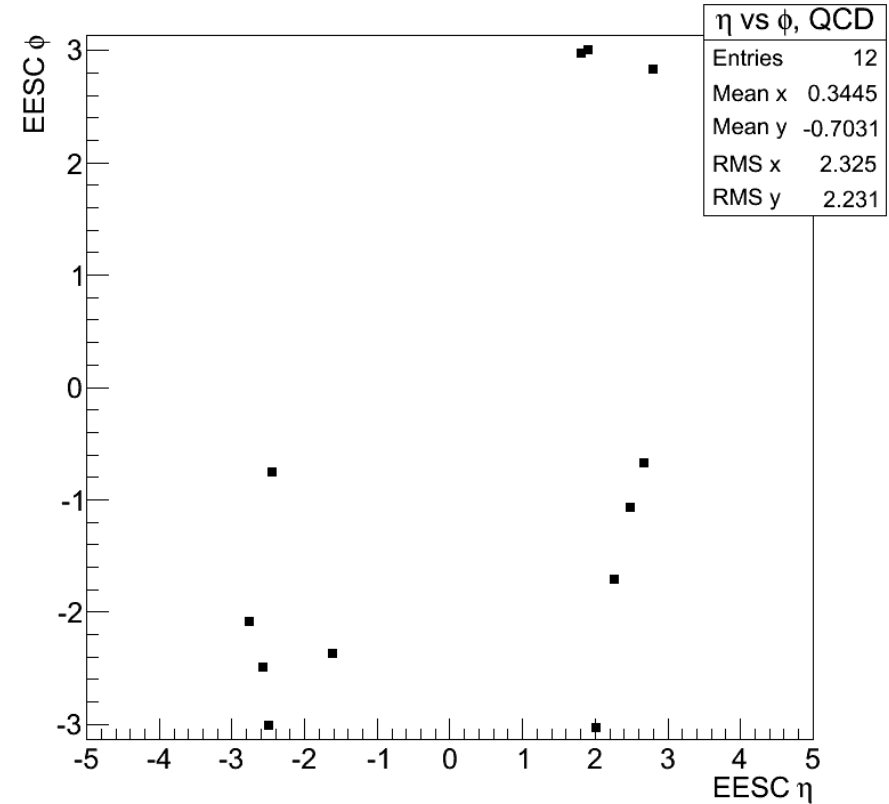
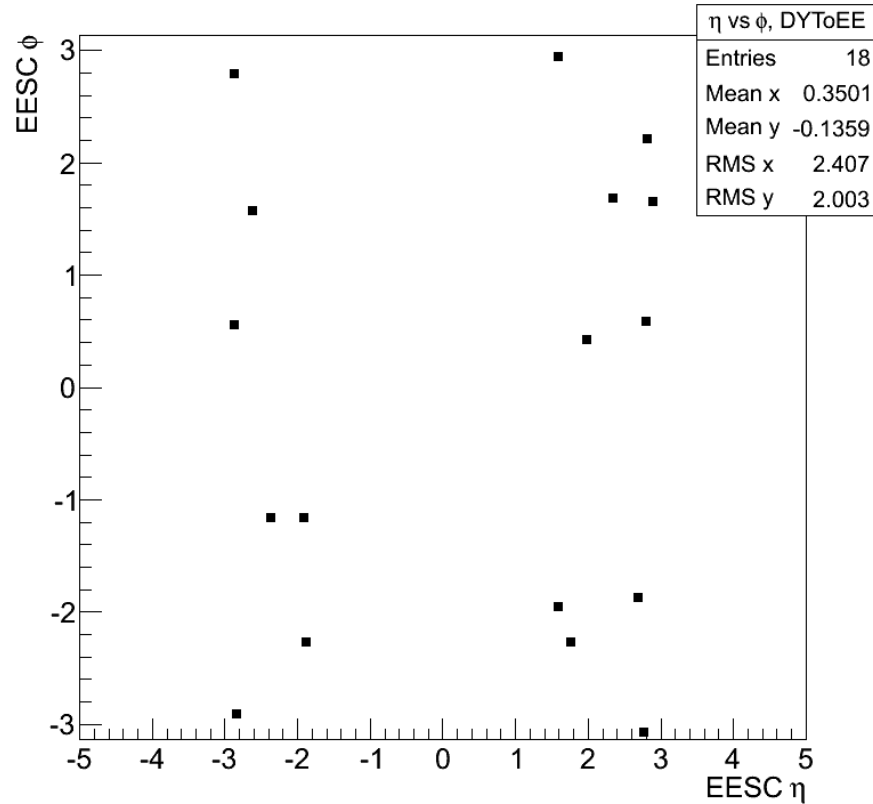
Bin size 0.0174x0.0174



η vs ϕ of EcalEndcap SuperClusters

Looped over all EcalEndcap Superclusters in an event

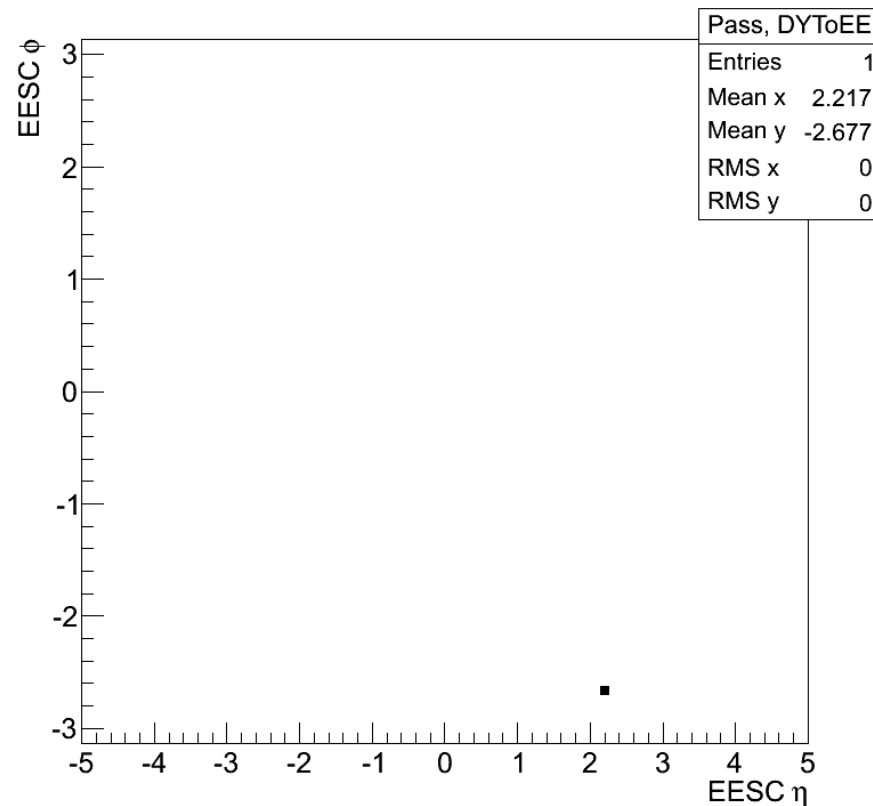
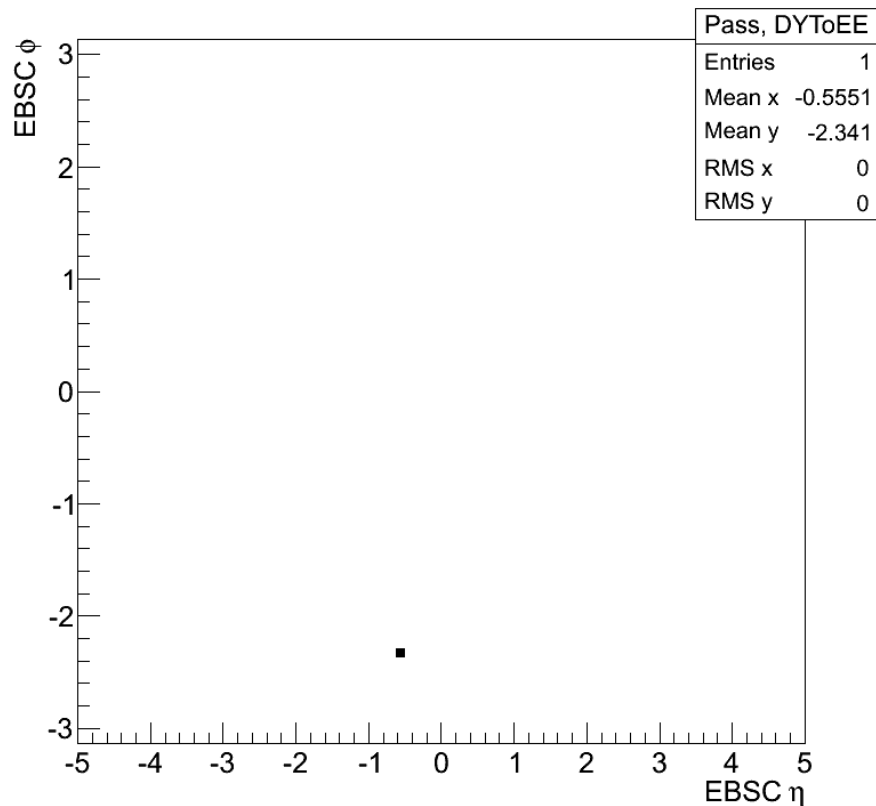
Bin size 0.0174x0.0174



η vs ϕ of EBSuperCluster and EESuperCluster

Both the collections match the same electron of DYToEE

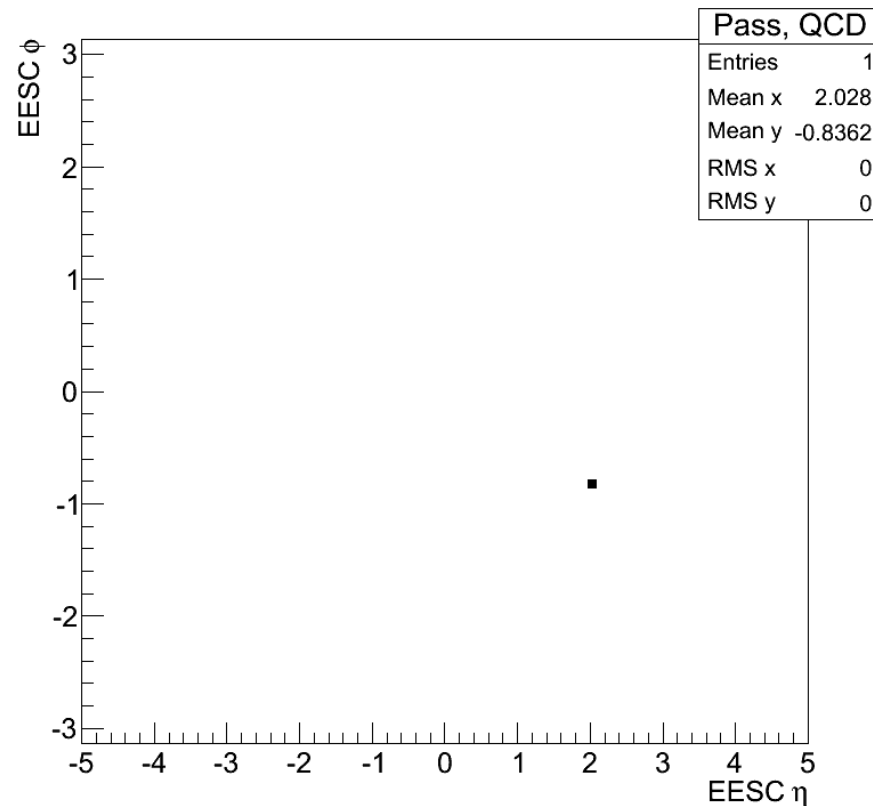
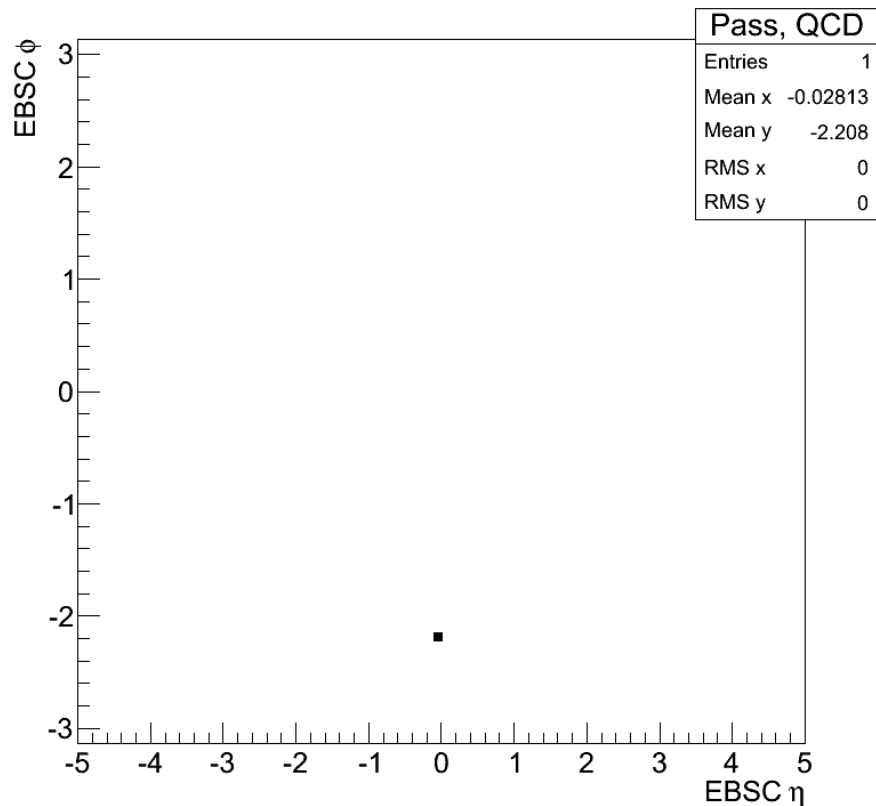
Bin size 0.0174x0.0174



η vs ϕ of EBSuperCluster and EESuperCluster

Both the collections match the same electron of QCD

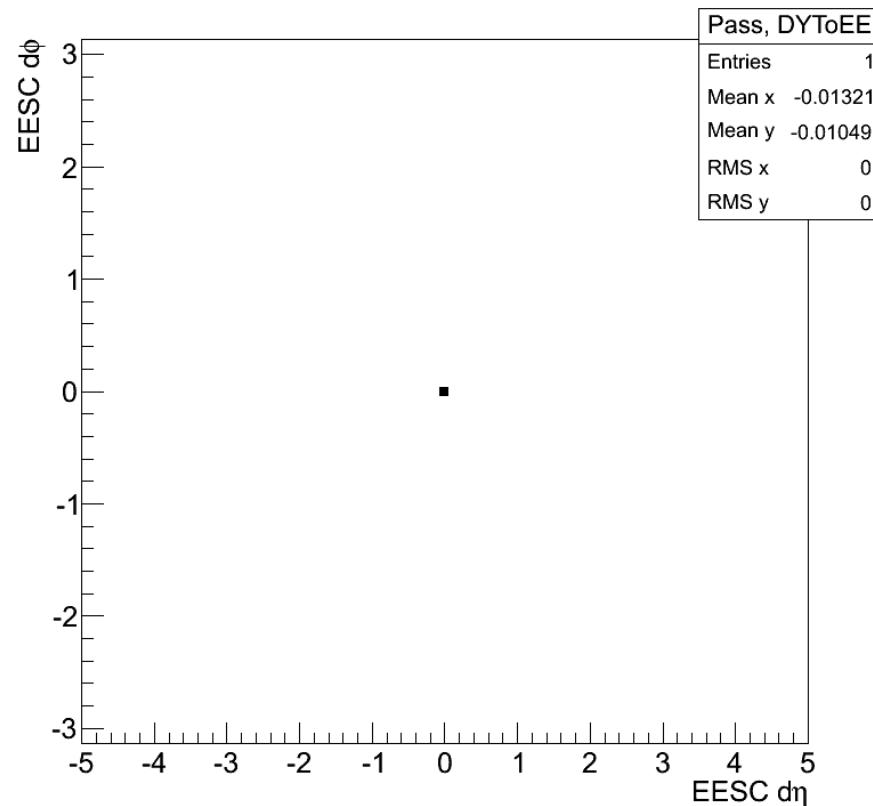
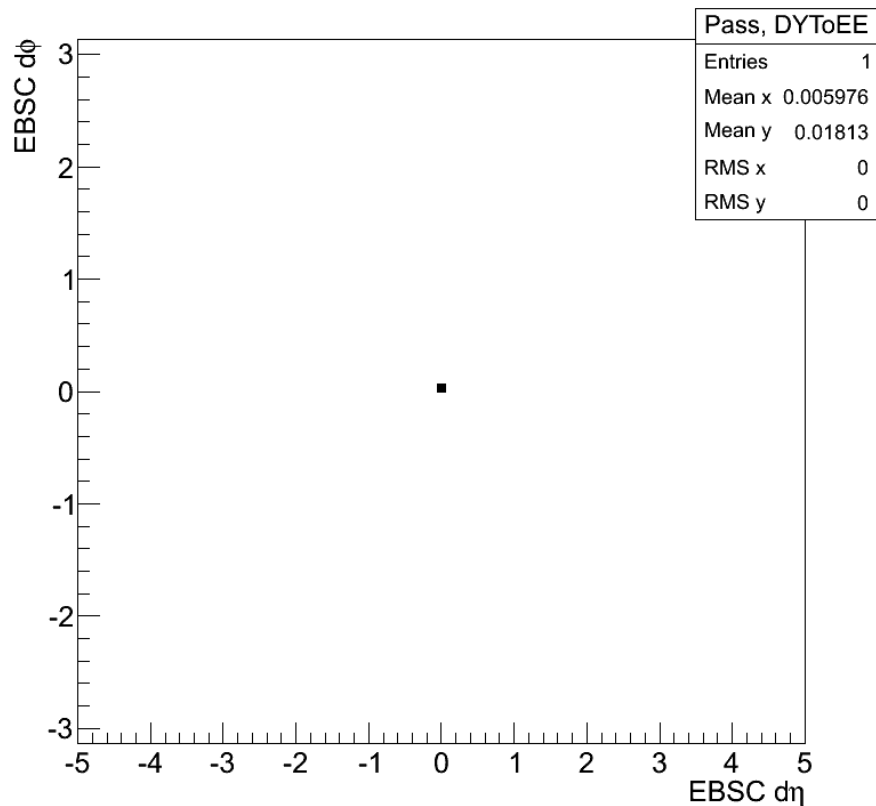
Bin size 0.0174x0.0174



$d\eta$ vs $d\phi$ of EBSuperCluster and EESuperCluster

Both the collections match the same electron of DYToEE

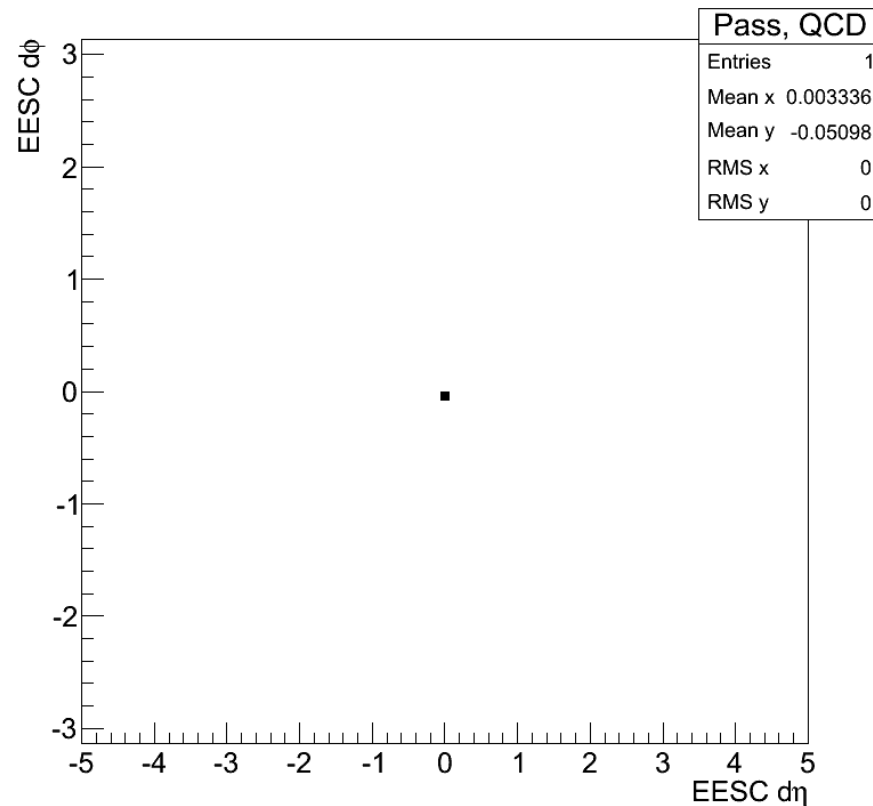
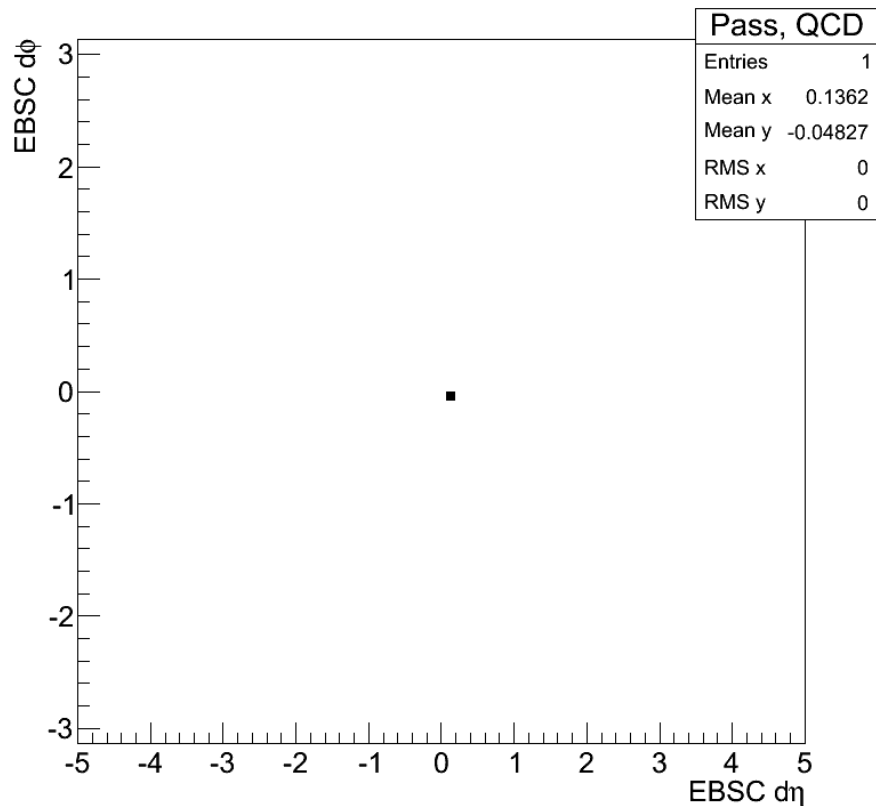
Bin size 0.0174x0.0174



$d\eta$ vs $d\phi$ of EBSuperCluster and EESuperCluster

Both the collections match the same electron of QCD

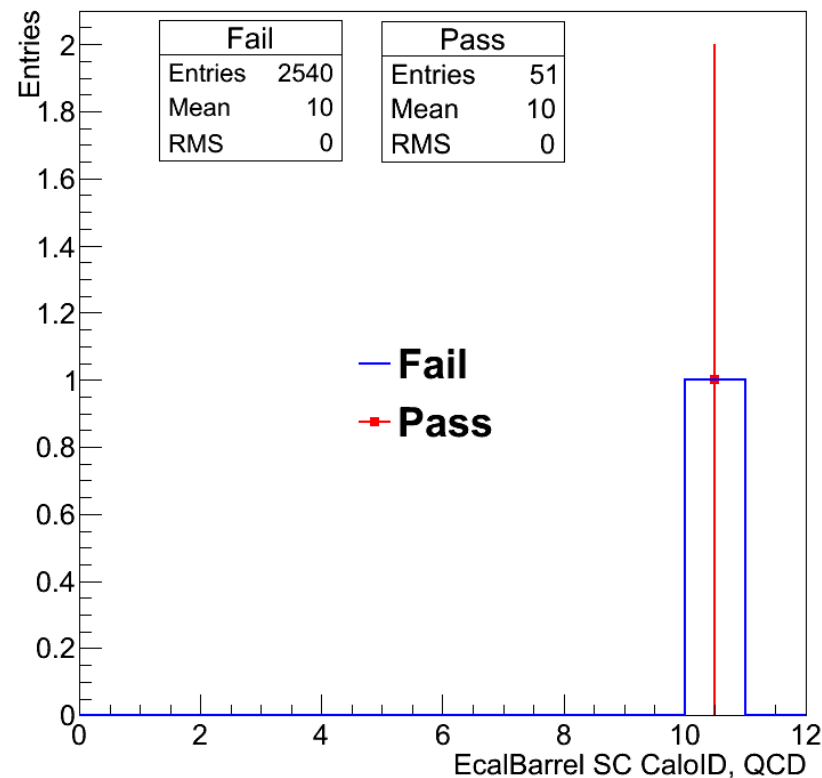
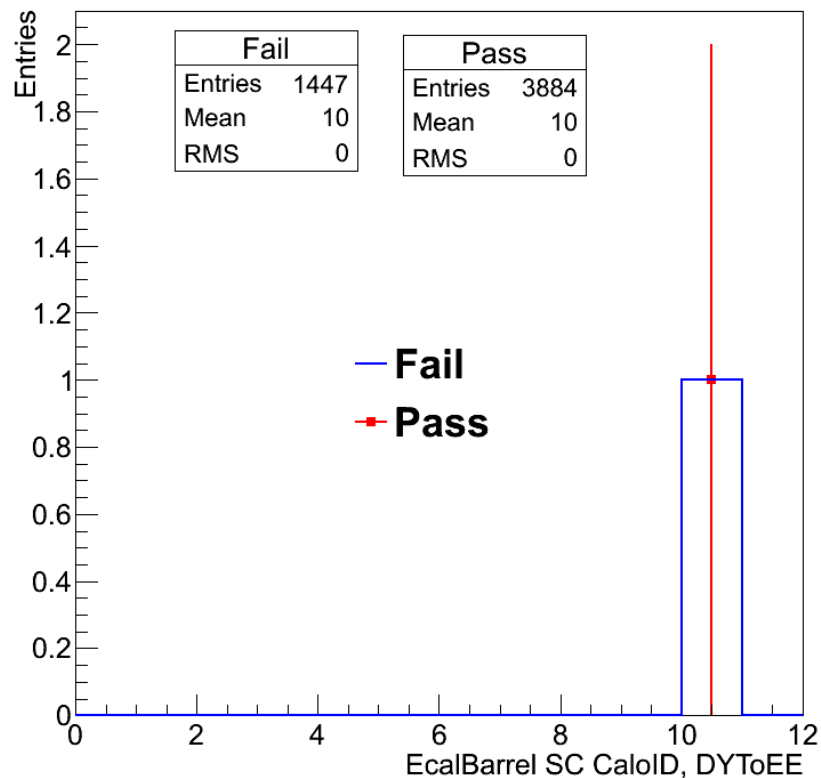
Bin size 0.0174x0.0174



EcalBarrel SuperCluster Detector ID

Value 10 : DET_NONE (probably they didn't fill in the value)

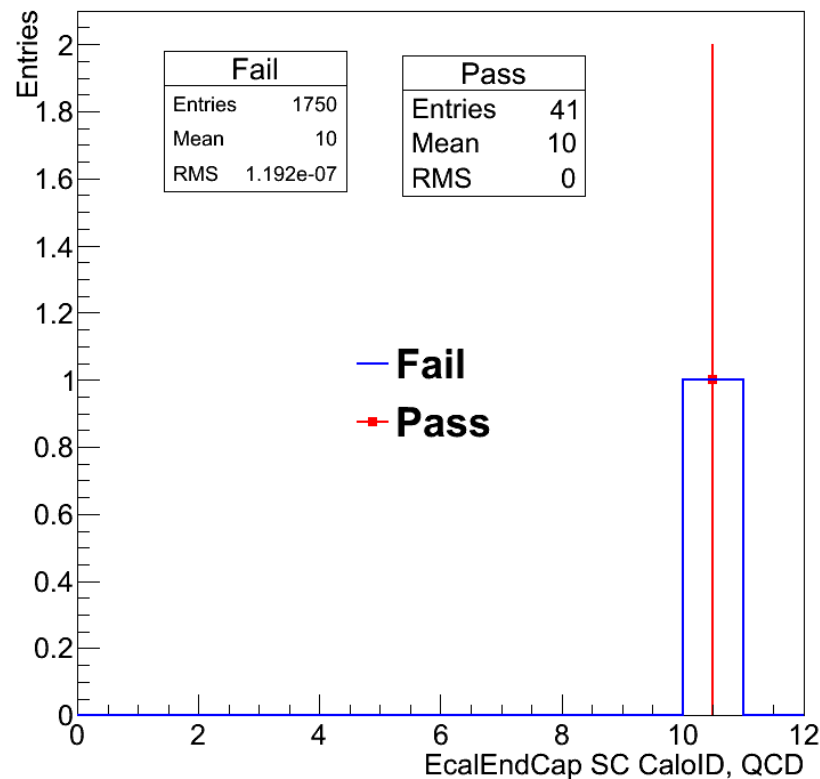
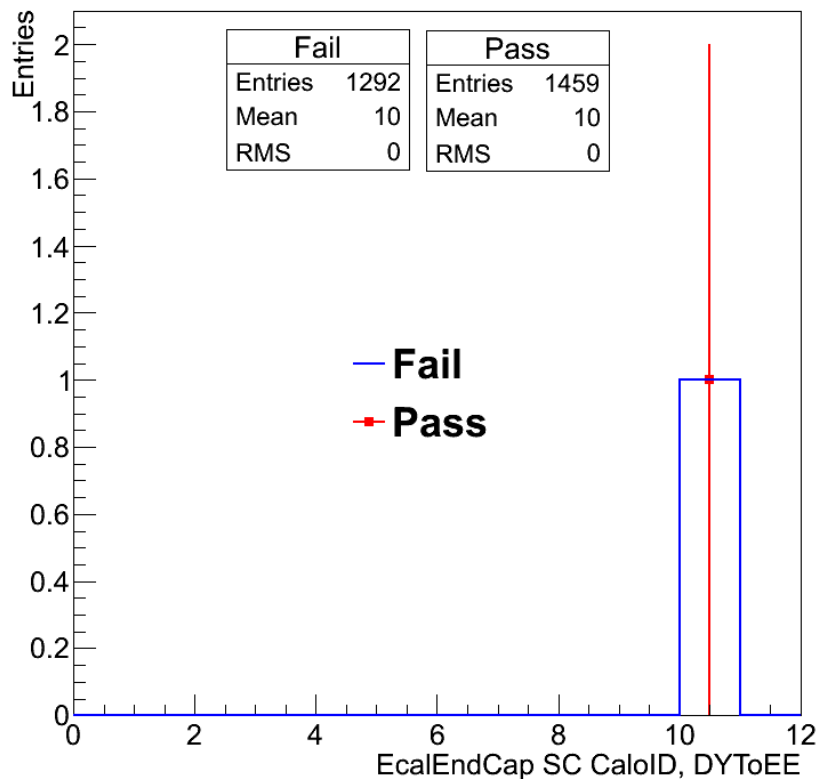
Histogram of detector ID at which EBSC is detected. Info of all other values can be found [here](#).



EcalEndCap SuperCluster Detector ID

Value 10 : DET_NONE (probably they didn't fill in the value)

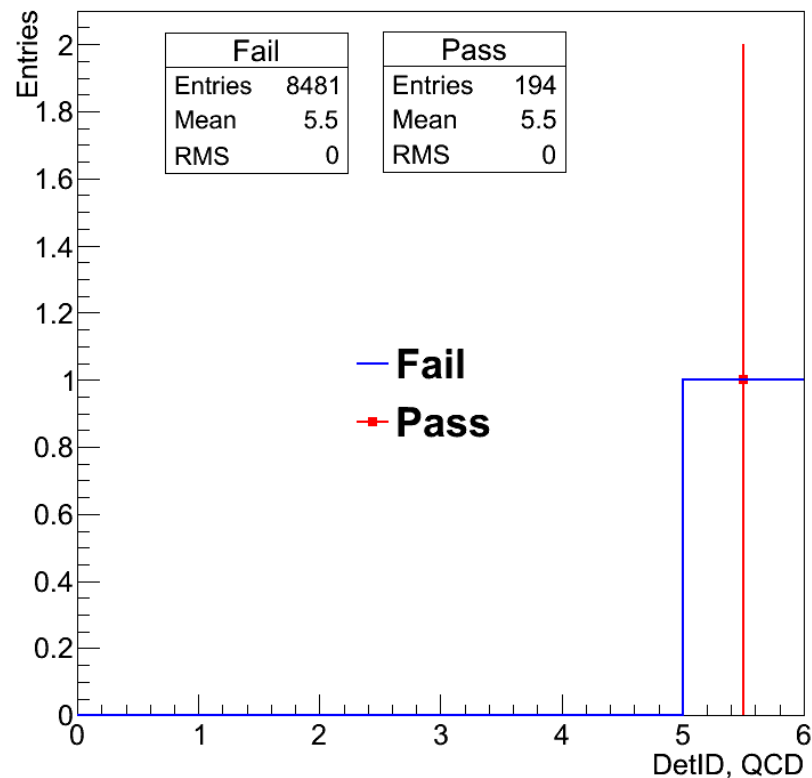
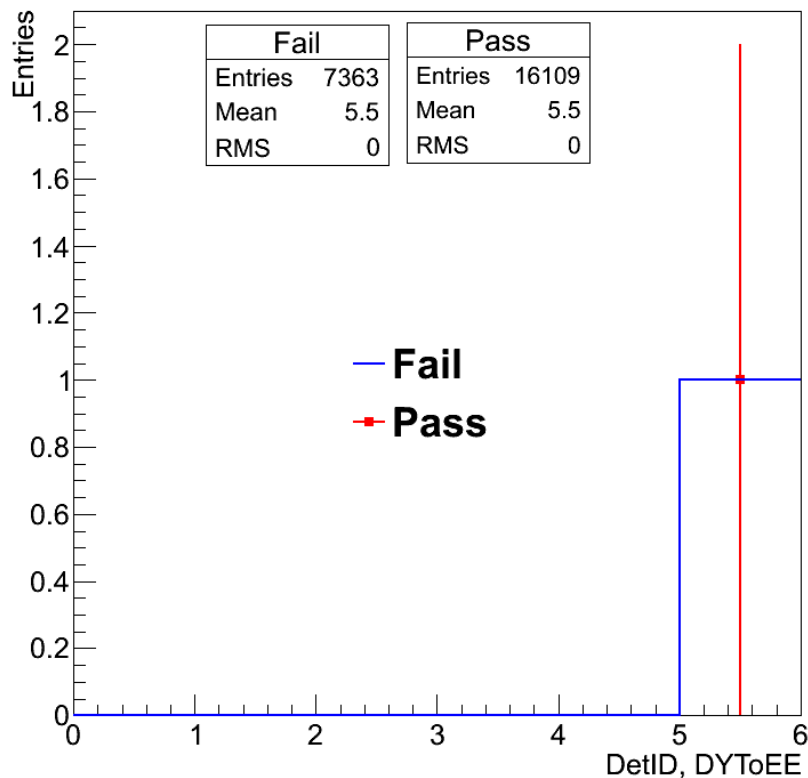
Histogram of detector ID at which EESC is detected. Info of all other values can be found [here](#).



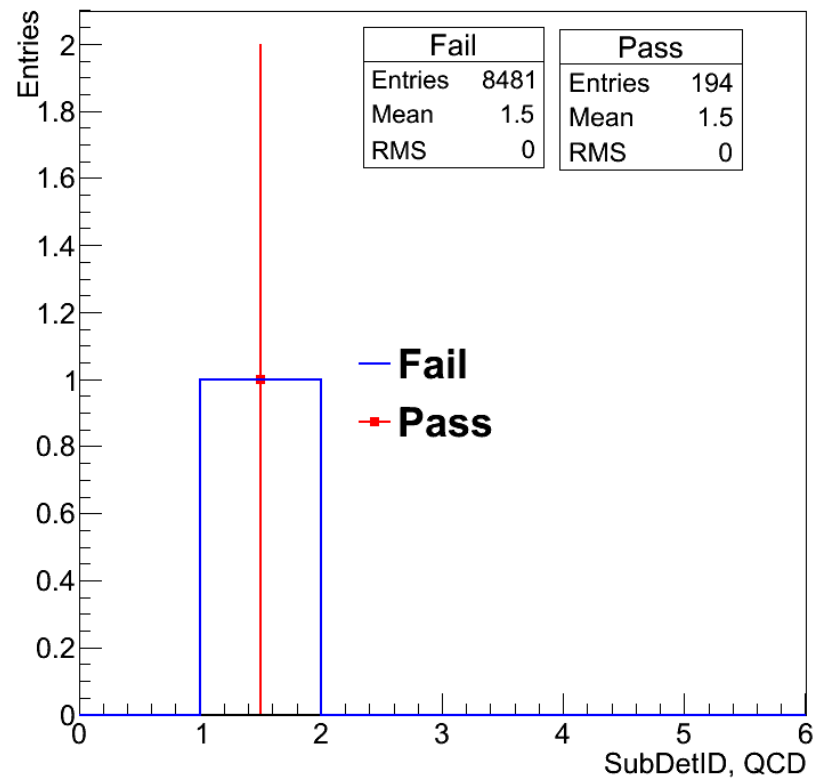
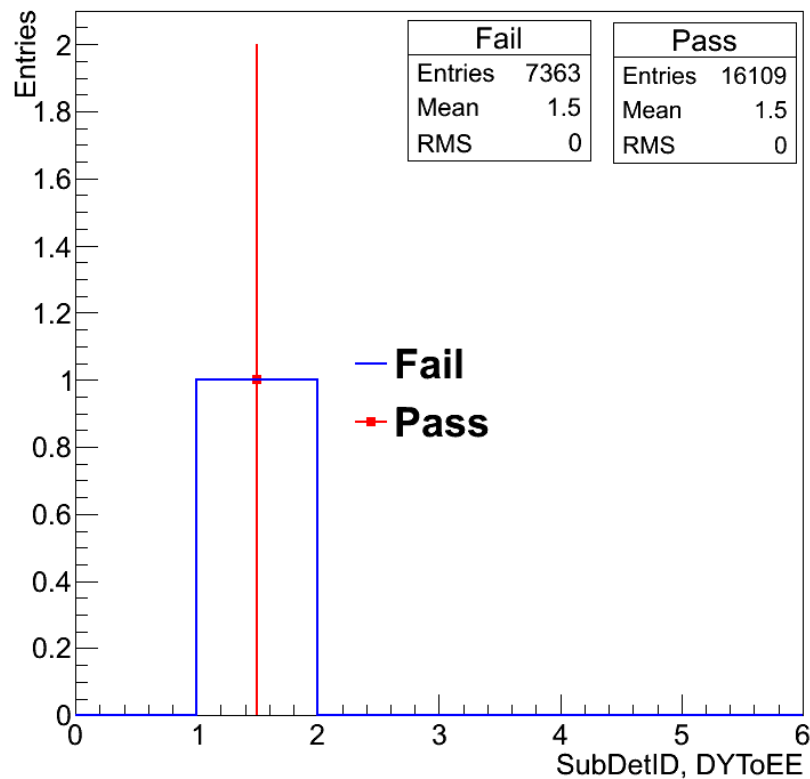
CaloTower DetectorID

Value 5: Calo

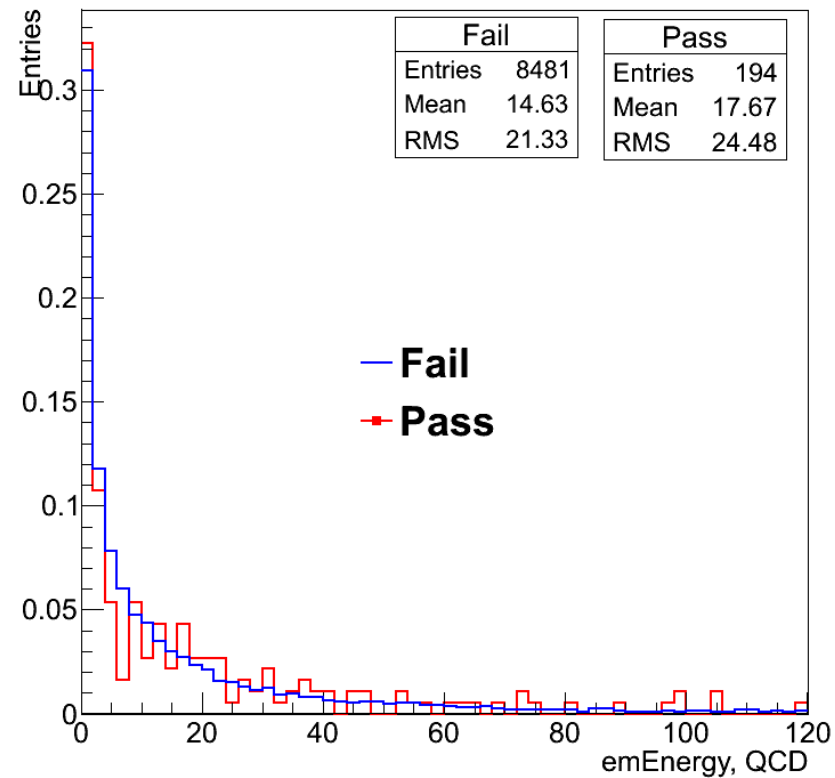
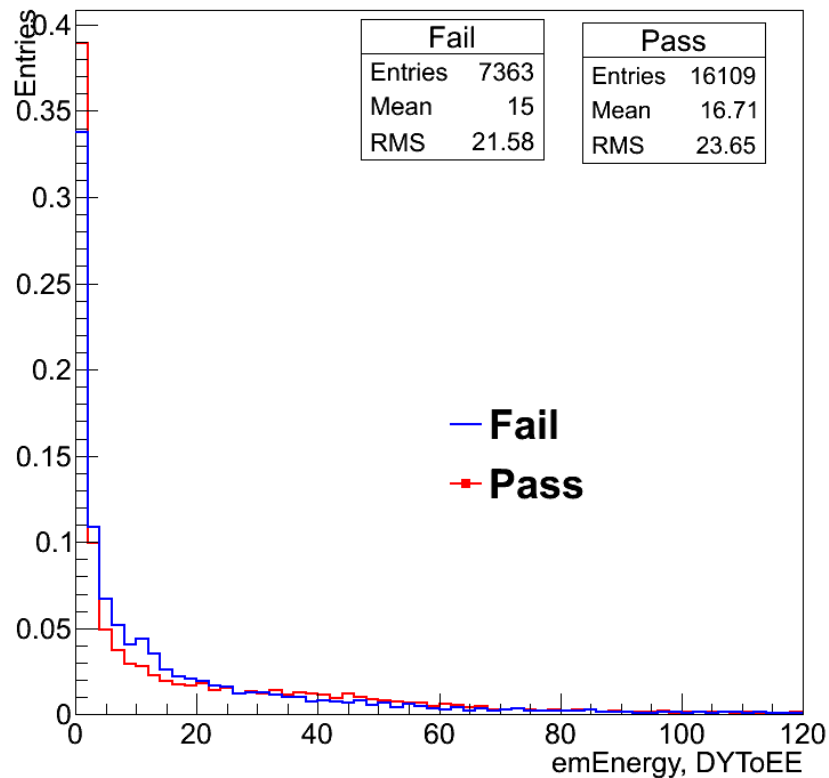
Histogram of detector ID at which the calotower is detected. Info of all other values can be found [here](#).



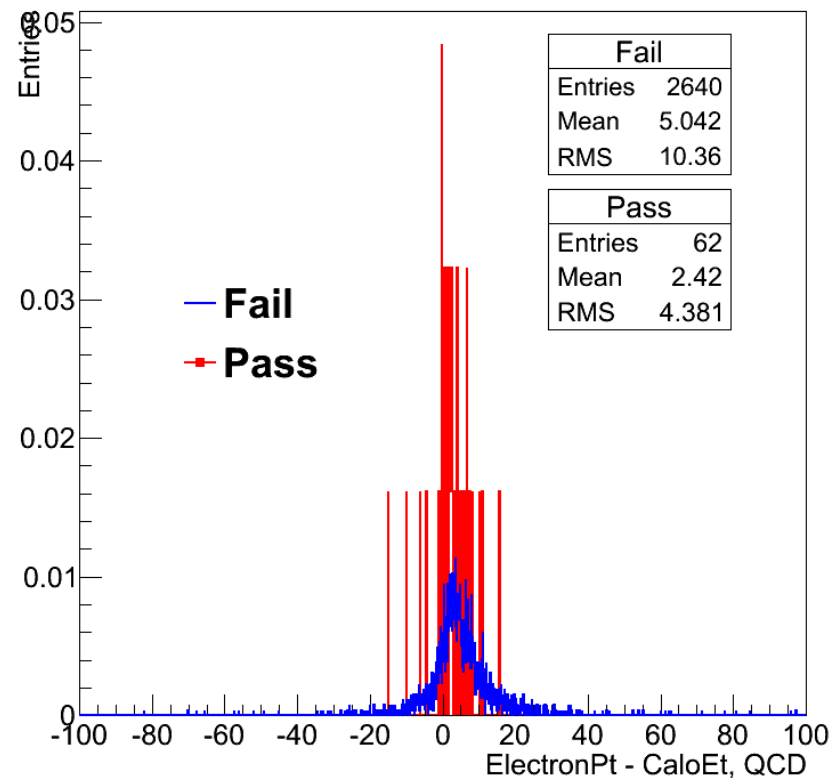
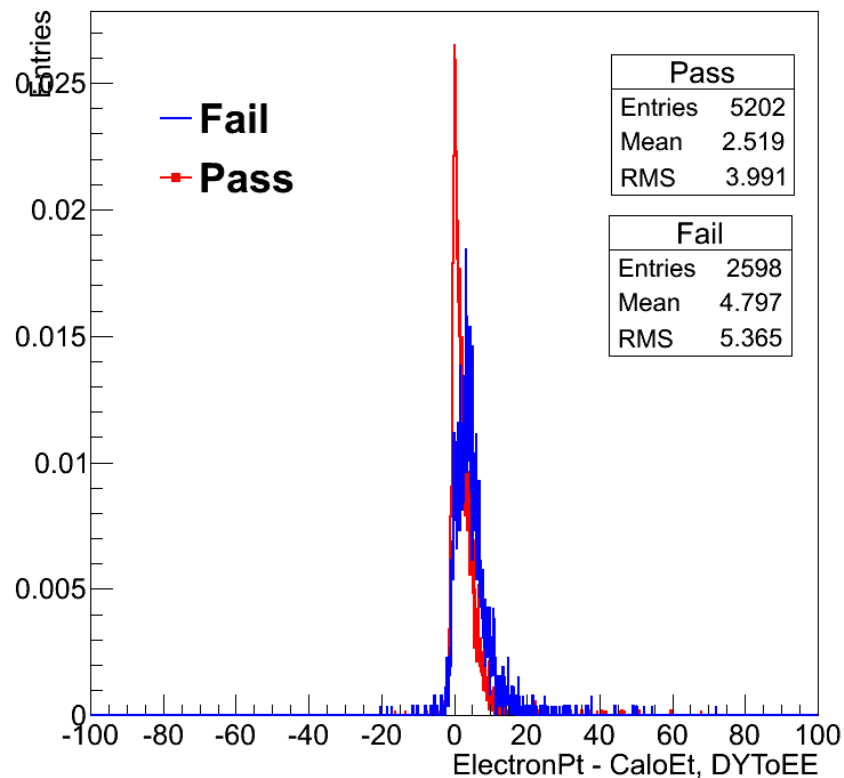
CaloTower SubDetector ID



CaloTowers' EcalEnergy

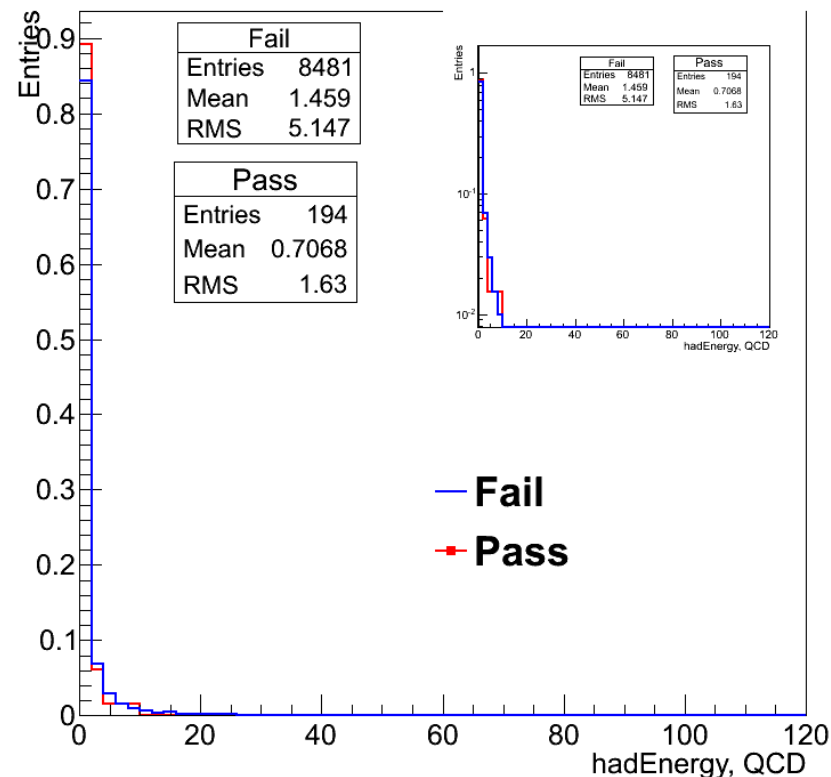
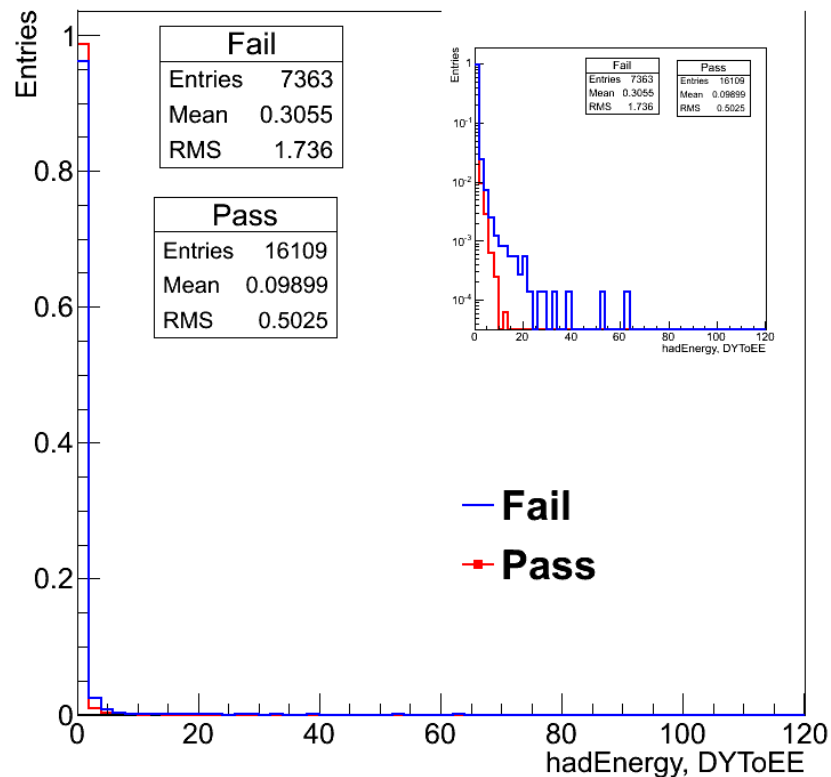


Difference of ElectronPt and Σ CaloTower Transverse Ecal Energy

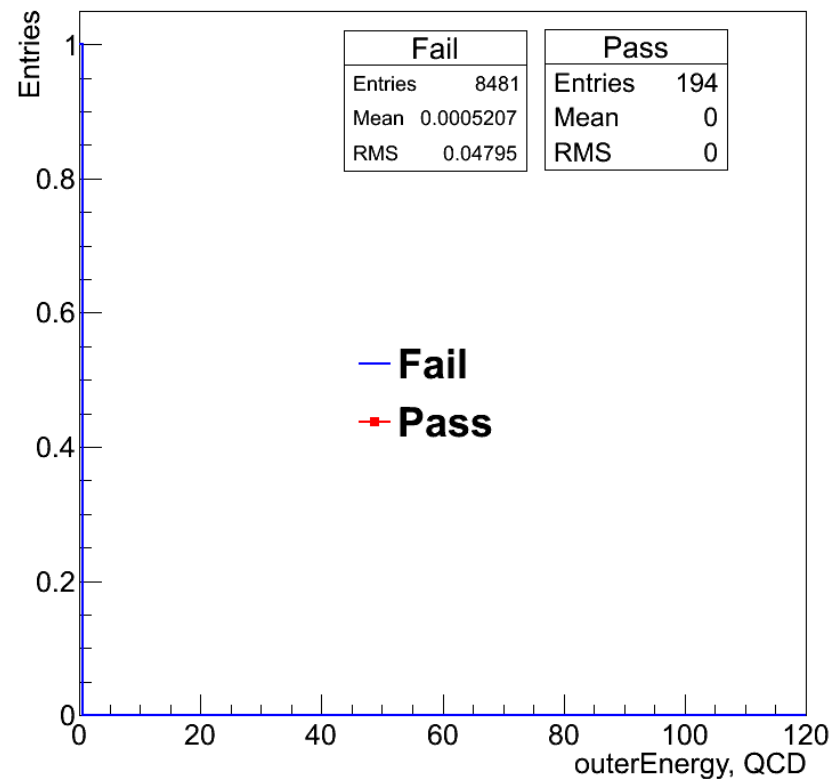
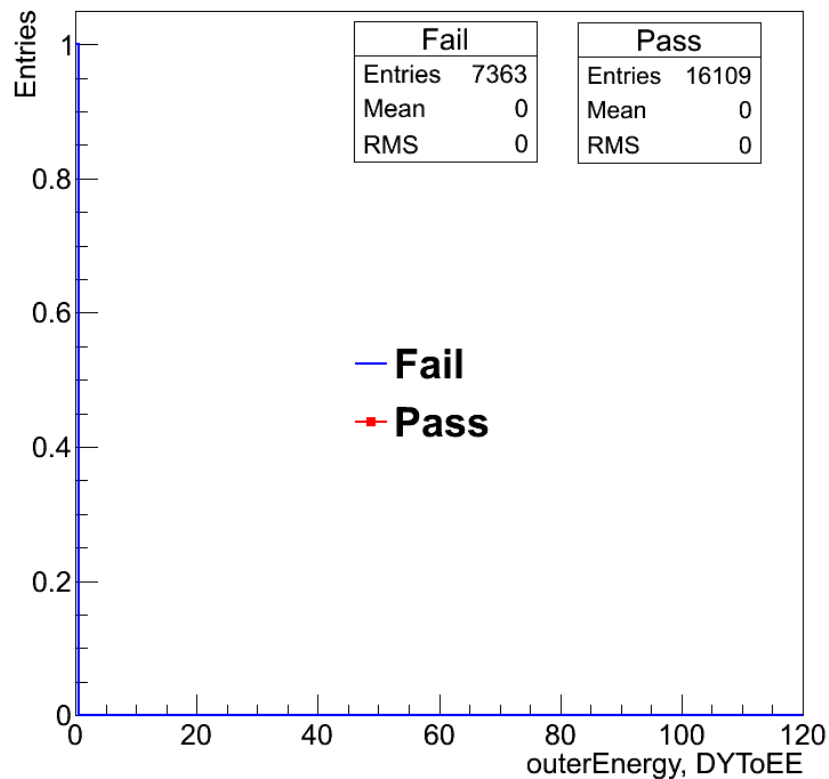


CaloTowers' Hcal Energy

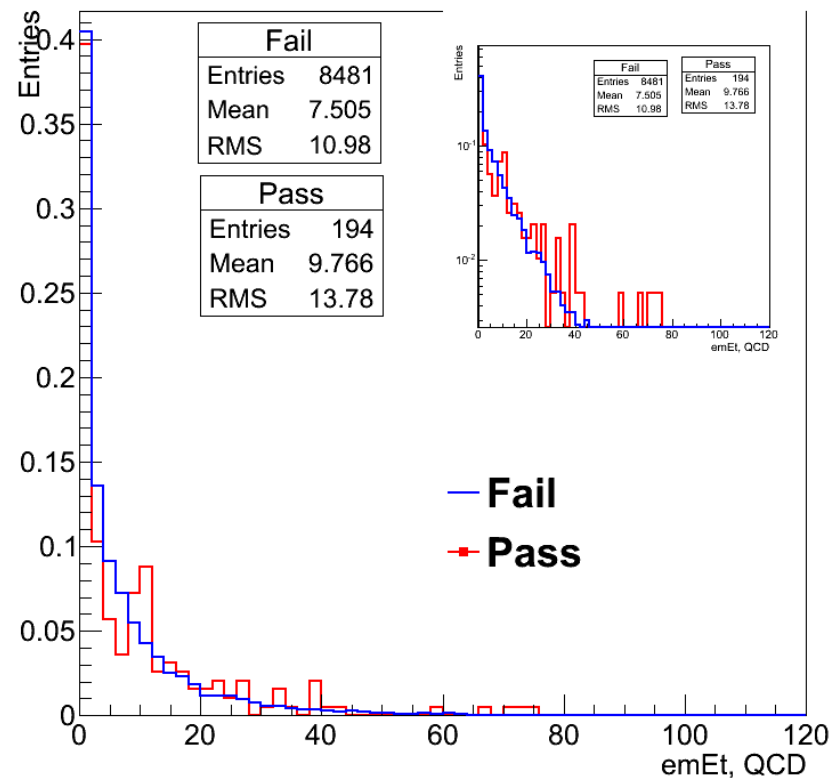
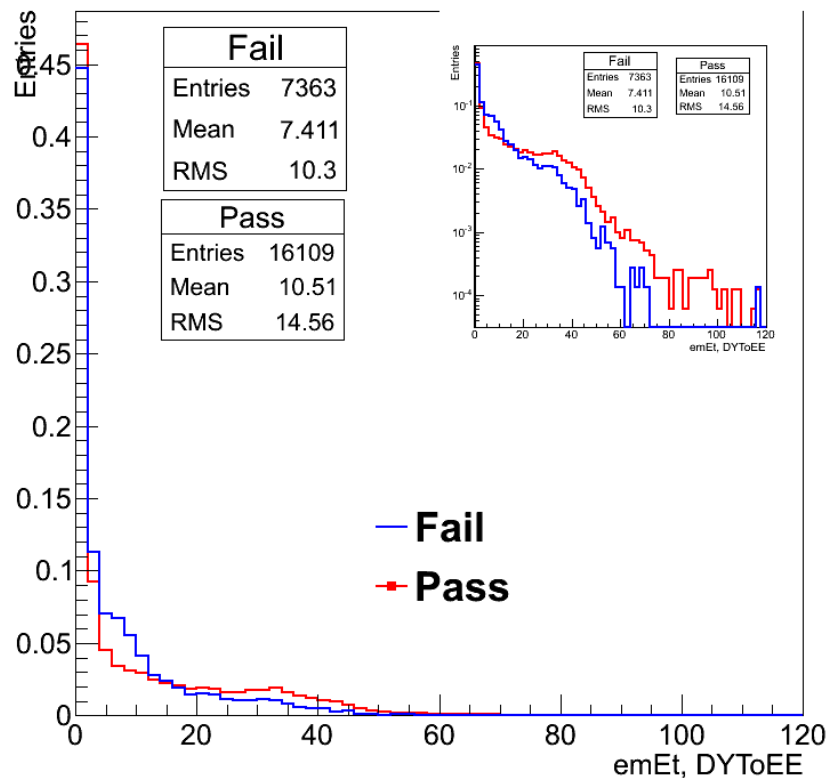
(OuterEnergy is not included in Hcal Energy)



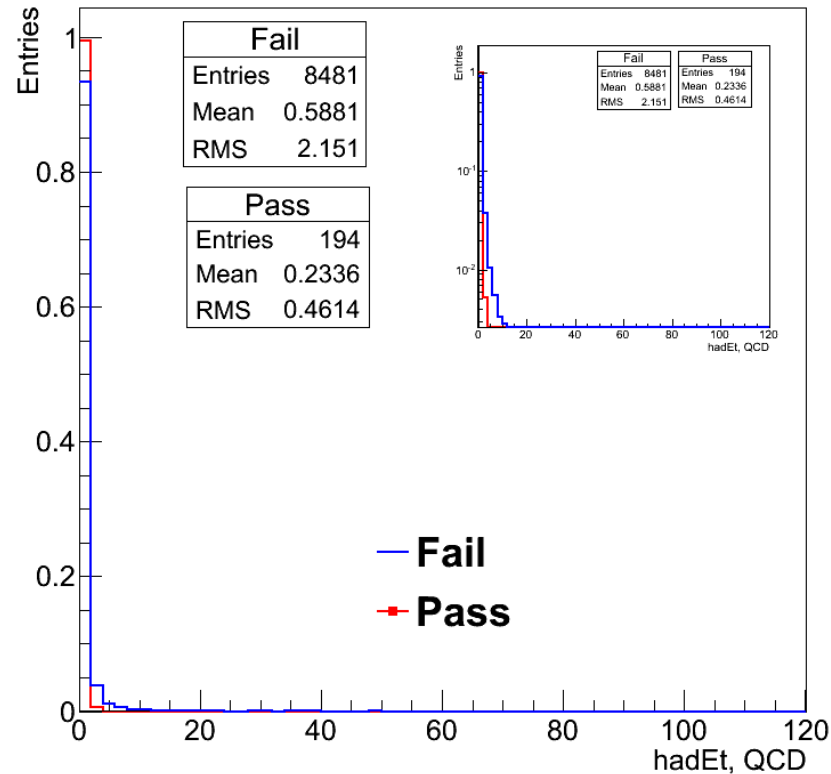
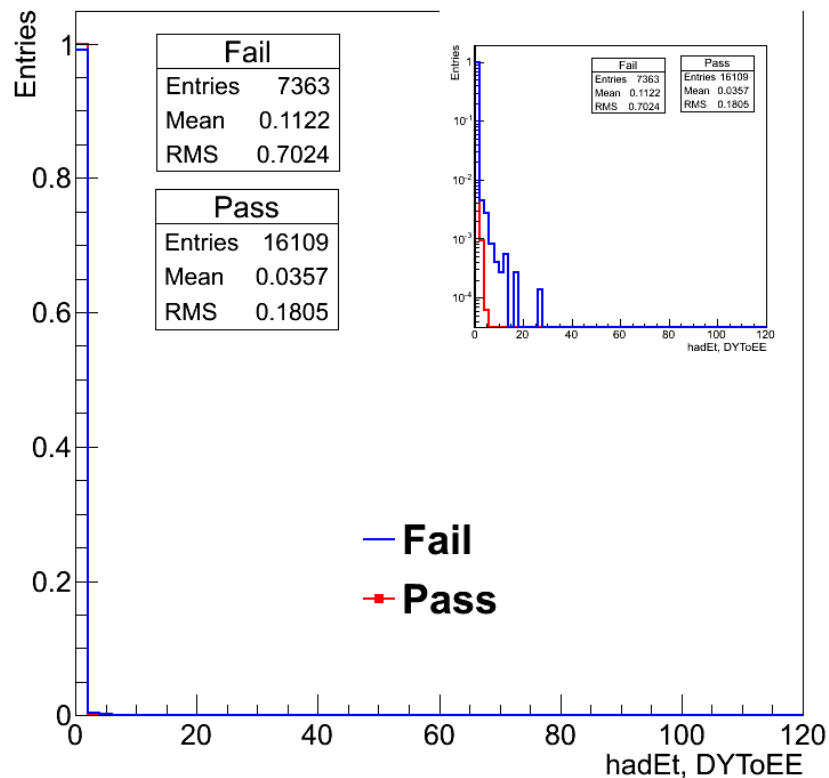
CaloTowers' OuterEnergy



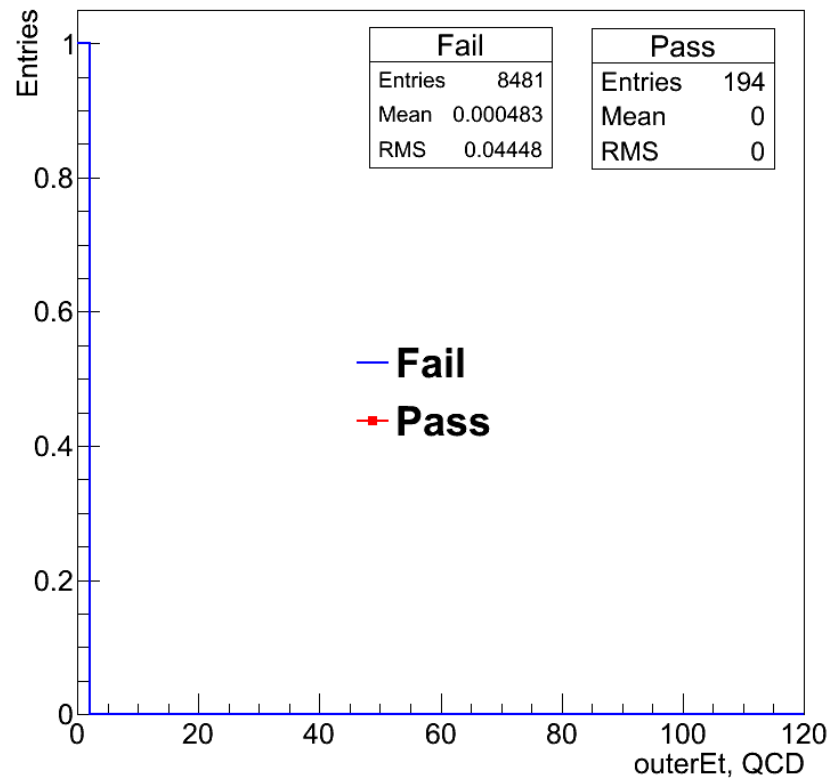
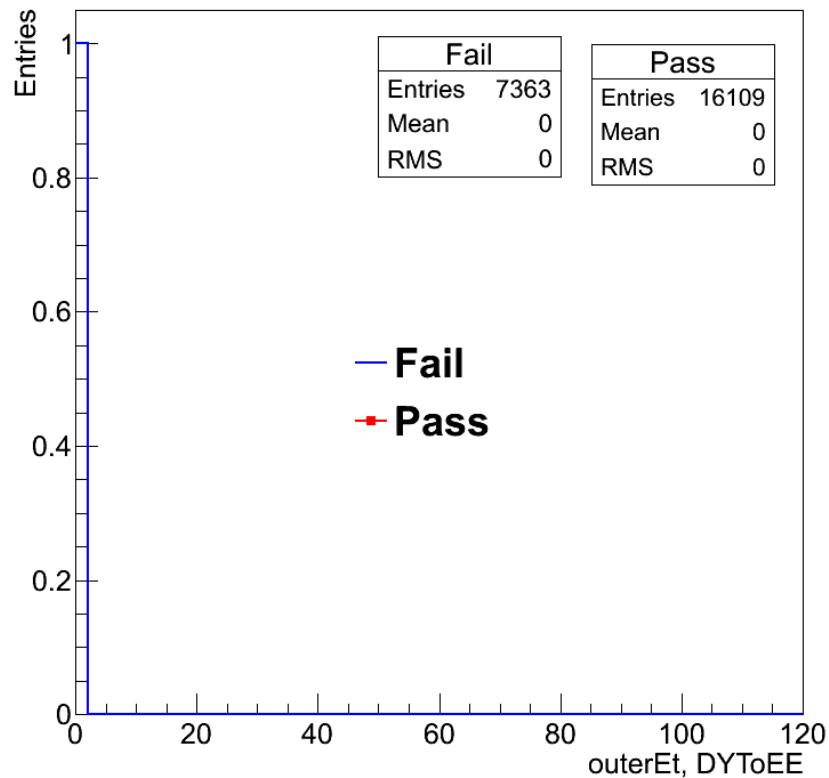
CaloTowers' Transverse Ecal Energy



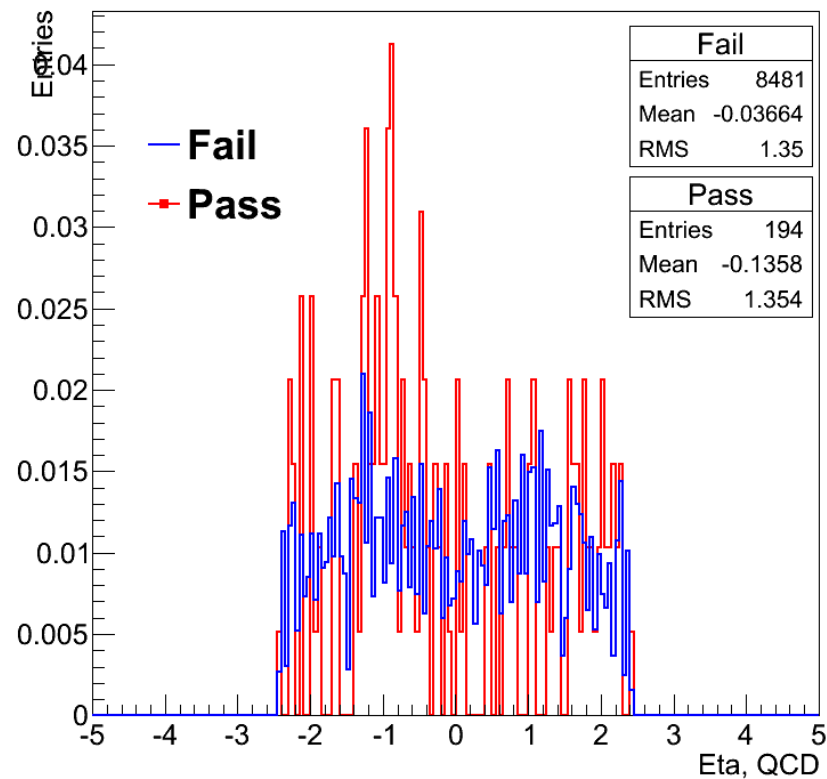
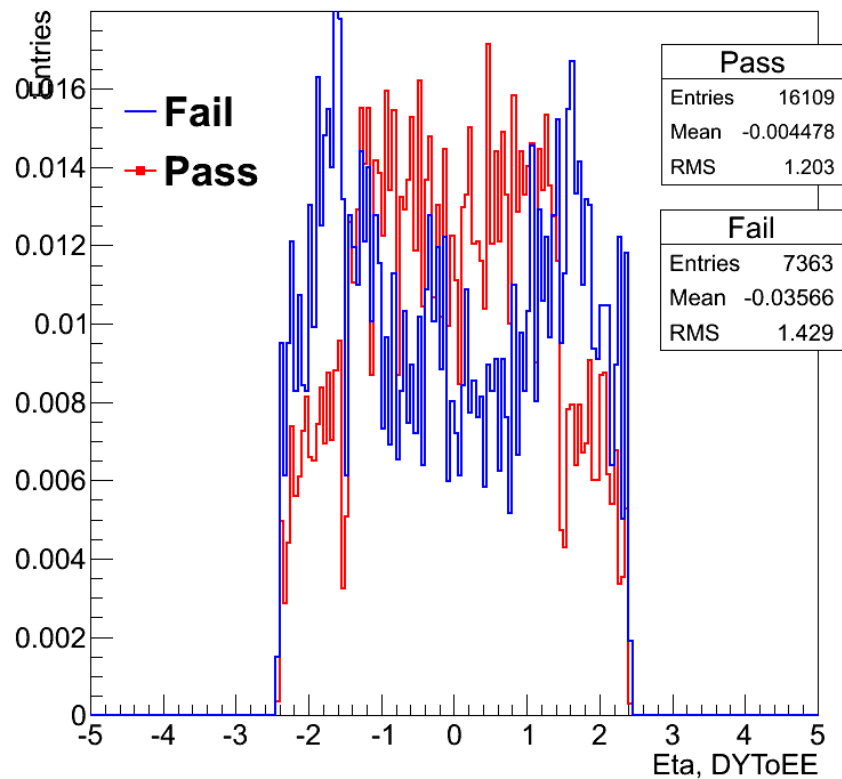
CaloTowers' Transverse Hcal Energy



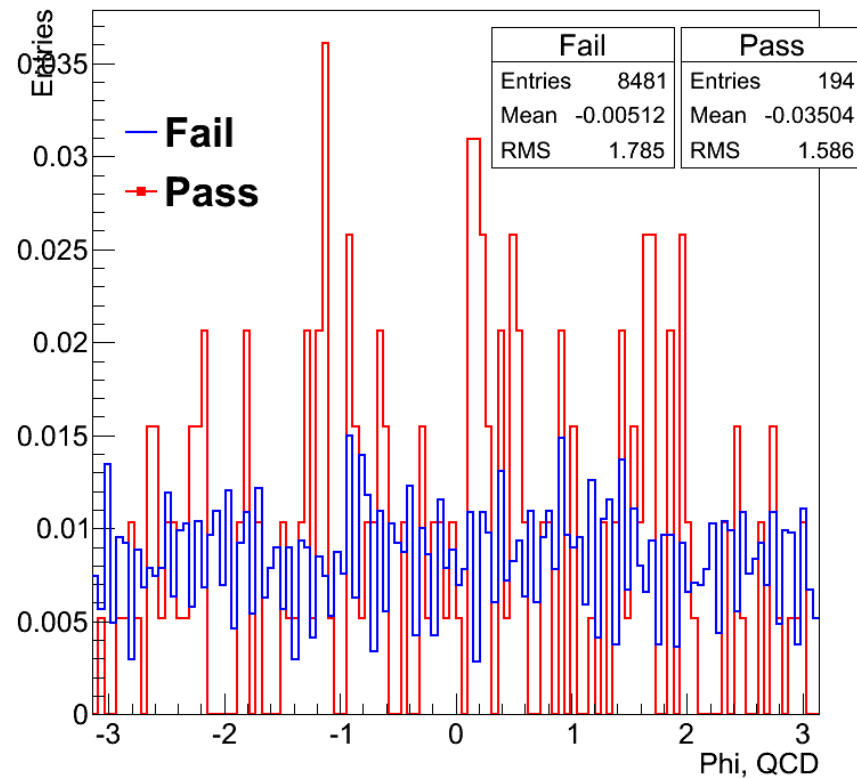
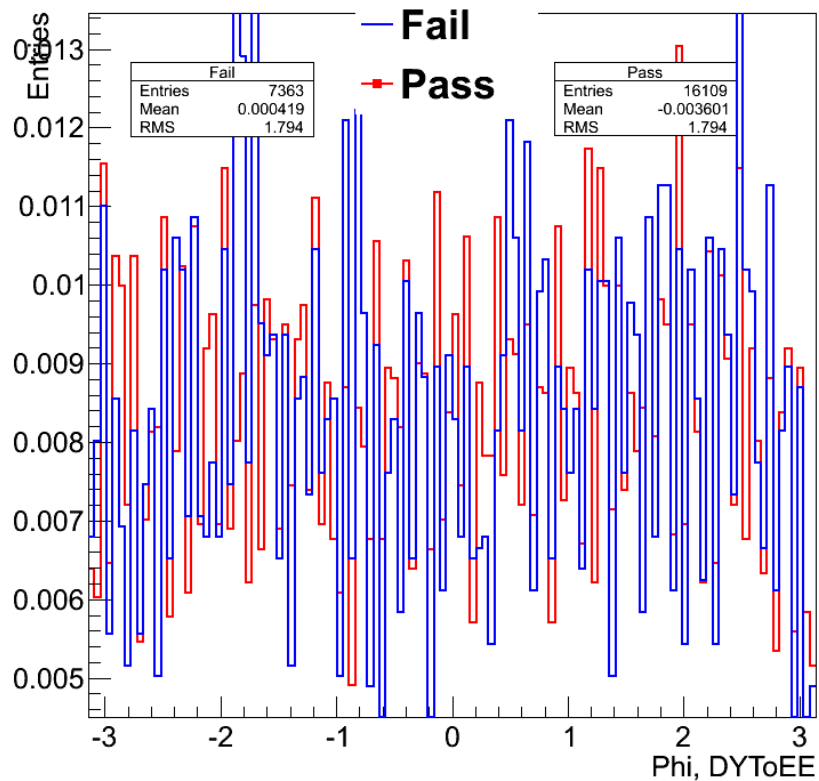
CaloTowers' Transverse Outer Energy



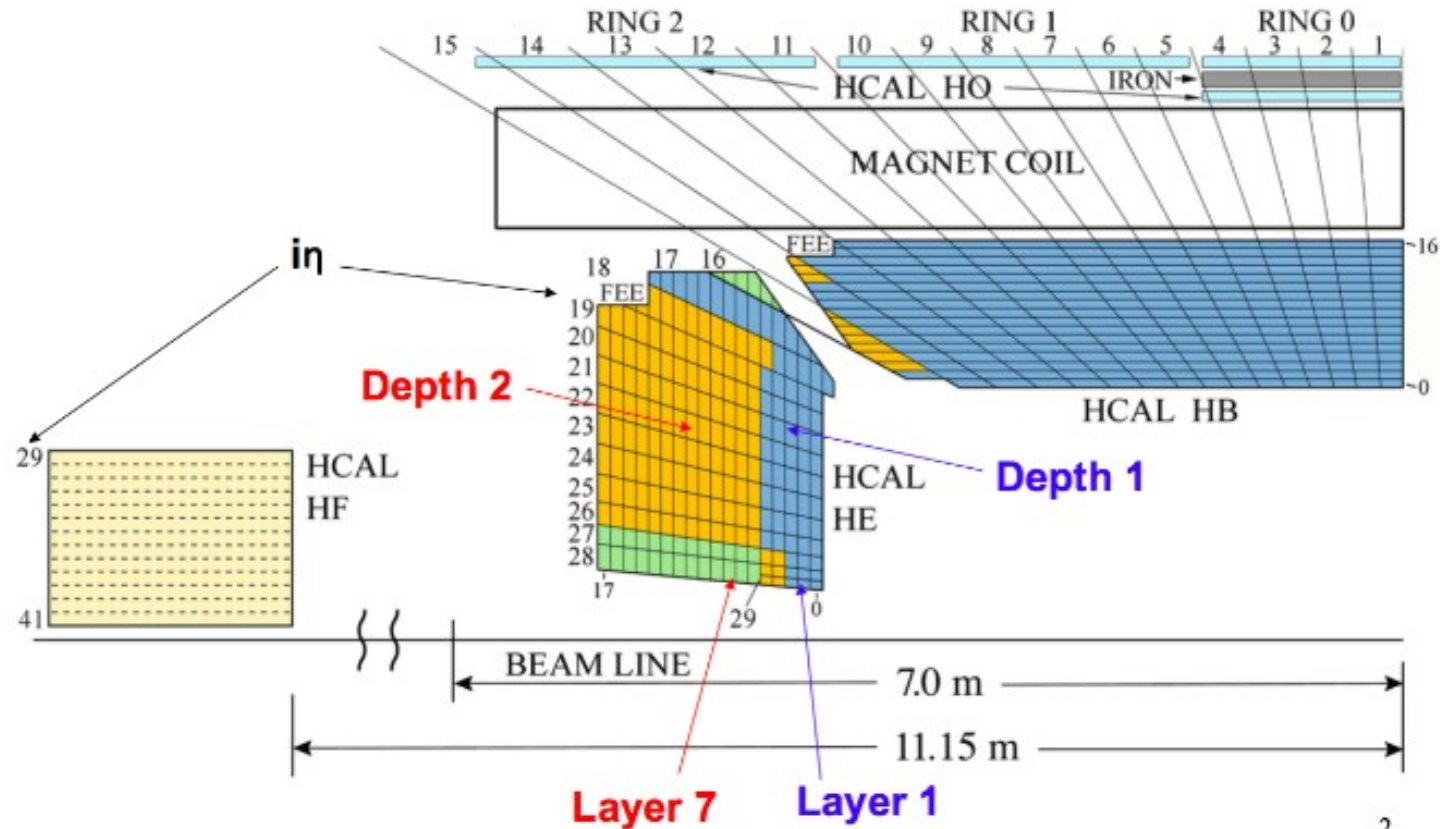
CaloTowers' η



CaloTowers' ϕ

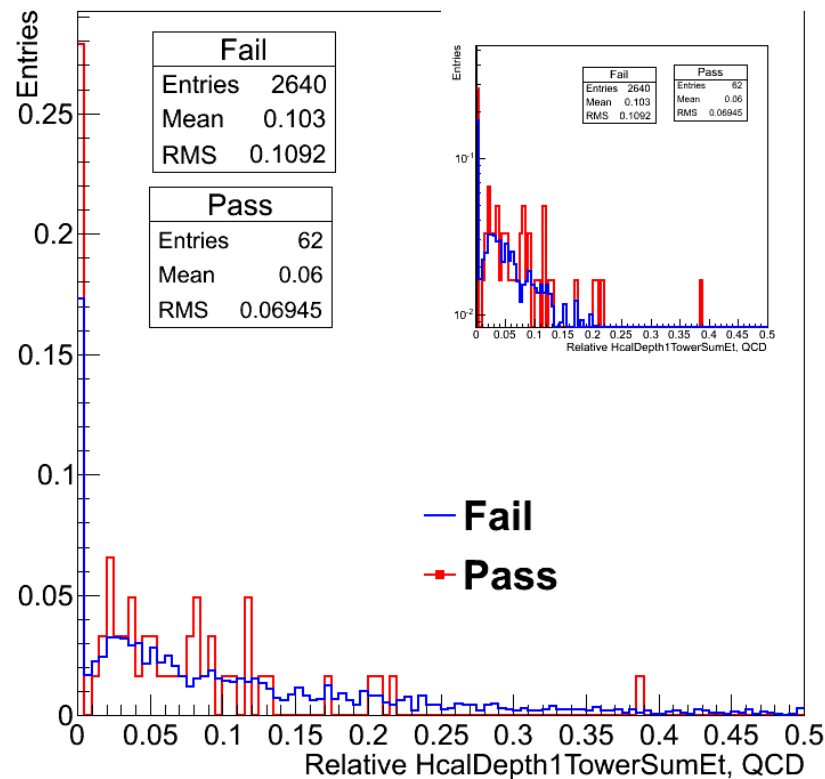
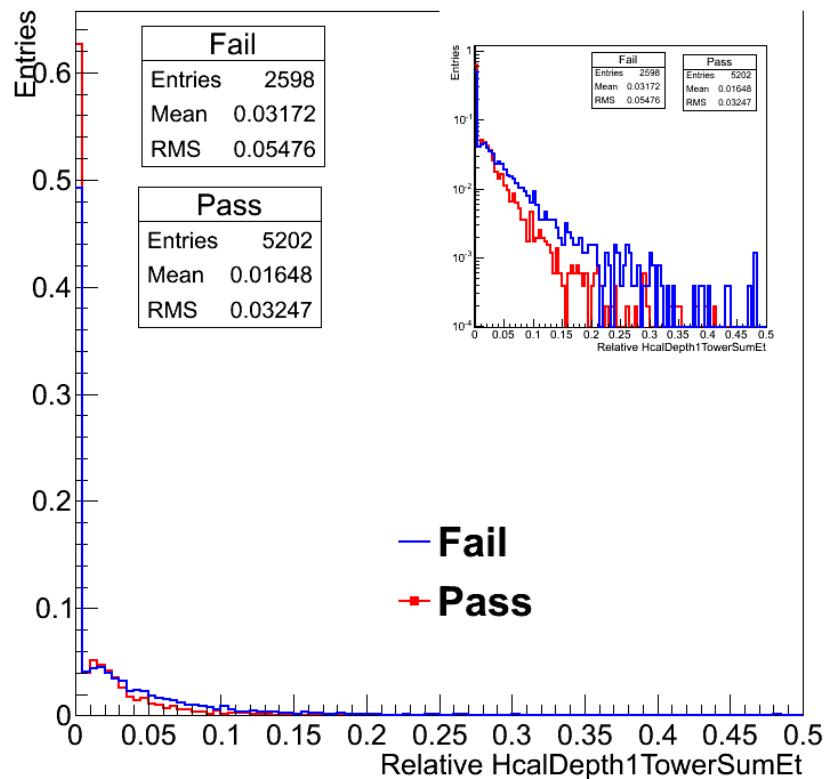


Hcal Depth1 And Depth2



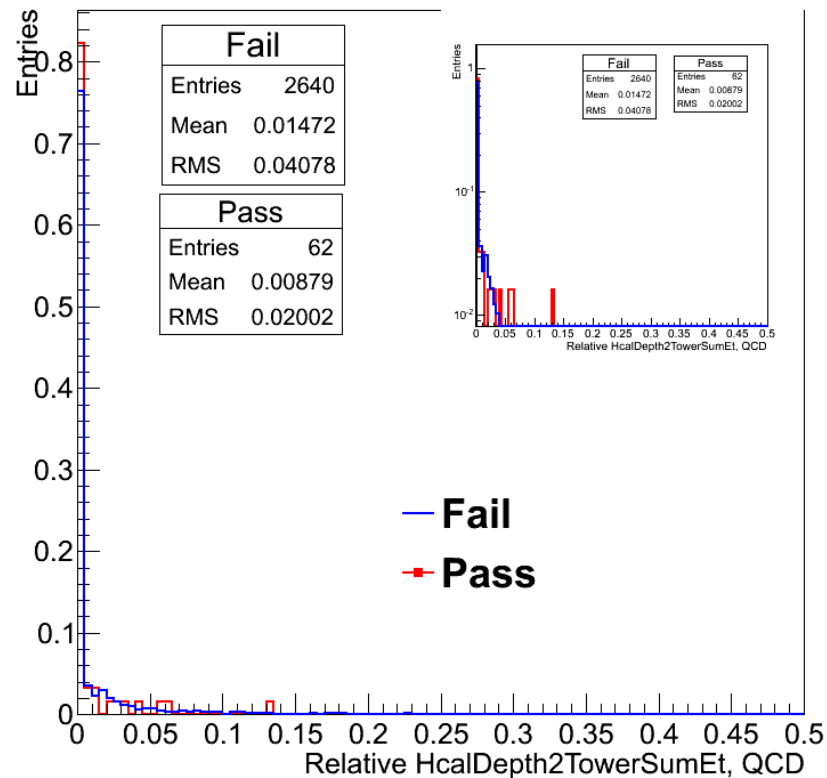
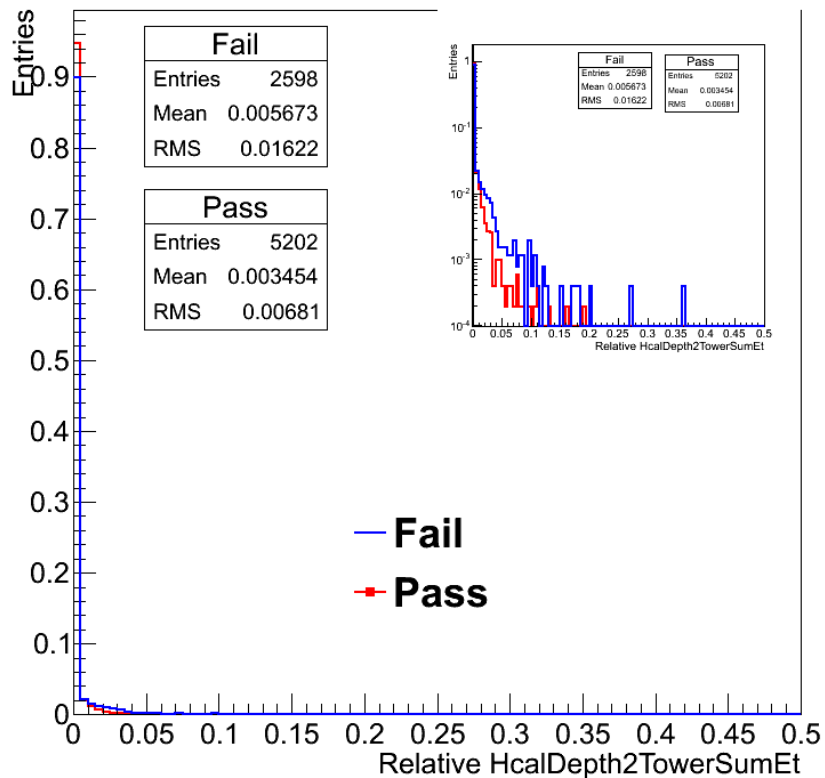
Electron's Relative HcalDepth1 TowerSumEt Isolation

hcal depth1 iso deposit with electron footprint removed



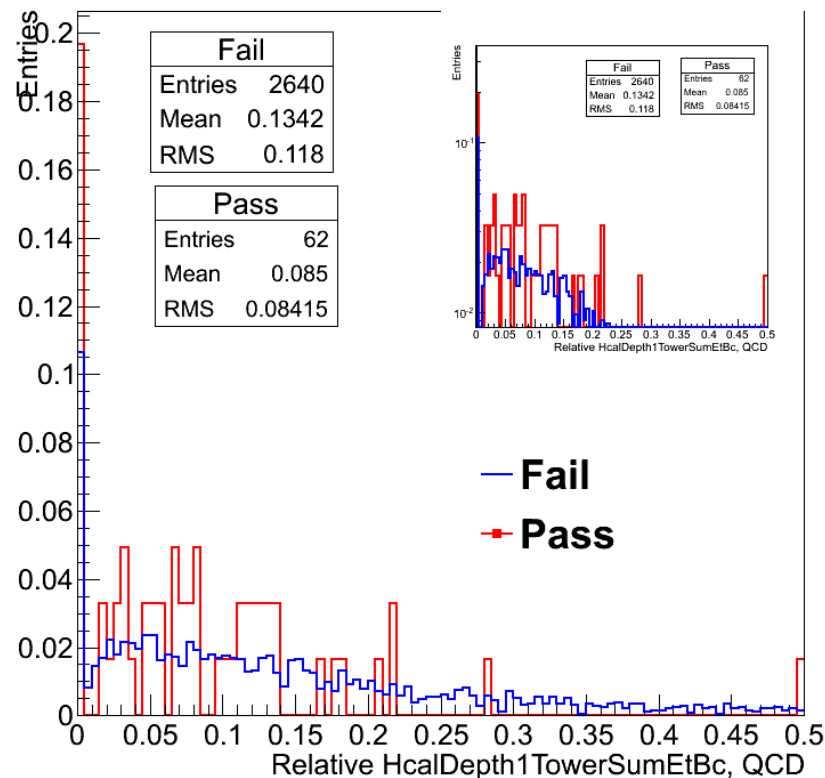
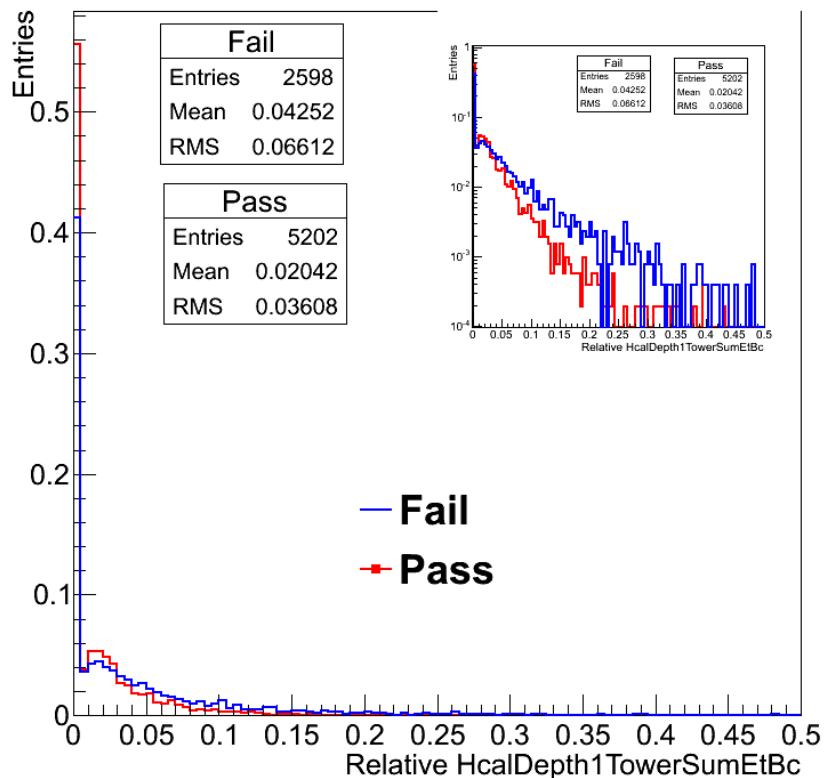
Electron's Relative HcalDepth2 TowerSumEt Isolation

hcal depth2 iso deposit with electron footprint removed



Electron's Relative HcalDepth1 TowerSumEtBclIsolation

hcal depth1 iso deposit without towers behind clusters



Electron's Relative HcalDepth2 TowerSumEtBclIsolation

hcal depth2 iso deposit without towers behind clusters

