

Plans for evaluation of PID performance w/o SPD&PS

D.Golubkov (ITEP)

DISCLAIMER: I haven't succeed to do anything yet — only try to discuss the strategy

Calo e/hadron separation in the offline reco:

- Based on difference between the likelihood distributions of the signal (currently electron/positron from gamma conversions) and background hypotheses (hadrons from $D0 \rightarrow K \pi$)
- For each of the sub-detectors the reference 2-dim histograms of the likelihood are made vs the measurement (χ^2_{3D} , PrsE, HcalE) and track momentum (p)
- Typical contributions (2011) from different sub-detectors:
(mis-ID rate at 90% cut efficiency):
 - ECAL (χ^2_{3D}): ~ 11%
 - PRS (PrsE): ~ 13% ← formally, a significant contribution
 - HCAL (HcalE): ~ 50%
 - ECAL+PRS+HCAL ~ 4%

=> Need first to re-do the PID reference histograms for the upgrade conditions (PrsE contributes to the CaloHypo energy, which enters calculation of χ^2_{3D}).

=> Then make the standard misID vs efficiency plots

Calo photon ID: *(as I understand it - Frederic is the expert)*

Photon CL is calculated as a combination of track-cluster matching chi2D, ClusterMass, and PhotonID. PhotonID is calculated (Frederic) using 2D histograms depending on (chi2_2D, eHypo), (PrsE, eHypo), (E1Hypo = Eseed/eHypo, eHypo) separately for Spd/no Spd clusters and for Inner/Middle/Outer.

=> Probably the 2D histograms also need to be recalculated (since eHypo might change - should be simpler since less classes of photons have to be considered)

Pi0/gamma separation: *(as I understand it - Miriam is the expert)*

IsPhoton variable calculated by TMVA tool by Miriam, using several shower shape variables, including both ECAL and PRS inputs:

(from <https://indico.cern.ch/conferenceDisplay.py?confId=186903>

PRS: Emax/Esum, E2nd/Esum, r2, |asym|, multi, multi15, multi30, multi45)

TMVA is tuned on B0->K*Gamma

=> Might require re-tuning

Current status:

Attempted to analyze the MC without SPD/PS B0->K*Gamma (14 TeV, L=2*10³³)

- photon and hadron reco seems working

(Bd2KstGamma stripping line eff ~20% with and w/o SPD/PS)

- some problem with electron reco (missing EmCharged CaloHypo)