DIRC Preshower Study

-- Code Overview --

Aleksandra Adametz, Heidelberg

- How is the association of DIRC-Hits to Emc-Clusters implemented?
Idea:

- Correct for the energy loss caused by photons which showered already in the DIRC or veto these “preshowers”
  (Need to associate detected Cherenkov-photons emitted by particles in em-shower of pre-showering photon with EMC-Cluster)

Status of feasibility study:

- Association of DIRC-photons to EMC-clusters possible
- Old study of a correction and veto mode exists: I will show new plots soon
  old study can be found here: http://www.physi.uni-heidelberg.de/physi/publications/adametz05.pdf

Code status:

- Template for package “EmcPreshower” exists in CVS, but no code is committed yet.
- Modules for faking “neutral tracks” and neutral Drc-Track to Drc-Hit association tested in analysis-32
- Module for writing ntuples containing all necessary information for the study is working
- Final Emc-Cluster to DIRC-Photon association is done on ntuple level!
- Correction/veto mode studies are also on ntuple level
NeutralDrcSequence appended to BetaMiniDetectorSequence

Produces “neutral” tracks and connects them with reconstructed DIRC photons

Modules in sequence:
- EmcMakeNeutralTracks
- DrcMakeNeutralTracks
- DrcAssociateNeutral
Connects cluster and interaction point with a straight line: “Neutral Track”

Straight Line: Implemented as a helix because drc software wants a helix
- starting point of helix at the cluster centroid
- endpoint of helix at the IP
- particle momentum parameter set to distance between these points (~ 90 GeV)

In: EMC candidates list “Unique”

Out: TrkRecoTrk List “Neutral”
NeutralDrcSequence

Module: **DrcMakeNeutralTracks** (clone of DrcReco/DrcMakeTracks)

Makes “neutral” Drc-Tracks from TrkRecoTracks (“Neutral Tracks”)

In: TrkRecoTrk List “Neutral”

Out: Drc-Track list “Neutral”
     Drc-PidInfo list “Neutral”
Module: DrcAssociateNeutral (clone of DrcReco/DrcAssociate)

Associates “neutral” Drc-Tracks with reconstructed Drc-Hits

In:  - Drc-PidInfo “Neutral”  
     - Drc-RecoHit List

Out: - “Neutral” Drc-PidInfo object containing the association info
Module: **EmcMiniCalibTuple ( writes root ntuples )**

- **EmcMiniCalibTuple** appended to BetaMiniSequence

  **In:**
  - Charged and Neutral DIRC Information
  - EMC Information

  **Out:**
  - root ntuples containing all quantities required for the preshower study

**Association Code ( ntuple level ):**

- Macro which does the final association between the EMC-Clusters and Drc-Hits
- Some old macros for the correction/veto study which need to be rewritten
What needs to be clarified with experts?

• Can we put the NeutralDrcSequence into official reconstruction software?
• We need a discussion about the design of output of NeutralDrcSequence.
• How to design a module for the final Emc-Cluster to DIRC-photon association?
• ... and a lot of other detailed questions...

ToDo:

• further feasibility studies of correction/veto mode on ntuple level
• work with expert on code implementation (NeutralDrcSequence)
• studies for final association module

I would need expert help for implementation