

# Changes To Be Made

- Normalize the plots.
- Amend the Pt. Cut in Basic+Medium.

# CNNs for Electron Identification

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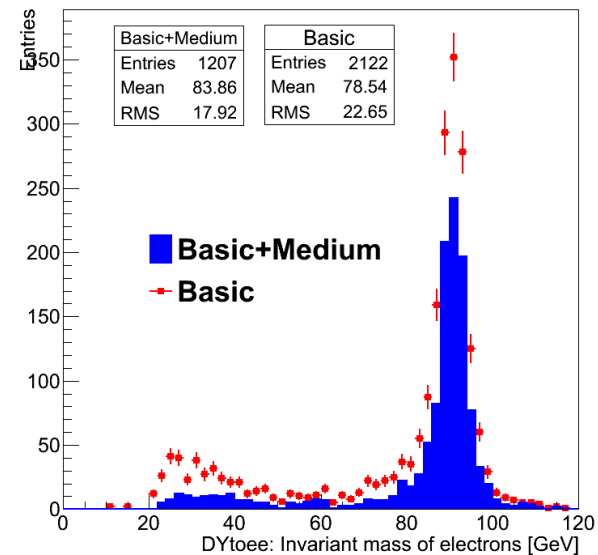
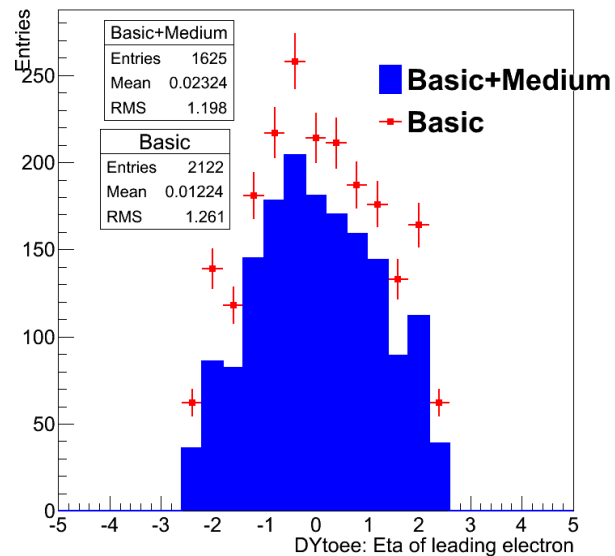
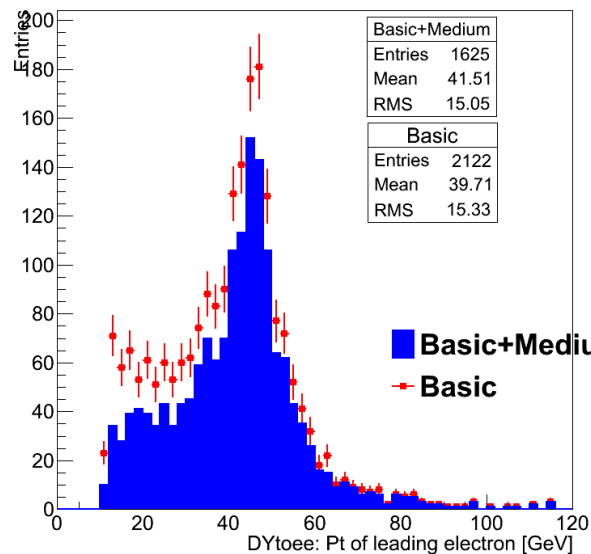
# Strategy

- **Aim**: Use CNNs to classify fake and real electrons.
- **Real**: Electrons from gauge boson decay (Z, W, new particles)
- **Fake**: Electrons from other sources such as jets.
- Electrons will be selected from CMS samples available in [CERN Open Data portal](#).
- **Real Electron Sample**: DYToEE\_M-20\_CT10\_TuneZ2star\_v2\_8TeV-powheg-pythia6
- **Fake Electron sample**: QCD\_Pt-40\_doubleEMEnriched\_TuneZ2star\_8TeV-pythia6
- More samples can be found in the respective hyperlinks and details of the samples can be found in the dropbox.
- For today, we are using subset of these samples.
- **DYToEE**: 7794 events used
- **QCD**: 155761 events used.

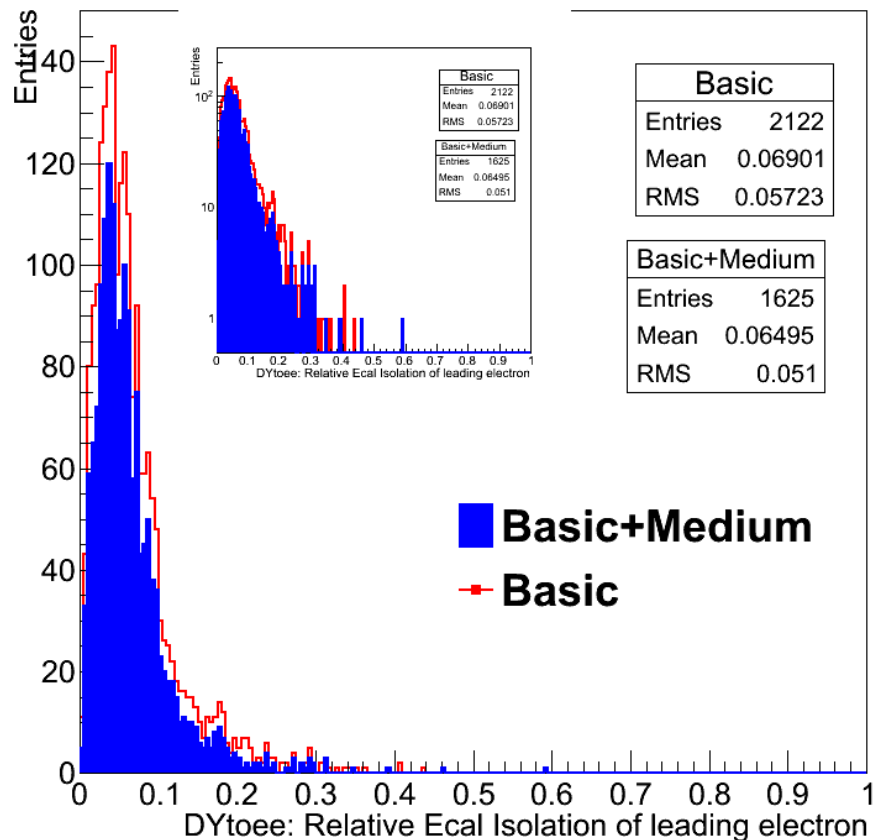
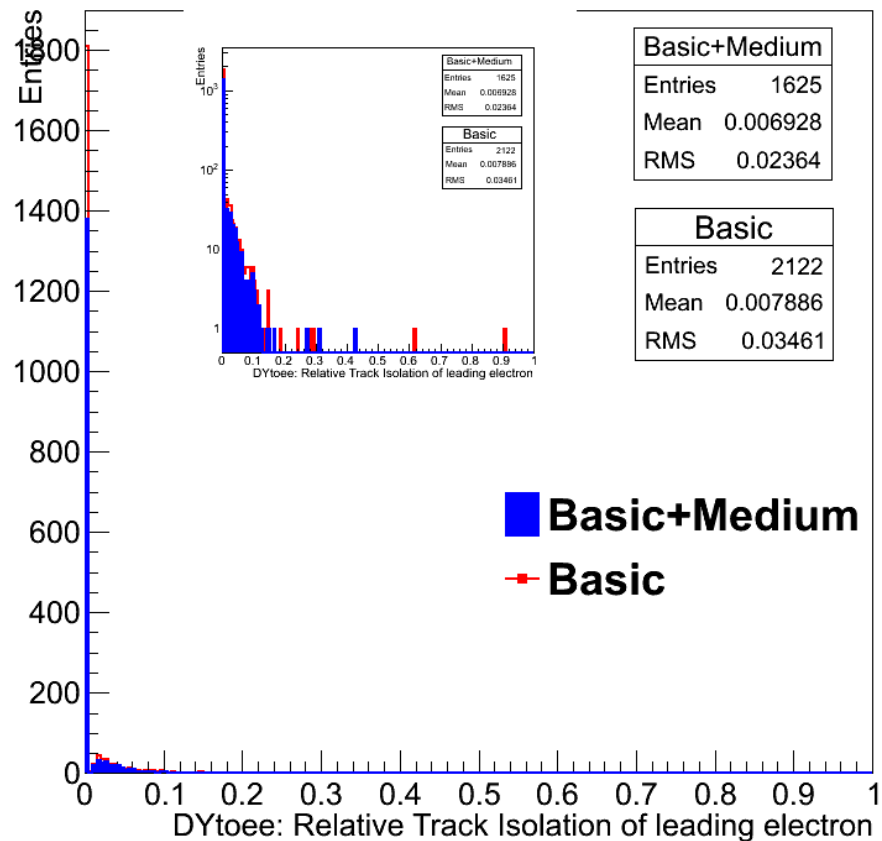
# Electron Selection

- For today's plots, we defined two electron selections.
- **Basic cut**:  $P_t > 10 \text{ GeV}$  &  $|\eta| < 2.4$
- **Medium Cut**: Medium Identification Criteria. Twiki mentioning the details can be accessed via hyperlink
- **Inv Mass Cut**: For DY samples we need additional invariant mass cut,  $60 \text{ GeV} < M_{\parallel} < 120 \text{ GeV}$ .

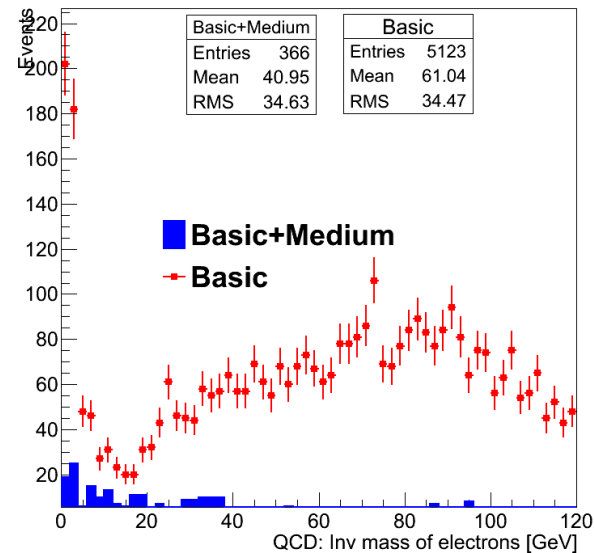
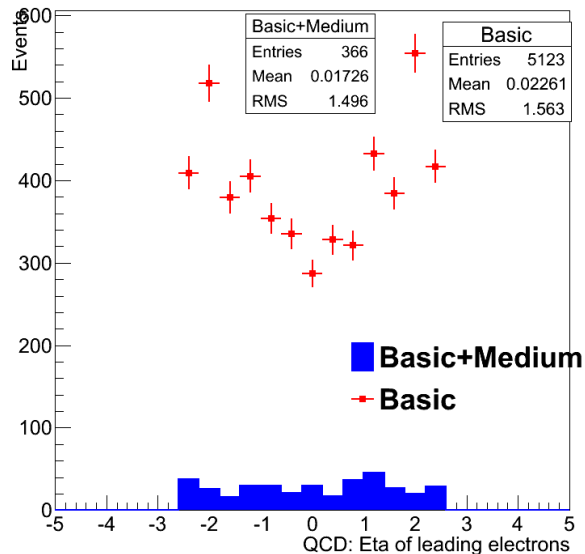
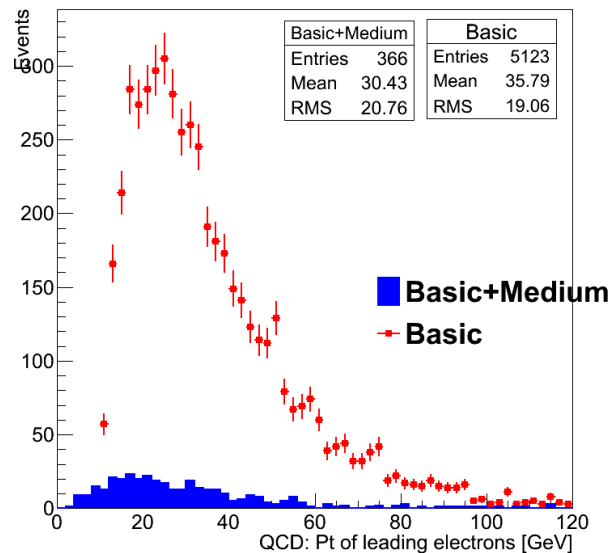
# DYtoEE plots



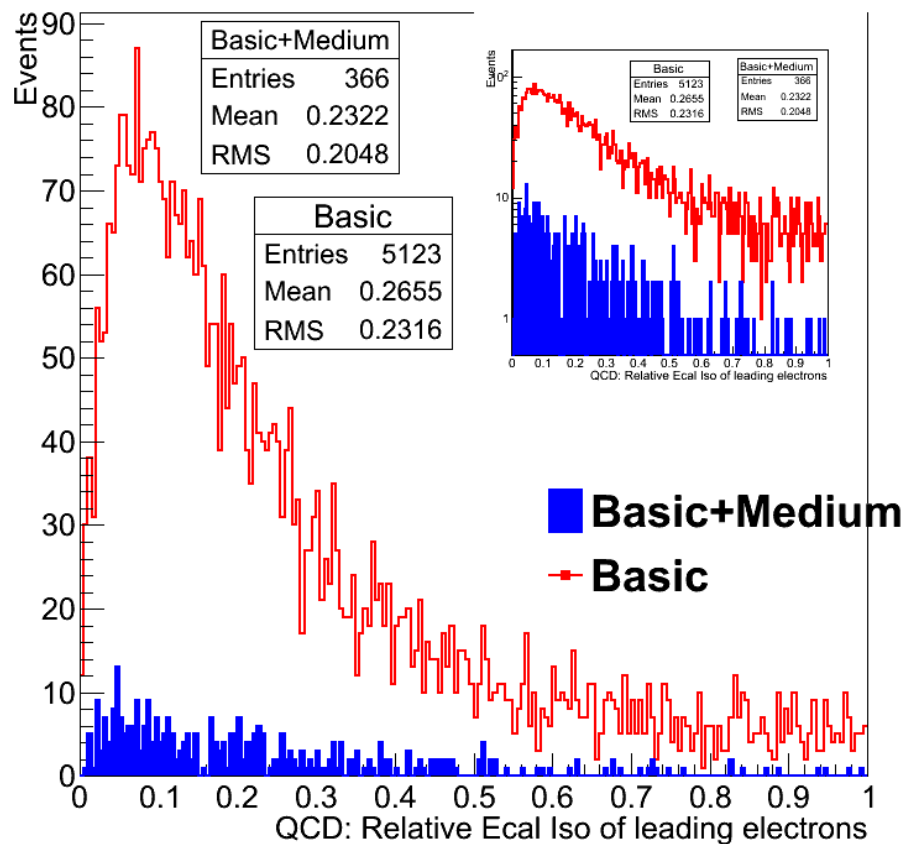
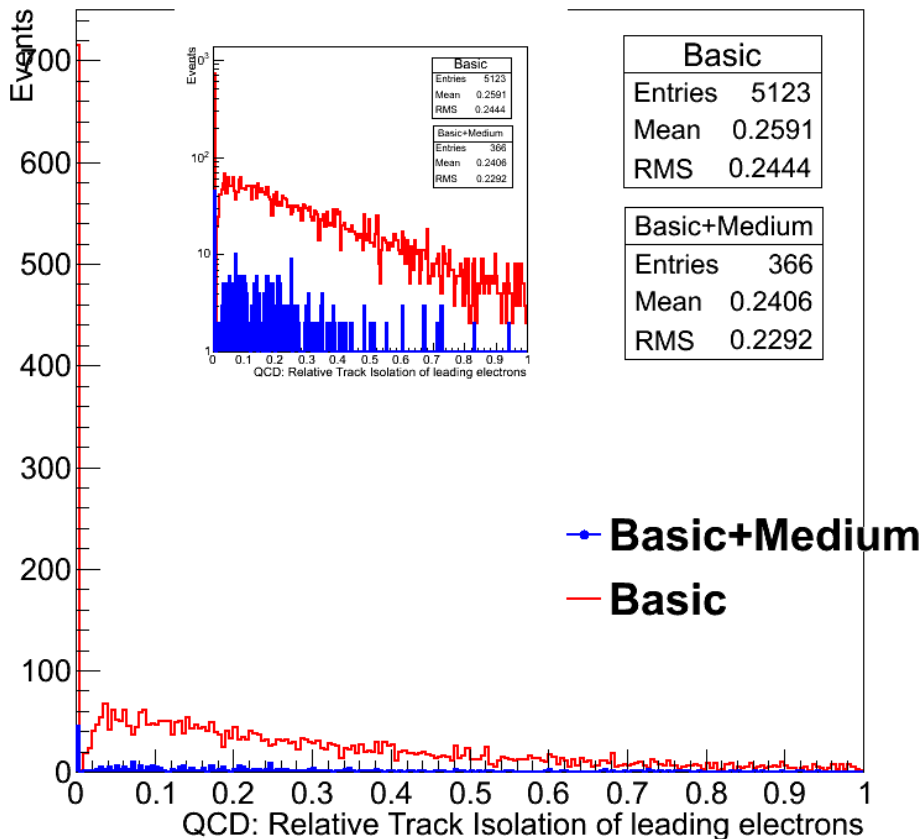
# DytoEE Iso Plots



# QCD Plots

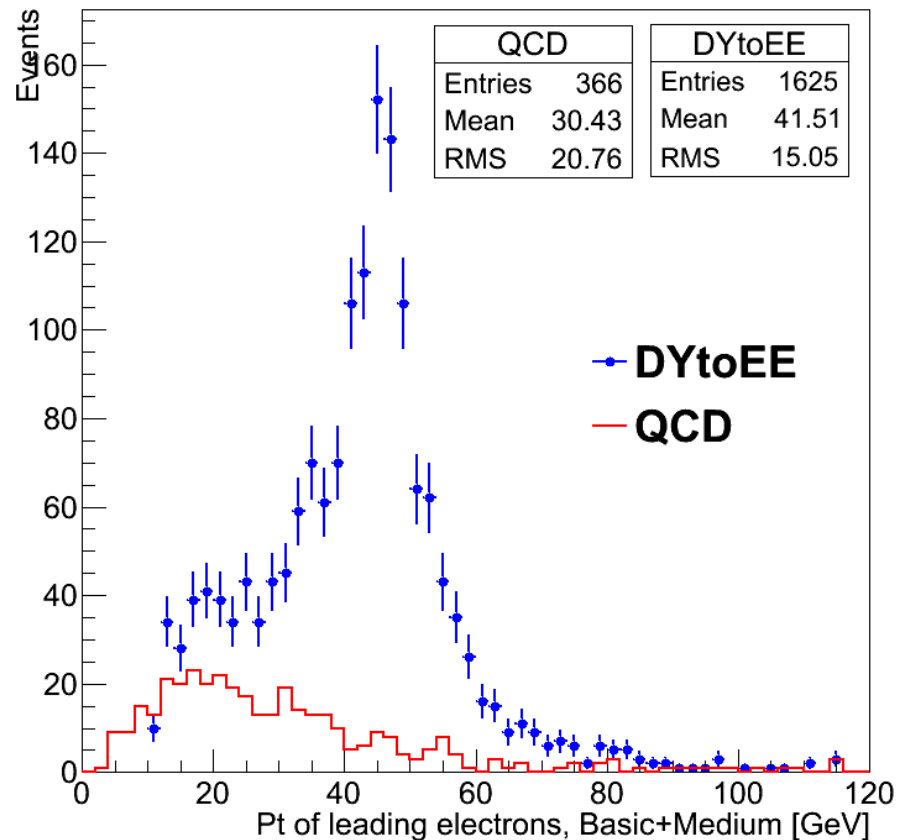


# QCD Iso Plots

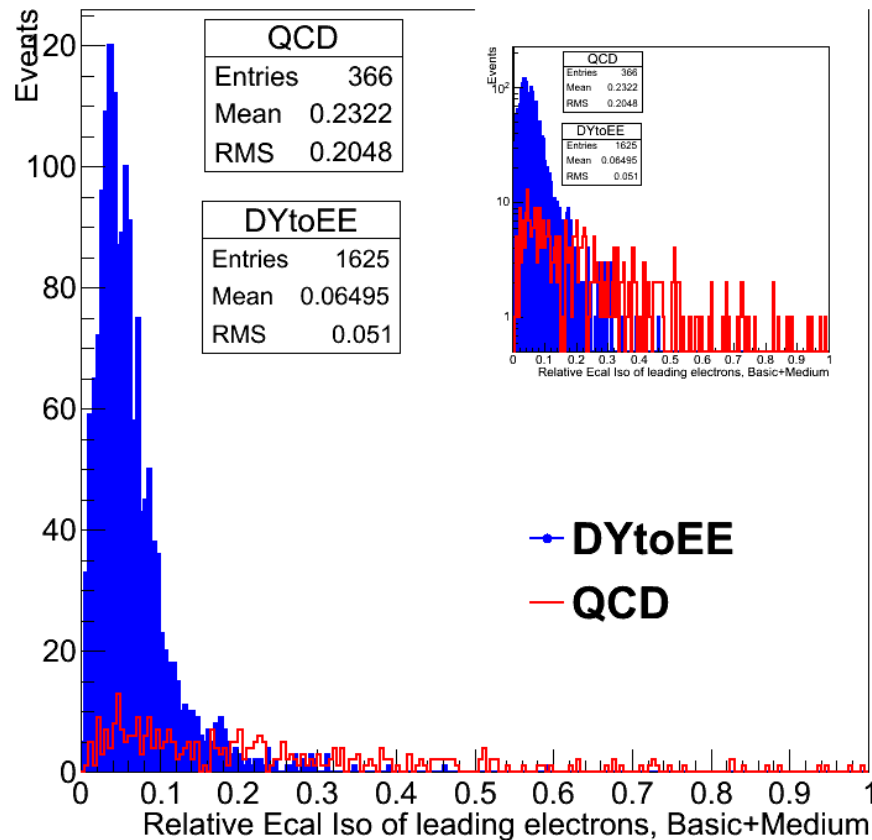
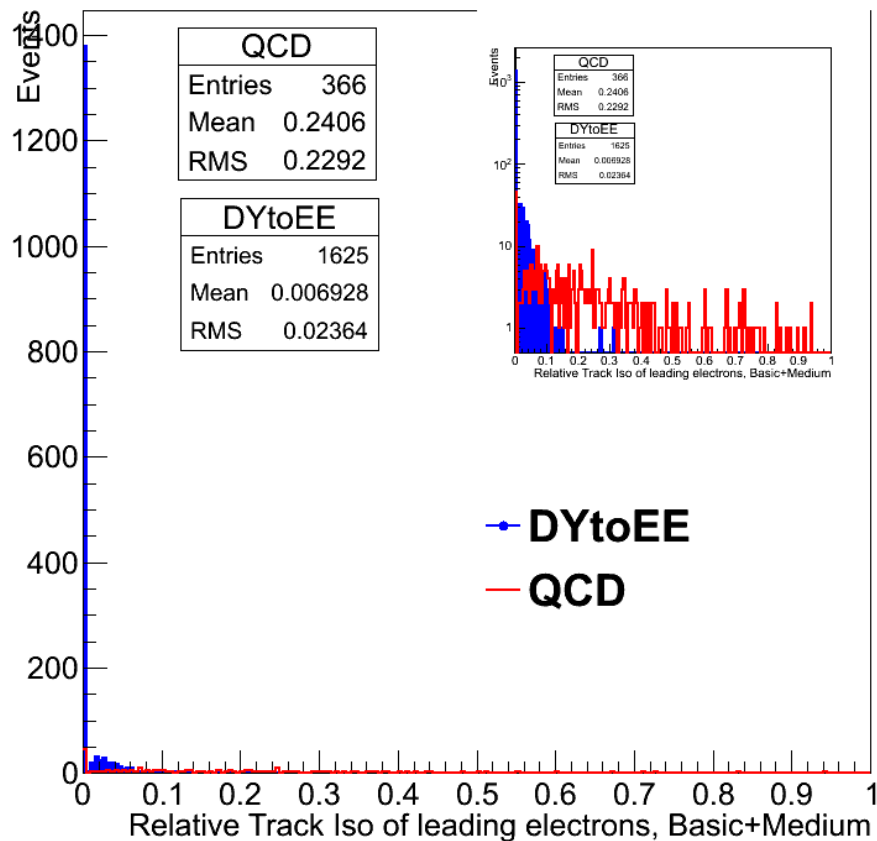




# QCD-DYToEE plots



# QCD-DYToEE plots



# Next Plan

- Next step involves making images of cal deposit.
- In 2D, axes will be  $d\eta$ - $d\phi$  and 2 channels Ecal and Hcal energy.
- For each electron,  $d\eta$  and  $d\phi$  of all other deposits within  $dR < (\text{some constant})$  will be plotted to make an image.
- For cal deposits, clusters to be used are `correctedHybridSuperClusters` (barrel only), `correctedMulti5x5SuperClustersWithPreshower` (end cap). Cluster information can be found [here](#).