Subject: Loss of efficiency for electrons at theta~22^deg, due to association failure in EMC
Posted by Ermias on Fri, 20 Feb 2015 16:10:26 GMT
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Dear all,

While doing simulations on electrons, I noticed a localized efficiency loss for electrons at around theta~22^deg. After
digging around a bit, I was able to pinpoint that it was due to electrons in this location not being associated to *any* cluster,
even though there is a valid reconstructed cluster sitting near the electron's projection. I first started to notice this problem
in oct.14 release. Even though the efficiency drop with oct.14 was localized in a relatively smaller zone (~1degree window),
the effect on the signal I was simulating was significant (~10%) because the electrons for this signal peak around 20^deg in theta.
However with the current development version (26841) the loss in efficiency is striking (see attached figure,
left panel, count of all electrons vs electrons with eid vs. theta). The efficiency loss is there for positrons too.

I looked at the change in the EMC association code and the only significant change that happened between apr.13 release
and current trunk is the addition of the following conditions before starting the cluster association:

```
  if ( (emcModule<3) && (helix->GetZ()>150.)  ) continue; // not consider tracks after emc barrel for BARREL
  if ( (emcModule==3) && (helix->GetZ()<165.) ) continue; // consider tracks only from last gem plane for FWD
  if ( (emcModule==4) && (helix->GetZ()>-30.) ) continue; // consider tracks only ending at the back of STT for BKW
```

at L47 of PndPidEmcInfo.cxx. I assume these lines are there for a reason (would appreciate to hear from
EMC experts why...), but I was able to recover most of the loss in efficiency by commenting them out (right panel).
Could it be that the actual cut values are not correctly set?

What fix do EMC experts suggest? Maybe its a known issue and people are working on it, but for "mass" simulation,
would it be advisable to just go back and patch oct.14 version? or wait until a new release that includes fixes? What
would be the approximate time scale for the next release, if it is okay to ask?

Thanks in advance!

Ermias.

File Attachments

1) tc.png, downloaded 1080 times