CNNs FOR ELECTRON IDENTIFICATION

Viraj Bagal

Angira Rastogi, Sourabh Dube, Arun Thalapillil

April 20, 2020

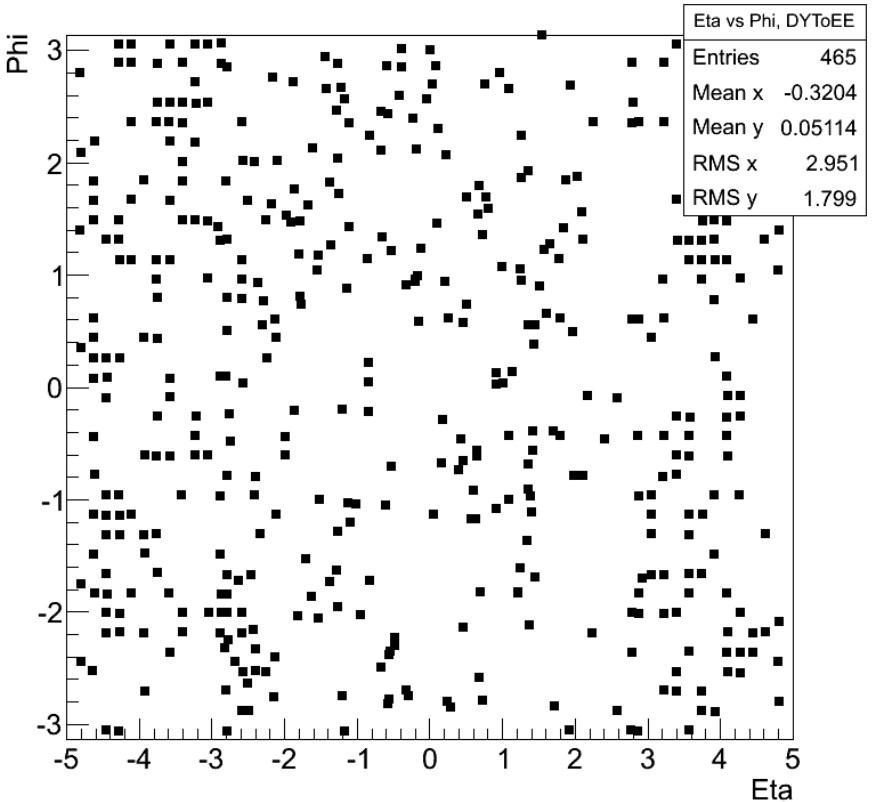
STRATEGY

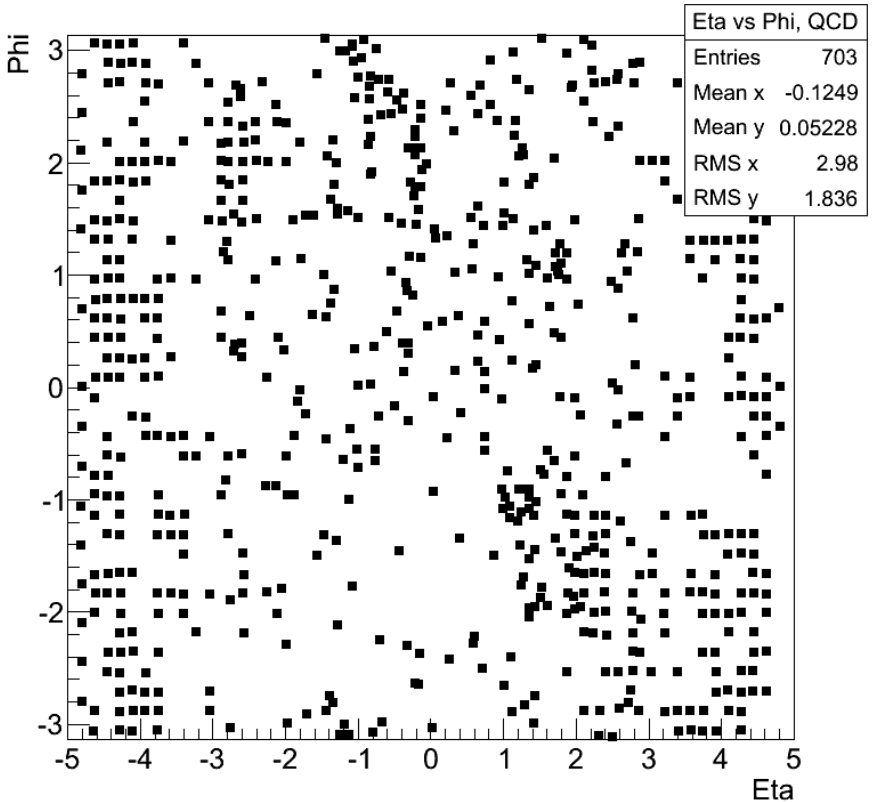
- **Aim:** We want access to collection of cal deposits which will allow us to have images of highest resoultion.
- Here, we explore different collections in order to achieve the above objective
- **Content:** Plots of CaloTower, SuperCluster η-ϕ, Electron Hcal Isolation Plots and 2D Histograms of Ecal, Hcal and Total Energy of CaloTowers.
- **Pass:** Electrons which pass medium ID.
- **Fail:** Electrons which fail medium ID.
- For 2D Histograms, dR<0.4
- **Some Facts:**
  - ECAL crystal size in eta-phi space is 0.0174x0.0174
  - HCAL crystal size is 0.087x0.087 in barrel and 0.17x0.17 in endcap.
  - SuperCluster is combination of calotowers.

η vs ϕ of CaloTowers

Looped over all calotowers in an event

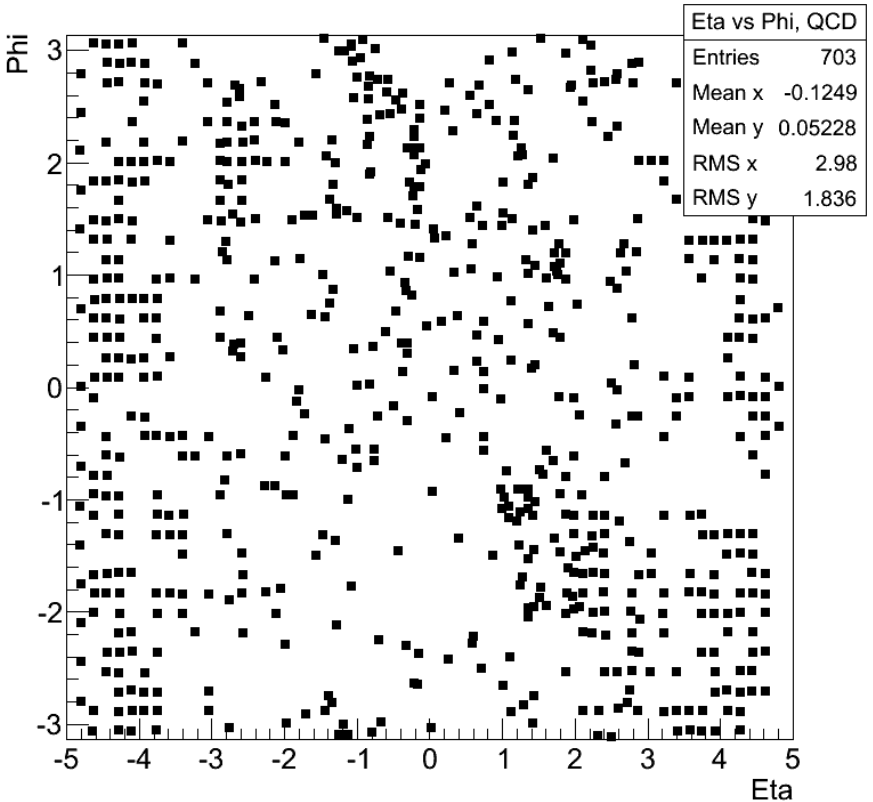
Bin size 0.0174x0.0174

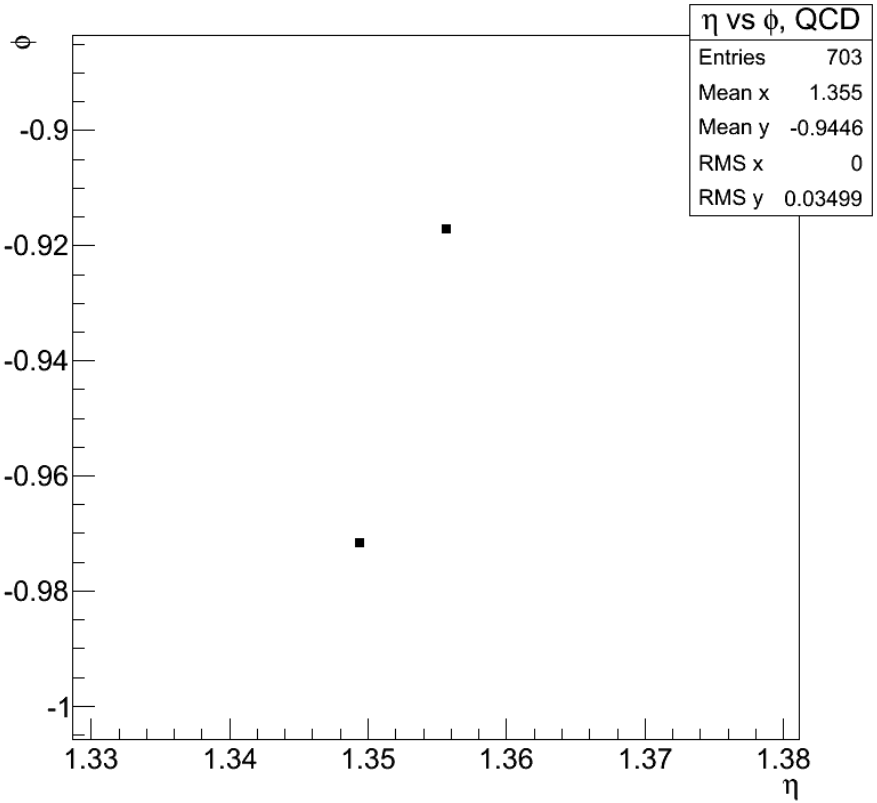




η vs ϕ of CaloTowers and Zoomed Version

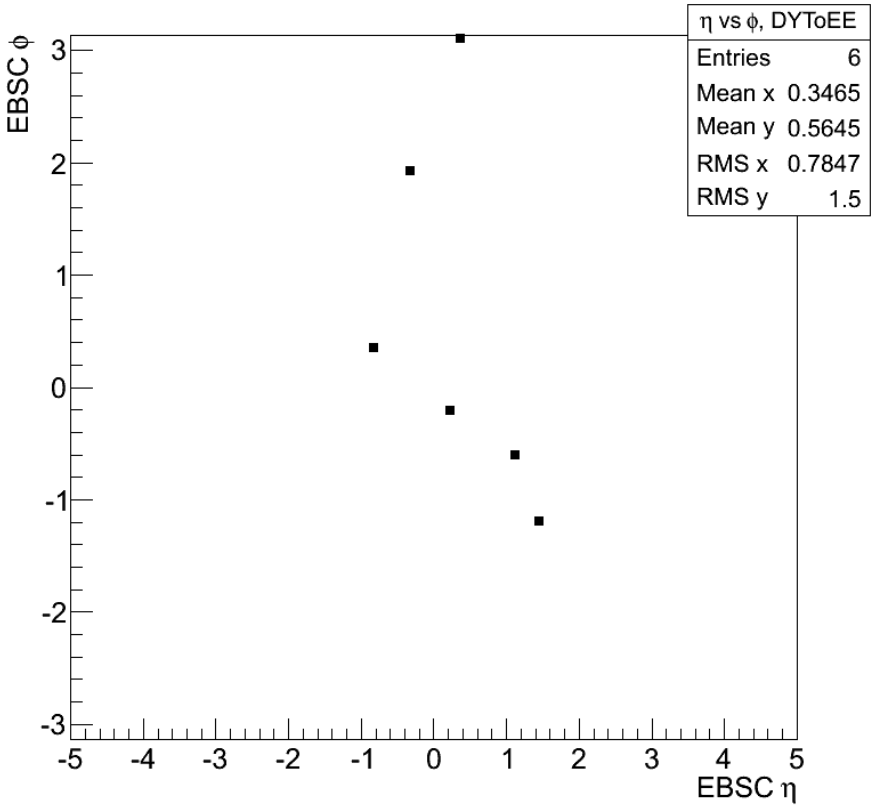
Looped over all calotowers in an event
Bin size 0.0174x0.0174

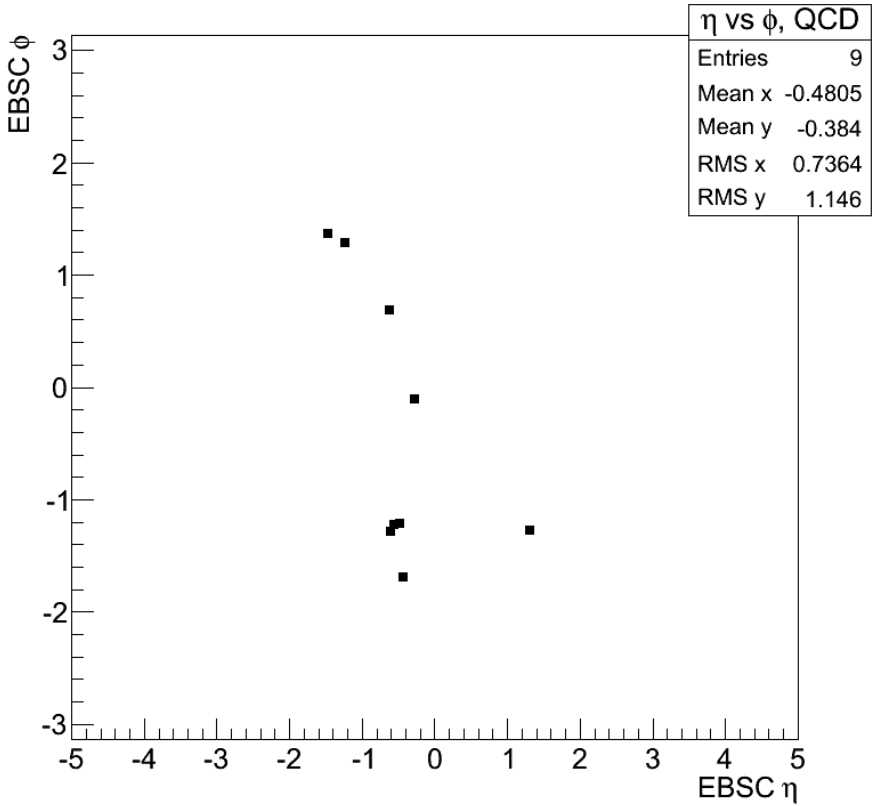




η vs ϕ of EcalBarrel SuperClusters

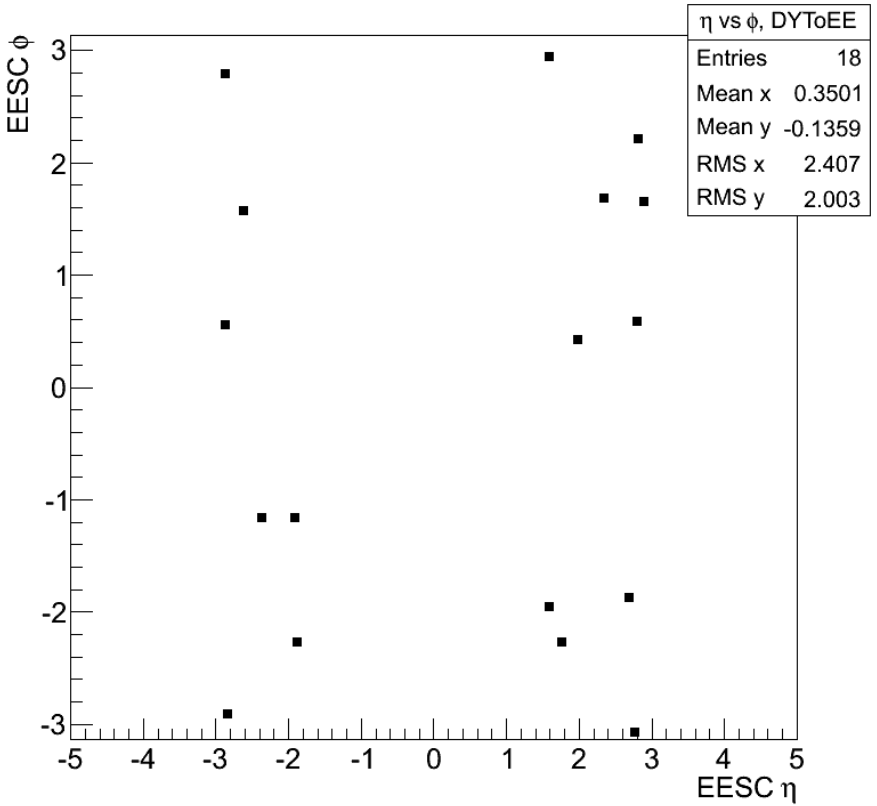
Looped over all EcalBarrel Superclusters in an event
Bin size 0.0174x0.0174

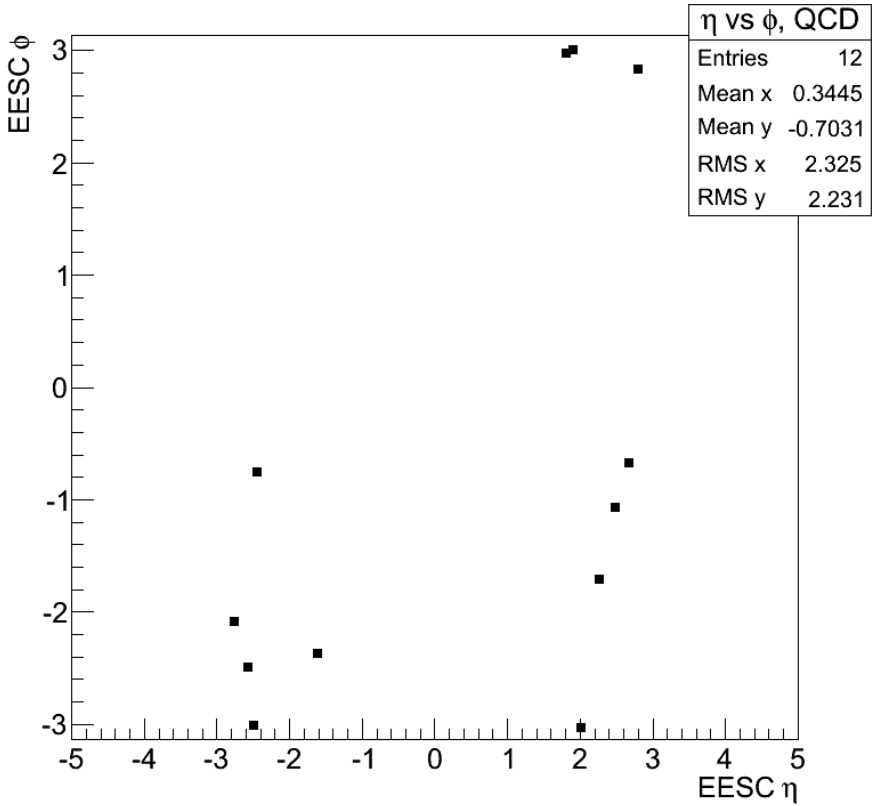




η vs ϕ of EcalEndcap SuperClusters

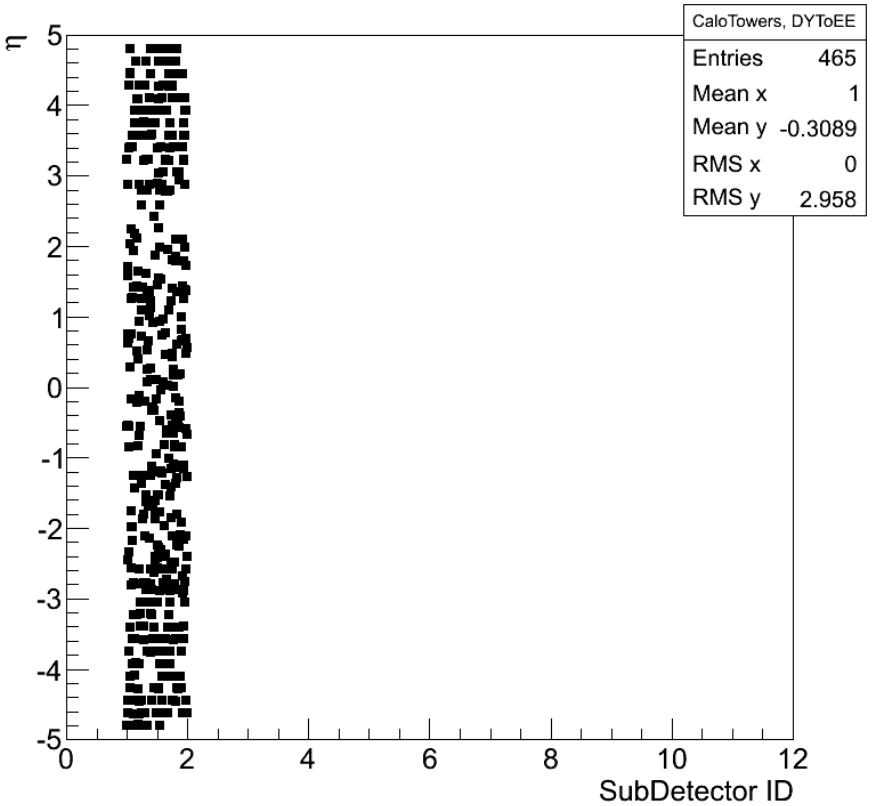
Looped over all EcalEndcap Superclusters in an event
Bin size 0.0174x0.0174

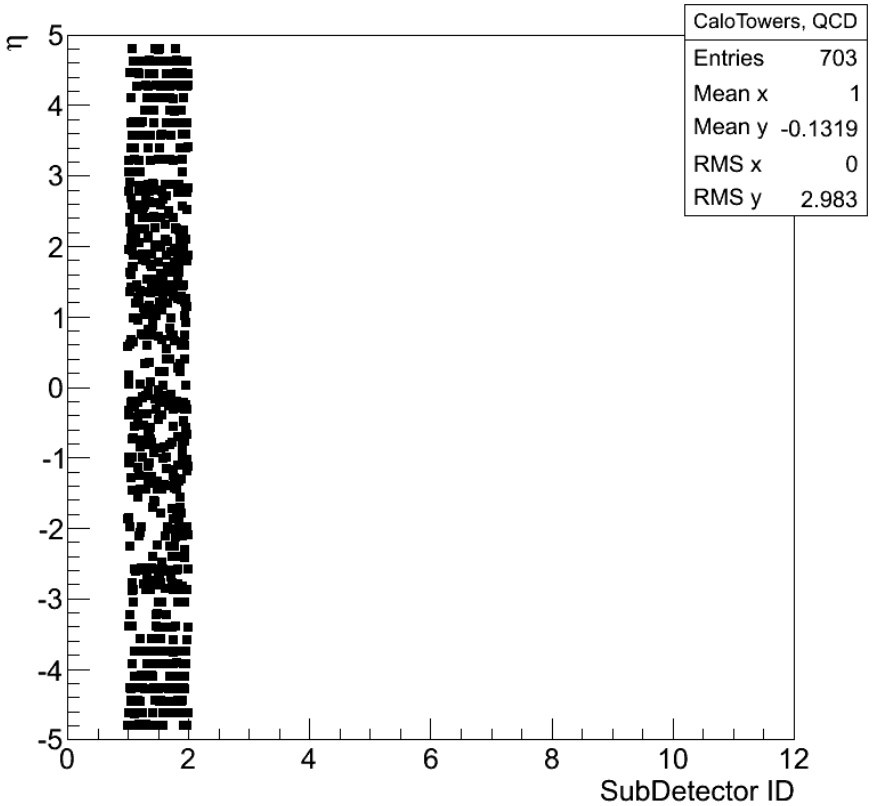




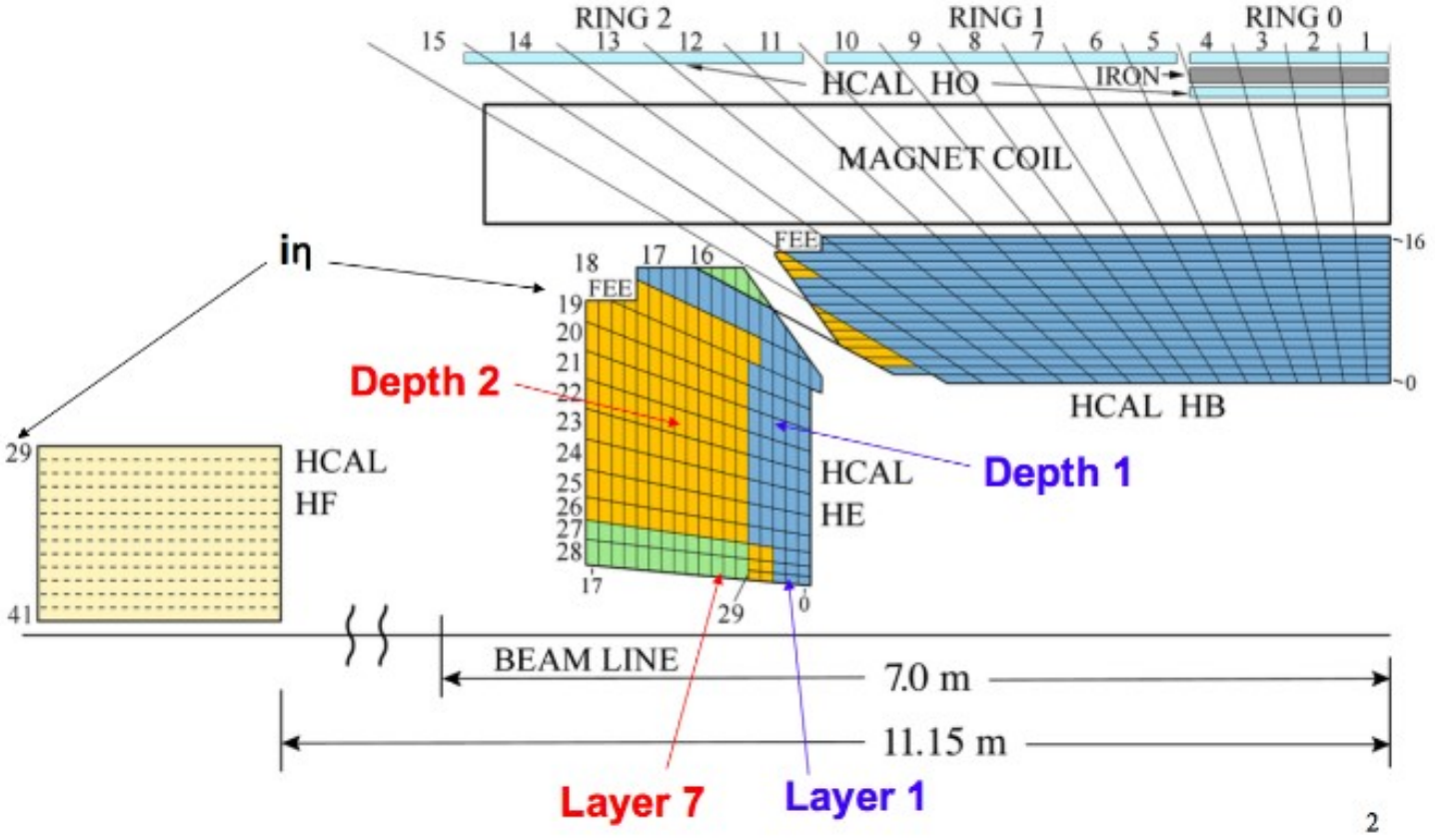
Subdetector ID vs η of CaloTowers

Looped over all CaloTowers in an event
Bin size 0.0174x0.0174



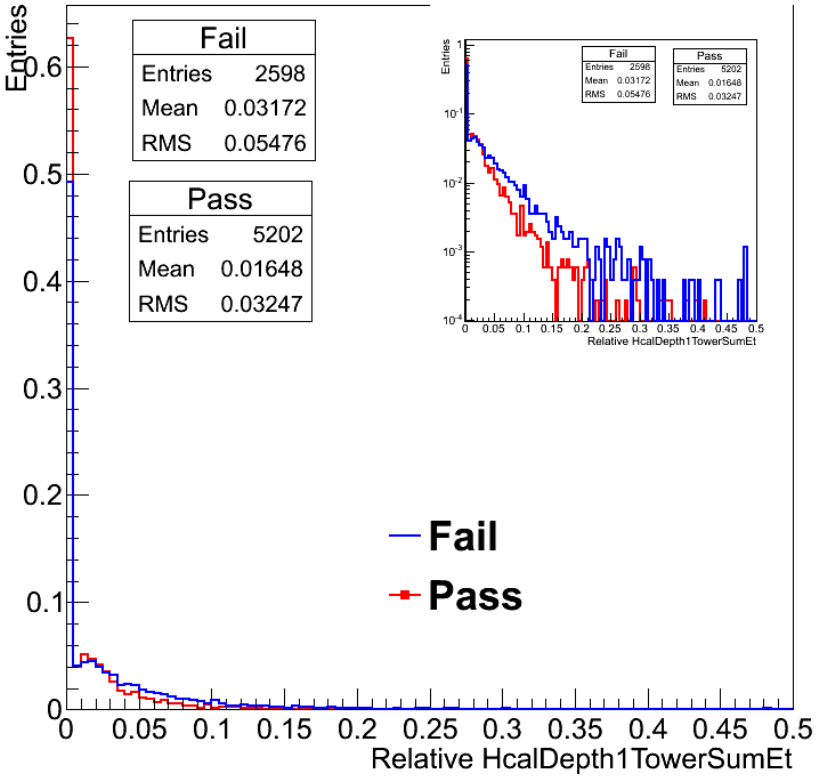


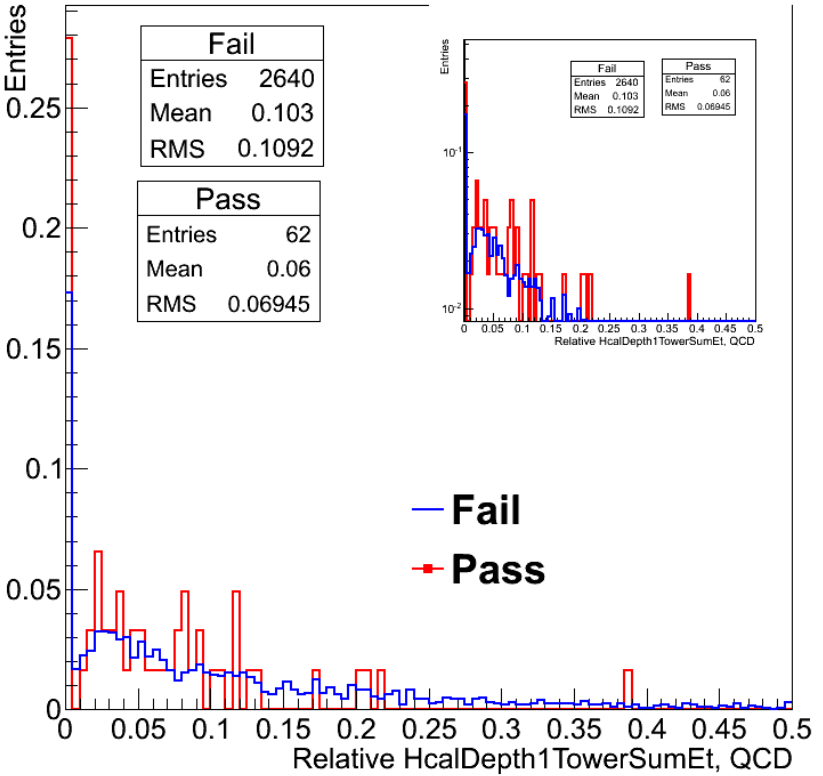
Hcal Depth1 and Depth2



Electron's Relative HcalDepth1 TowerSumEt Isolation

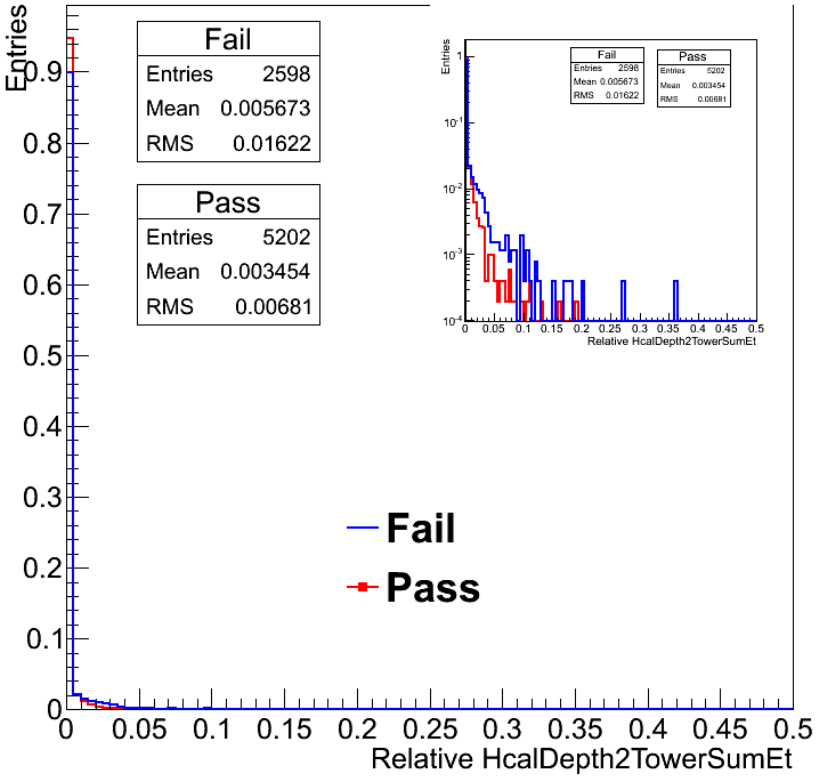
hcal depth1 iso deposit with electron footprint removed

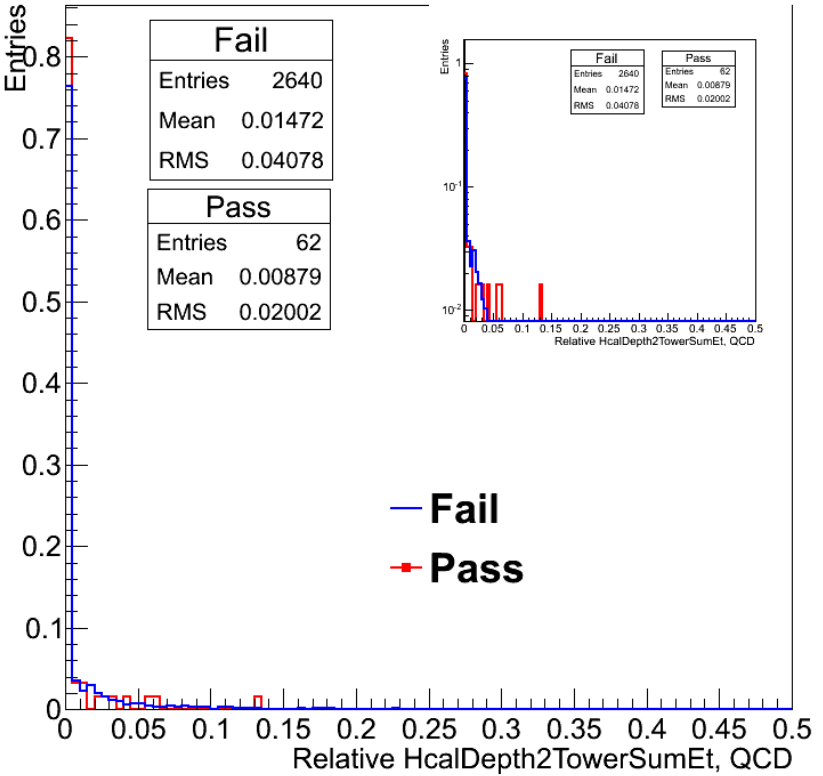




Electron's Relative HcalDepth2 TowerSumEt Isolation

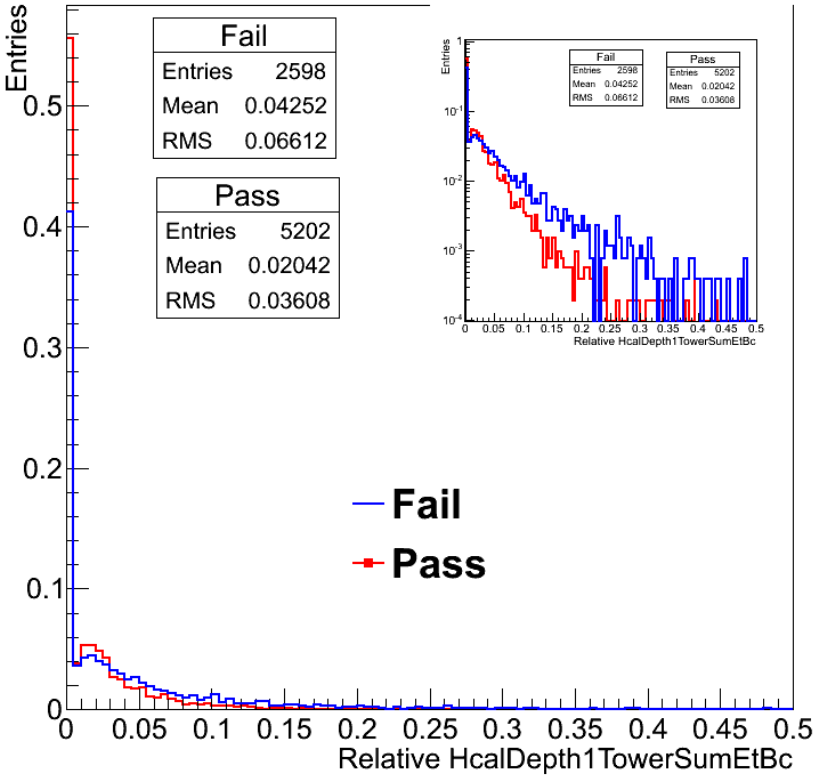
hcal depth2 iso deposit with electron footprint removed

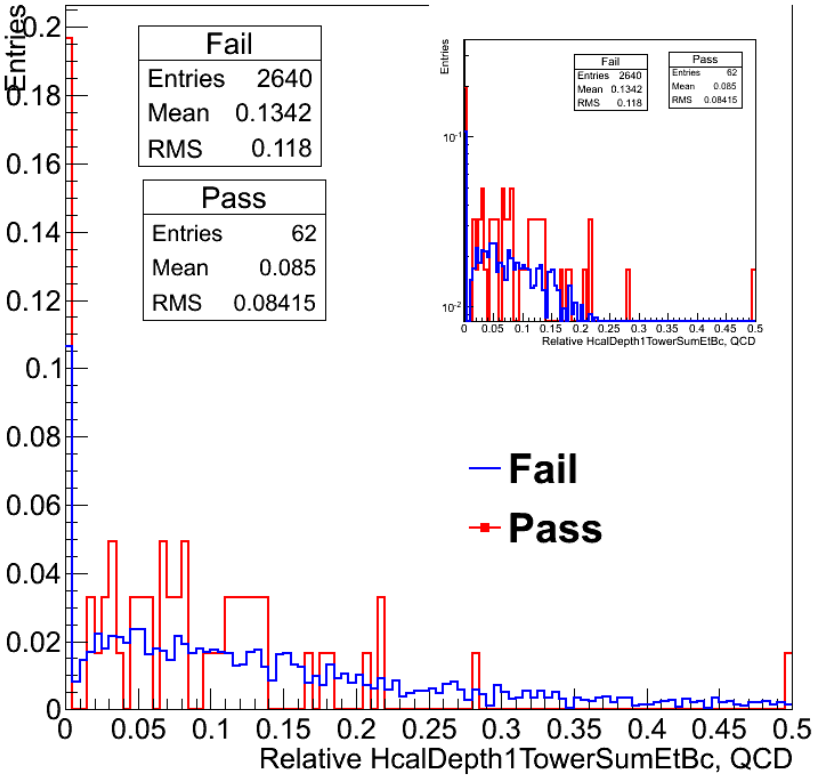




Electron Relative HcalDepth1TowerSumEtBc Isolation

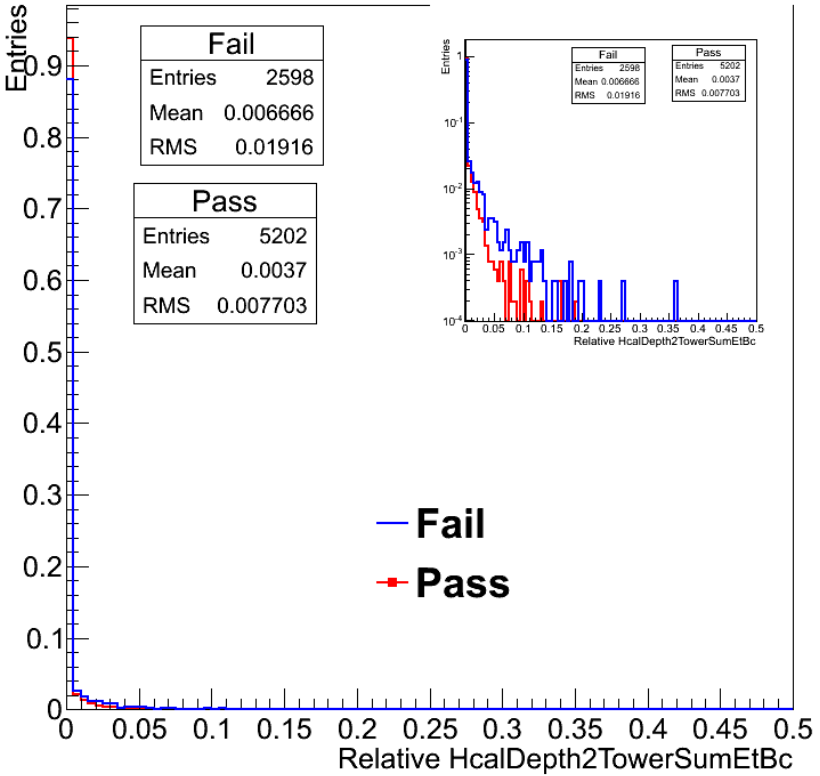
hcal depth1 iso deposit without towers behind clusters

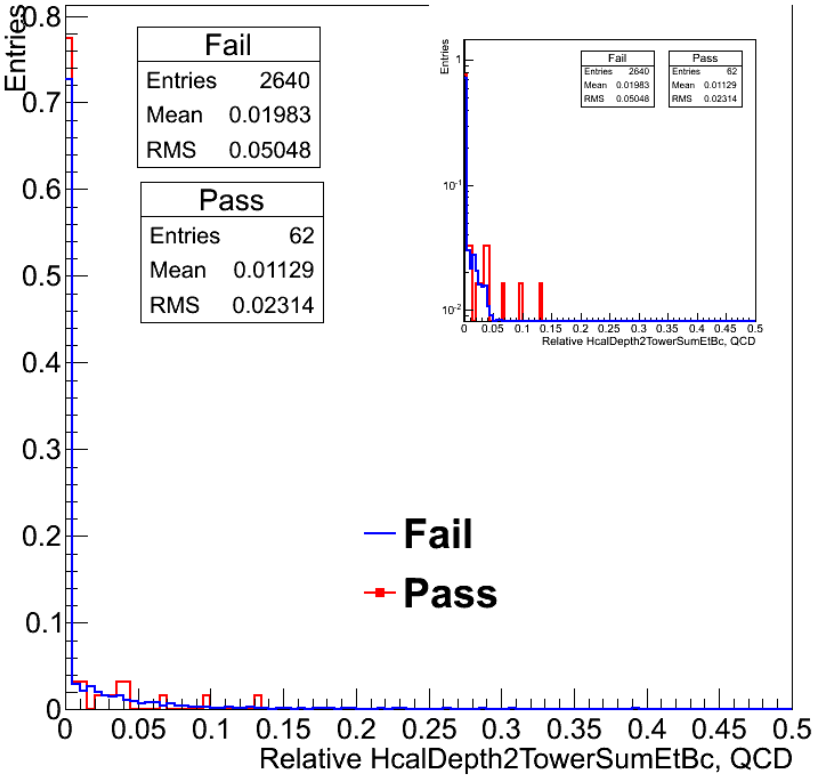




Electron Relative HcalDepth2TowerSumEtBc Isolation

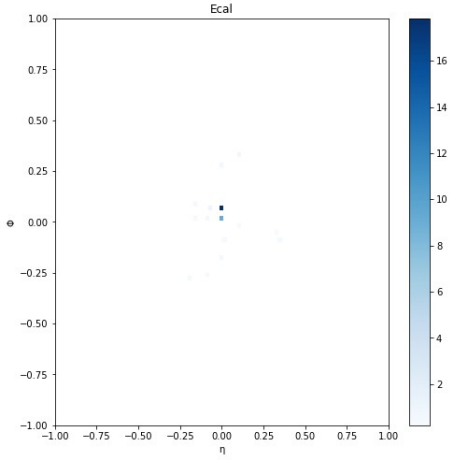
hcal depth2 iso deposit without towers behind clusters

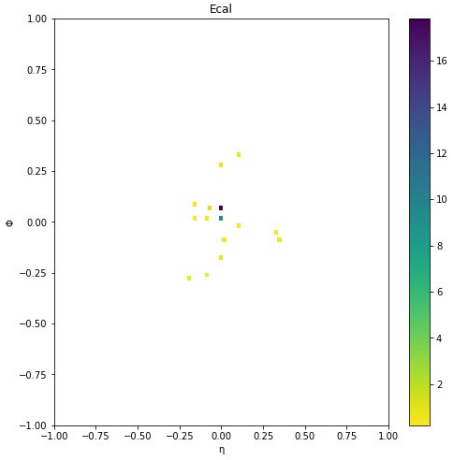


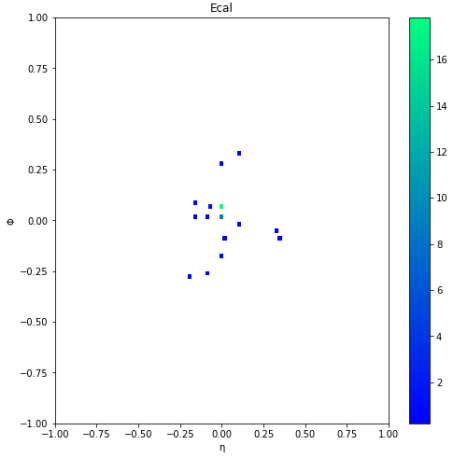


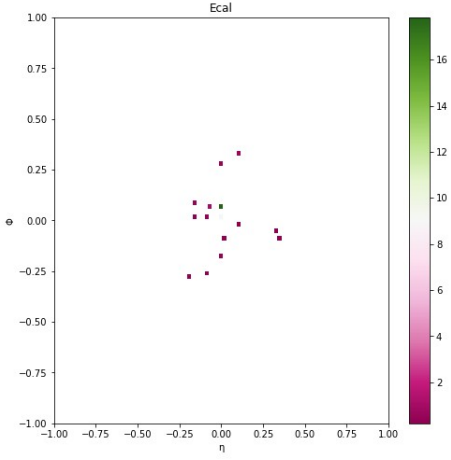
Ecal Energy Plots

Blues, Viridis, Winter, PiYg



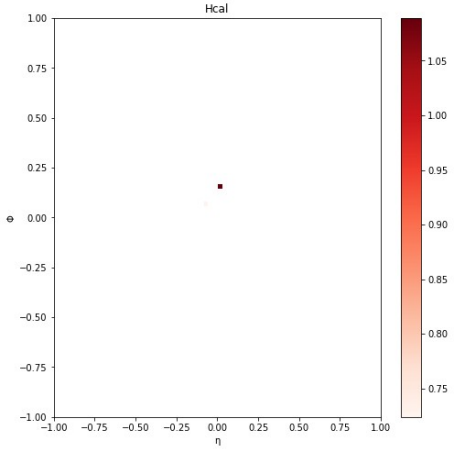


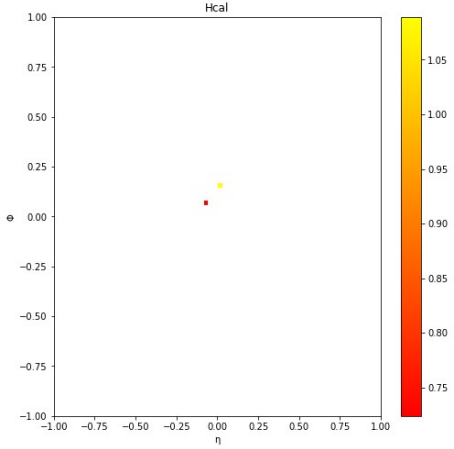


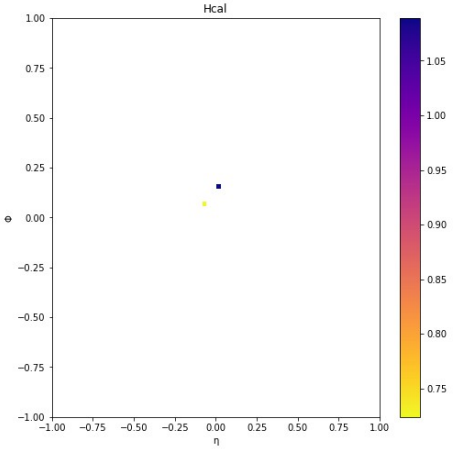


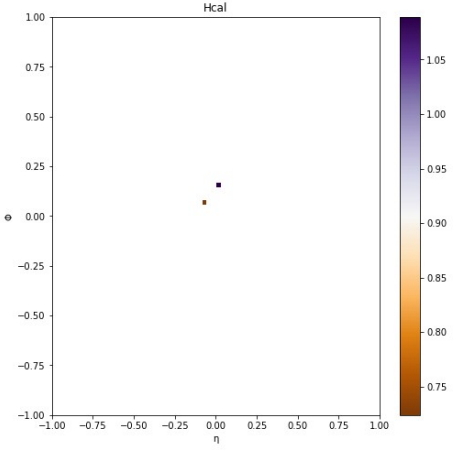
Hcal Energy Plots

Red,Plasma,Autumn,PuOr



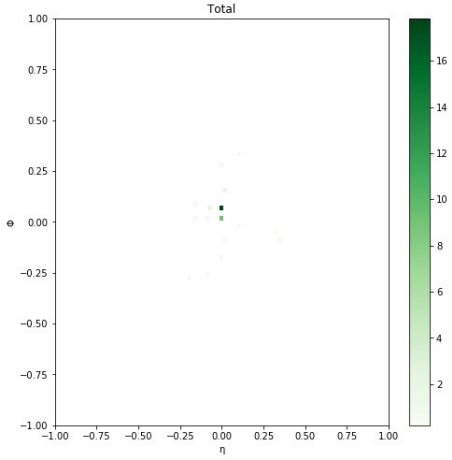


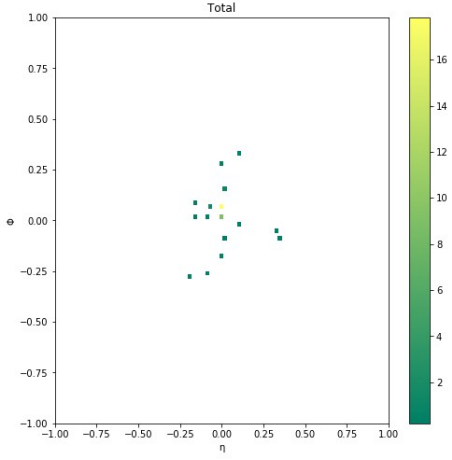


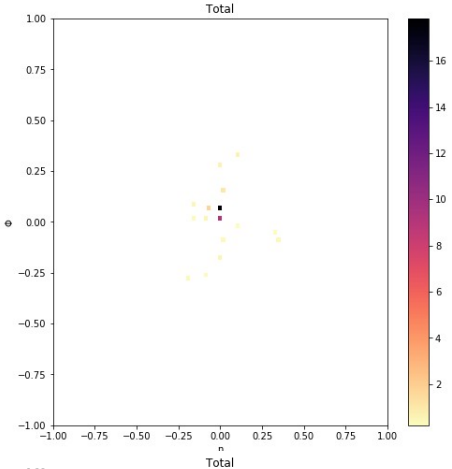


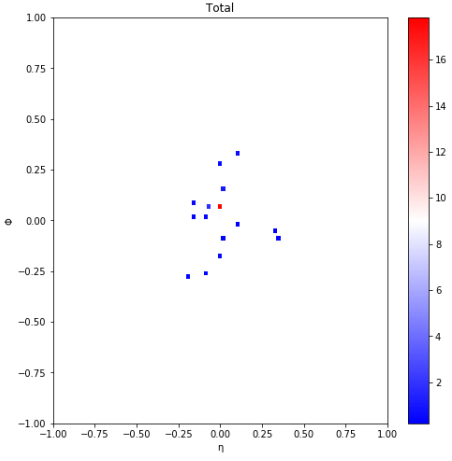
Total Energy Plots

Green, Magma, Summer, BWR









Normalizations