Some Quick Remarks on recent egamma (electron) Issues

Jan Kretzschmar

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UNIVERSITY OF
LIVERPOOL

Less Recent Changes

- As usual, egamma software is evolving quickly: reconstruction strategy and identification cuts keep changing

- It is a challenge for everyone, to use the "latest" (MC) versions and, more importantly, consistent Data/MC versions

- Quick summary of changes from MC08 (ATHENA $\sim$ v14.2.25) to first MC09 versions (ATHENA $\sim$ v15.3.1):
  - Electron/photon split stragegy changed: "all" true electrons and many converted photons end up in `ElectronCollection`
  - Retuning of Electron `loose isEM`: higher background rejection
  - Retuning of Electron `medium isEM`: changed cut variables, removed cluster isolation cut, in general lower background rejection and increased signal efficiency
  - New forward electrons available: $2.5 < |\eta| < 4.9$, no tracking just topo-clusters with shape cuts `frwdElectronLoose&` `frwdElectronTight, author=8`

- This is not really "new", but possibly people have "missed" some iterations since MC08 (as I have)

More Recent Changes

- In the last months again many changes starting from releases $\sim 15.6.1$ to the most recent $15.6.9.8$ ("May reprocessing")
  - *Photon recovery* on by default since $\sim 15.6.1.6$: large overlap between `ElectronCollection` and `PhotonCollection`, recovered photons have `author=16`
  - Various updates to more realistic conditions:
    - More material $|\eta| \gtrsim 2.2$ with `ATLAS-GEO-10-00-00`
    - Updates of dead LAr channels (mostly broken front end boards *FEBs*,*OTX*)
    - Increased TileCal noise since $\sim$`OFLCOND-DR-BS7T-ANom-07` $\Rightarrow$ retuning of hadronic leakage cuts for electrons in $15.6.8.2$
  - Redefinition of default isolation cuts (e.g. `mediumIso`): includes now track+calo isolation, tuned for 95% signal efficiency vs. 99% earlier and larger background rejection ($15.6.8.2$)
  - Redefinition of `tight` cuts: increase background rejection using tighter track-cluster matching and rejection of electrons, which are also reconstructed as "converted photons" ($15.6.8.2$)

Current Analysis Issues: Tracking

- Recent "new" `tight` cuts use too agressive track-cluster $\Delta\eta$ and $\Delta\phi$ matching cuts and "conversion matching" rejection not optimal in regions with known dead B-layer modules

- These issues lead to a "new-new" or "robust" `tight` definition used e.g. in W, Z analysis in electron channel: drop $\Delta\eta$ and $\Delta\phi$ matching cuts and make "conversion matching" rejection depending on "expected B-layer hits" – **analysis level change so far?!** Sharepoint link
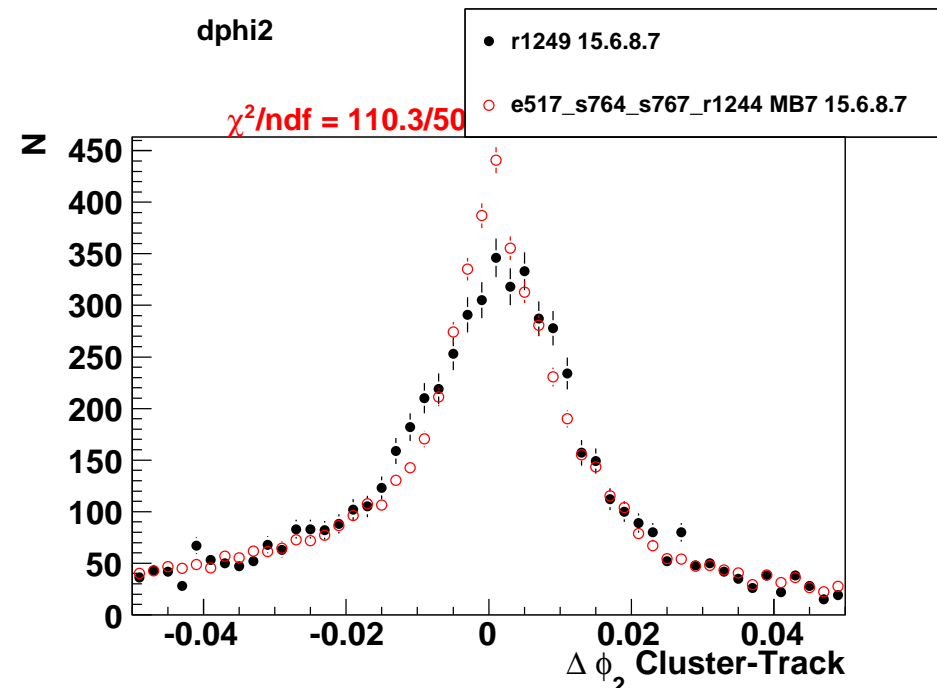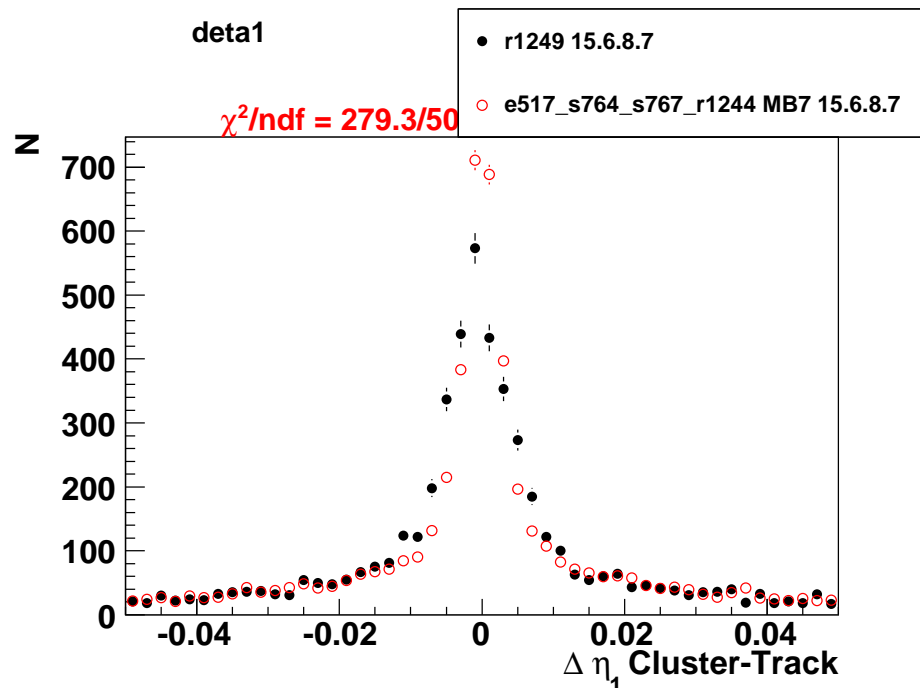
Current Analysis Issues: Calo

- Current egamma strategy: E_T and η are taken only from calo cluster

- A "hot" topic: how to deal with regions in the calo, where performance is degraded

- Various known problems:

  - Dead FEBs in layers 1&2: no clusters/incorrect energy measurement – all offline "fixes", e.g. corrections using trigger tower information, are currently disabled

  - Single dead cells

  - Regions with dead presampler and/or layer 3

- A "tool" is available to cut those regions Sharepoint link

- Under "constant" debate: probably cutting too conservative ($\sim 12\%$ of the calo declared bad!) and "code quality"