ILD Analysis
CALICE CIEMAT meeting

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CMS
Compact Muon Solenoid

29/11/19

Learning iLCSoft

In order to build up the validation tool and extend the timming studies. We need to add the SimHit and Digi information to the LCTuple:

- The steering xml file for the LCTuples already contain the option:

Branch: master ▾ LCTuple / example / lctuple.xml Find file Copy path

gaede - added support for TrackerHits 308ef53 on May 15, 2013

2 contributors

152 lines (127 sloc) | 7.28 KB Raw Blame History

```
<?xml version="1.0" encoding="us-ascii"?>
<!-- ?xml-stylesheet type="text/xsl" href="http://ilcsoft.desy.de/marlin/marlin.xsl"? -->
<!-- ?xml-stylesheet type="text/xsl" href="marlin.xsl"? -->

<!-- Loading shared library : /Users/fgaede/marlin/mymarlin/lib/libmymarlin.0.1.0.dylib (libmymarlin.dylib)-->

<!--##########################################
    #                                        #
    #     Example steering file for marlin   #
    #                                        #
    ##########################################-->


<marlin xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http://ilcsoft.desy.de/marlin/marlin.xsd
```

Learning iLCSoft

- and also our steering file (the one used for the uds sample):

```
<processor name="MergeSimCaloHits" type="MergeCollections">
  <!--MergeCollections creates a transient subset collection that merges all input collections -->
  <!--Names of all input collections-->
  <parameter name="InputCollections" type="StringVec">
    BeamCalCollection
    EcalBarrelCollection
    EcalEndcapRingCollection
    EcalEndcapsCollection
    HcalBarrelRegCollection
    HcalEndcapRingCollection
    HcalEndcapsCollection
    LumiCalCollection
    YokeBarrelCollection
    YokeEndcapsCollection
    LHCalCollection
  </parameter>
 <!--Optional IDs for input collections - if given id will be added to all objects in merged collections as ext<CollID>()-->
  <parameter name="InputCollectionIDs" type="IntVec">
    25 20 21 29 22 23 30 24 27 31
  </parameter>
  <parameter name="OutputCollection" type="string">SimCalorimeterHits </parameter>
  <!--verbosity level of this processor ("DEBUG0-4,MESSAGE0-4,WARNING0-4,ERROR0-4,SILENT")-->
  <parameter name="Verbosity" type="string">DEBUG </parameter>
</processor>
```

- It seems there is a merged collection of all our SimCaloHits. Including the Ecal.

Learning iLCSoft

- However I can not find the branches/leafs in the obtained TTree.

```
carrillo@gaeuicali1:~/ilcsoft/ntuplizer/mc-higgs-channel/Analysis> $root -b uds_LCTuple.root
root [0]
Attaching file uds_LCTuple.root as _file0...
(TFile *) 0x30f5290
root [1] MyLCTuple->Show()
======> EVENT:-1
 evevt           = 0
 evrun           = 0
 evwgt           = 0
 evtim           = 0
 evsig           = 0
 evene           = 0
 evpoe           = 0
 evpop           = 0
 evnch           = 0
 nmcp            = 0
 nrec            = 0
 npid            = 0
 ntrk            = 0
 ntrst           = 0
 nsth            = 0
 nsch            = 0
 r2mnrel         = 0
root [2]
```

- Is a recompilation needed?, how?
- Reco Hits are not even listed in the steering file. Would need to dig deeper.
- lets say work in progress...

Backup

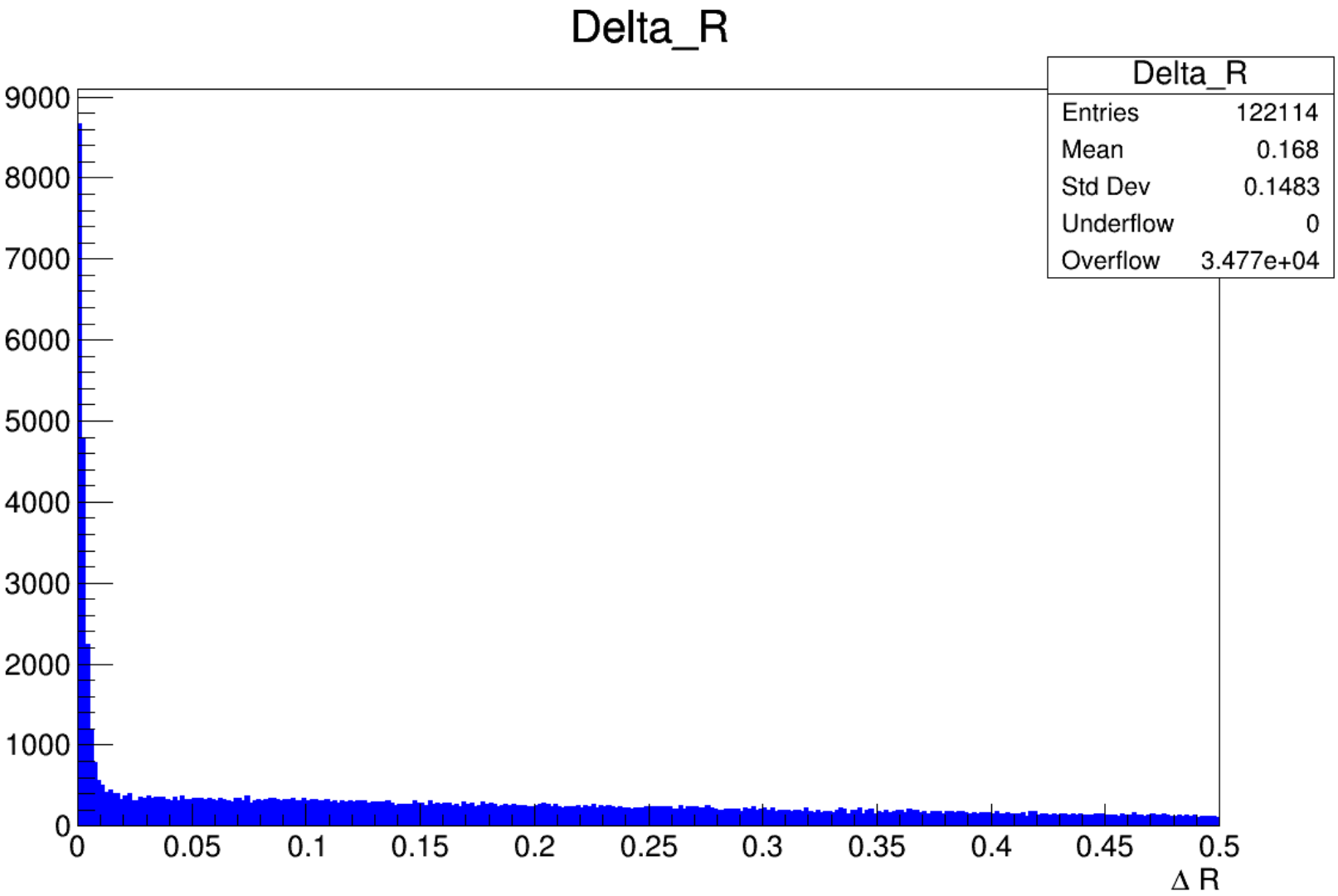
Analyzing the uds sample

The slcio file obtained from Dirac by Hector was ntuplized with the following command:

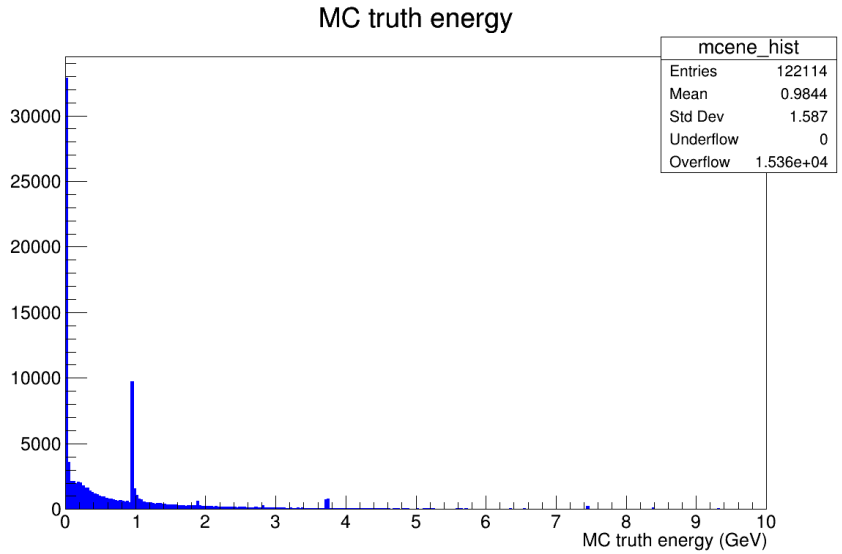
```
Marlin MarlinStdRecoLCTuple.xml
       --global.GearXMLFile=gear_ILD_l5_o2_v02.xml
       --global.LCIOInputFiles=/pool/calice/hectorgc/MC_samples/DIRAC/rec/1-calib/uds/ILD_l5_o2_v02_nobg/v02-00-01/rv0\
2-00-01.sv02-00-01.mILD_l5_o2_v02_nobg.E1-calib.I110069.Puds30.e0.p0.n001_001.d_rec_00010760_452.slcio
       -MyAIDAProcessor.FileName=uds_LCTuple
```

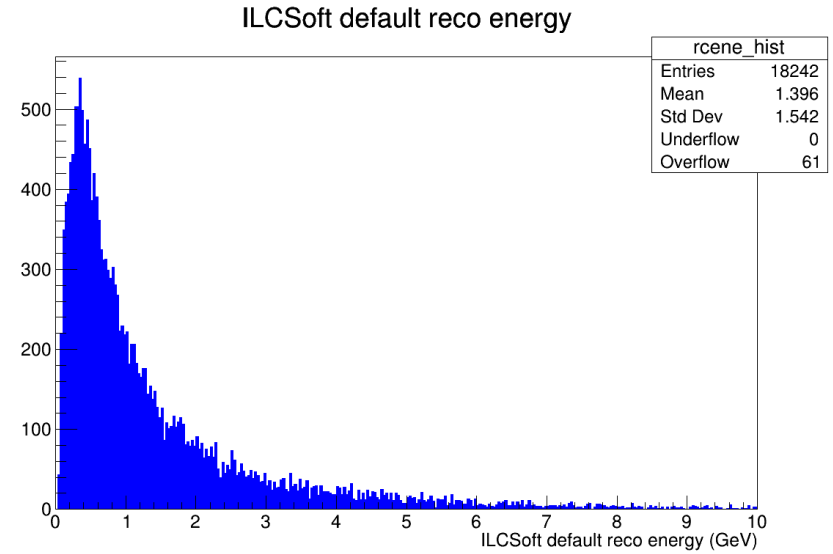
Providing the right xml files, and correct ilcSoft enviroment.
For the branches list: check branches.txt attached.

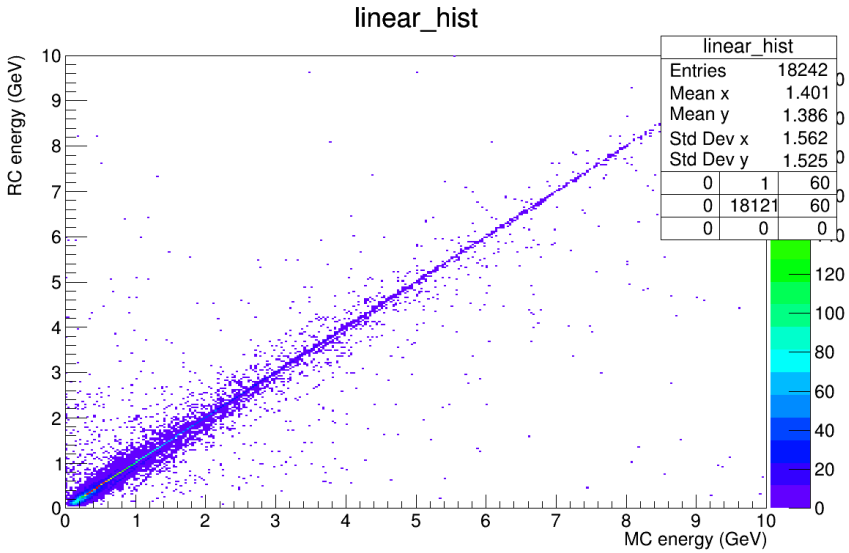
Original Hector Script for ΔR matching, all particles

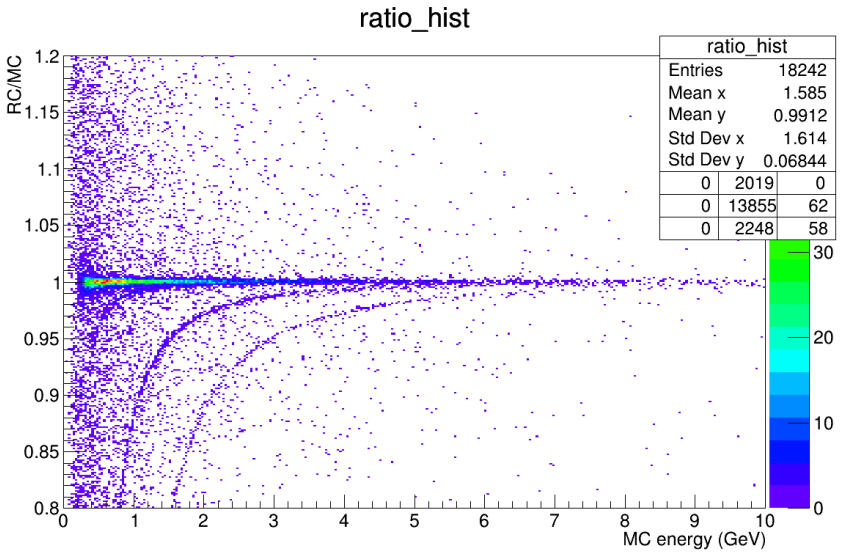


Energy Distributions, all particles



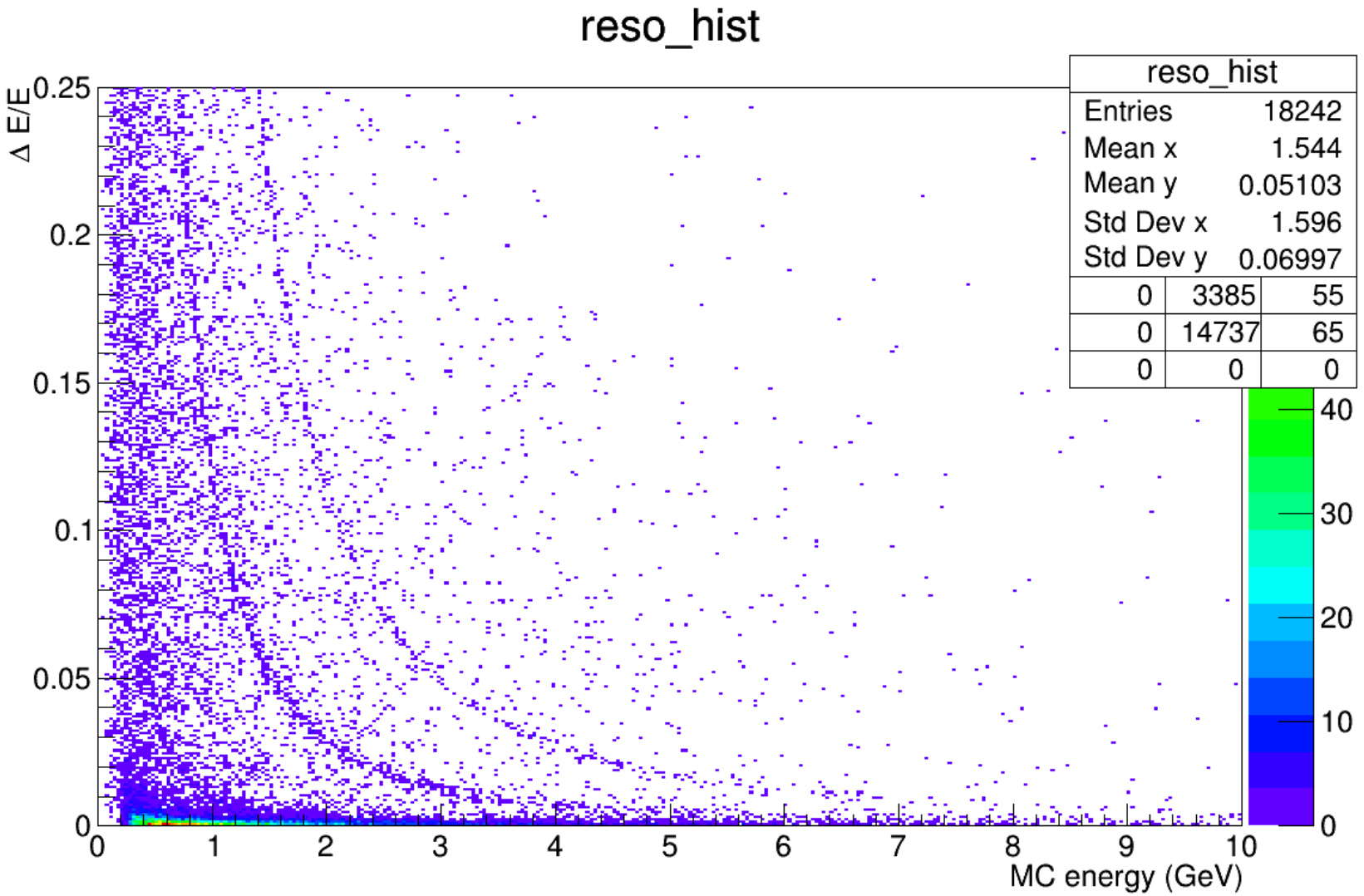




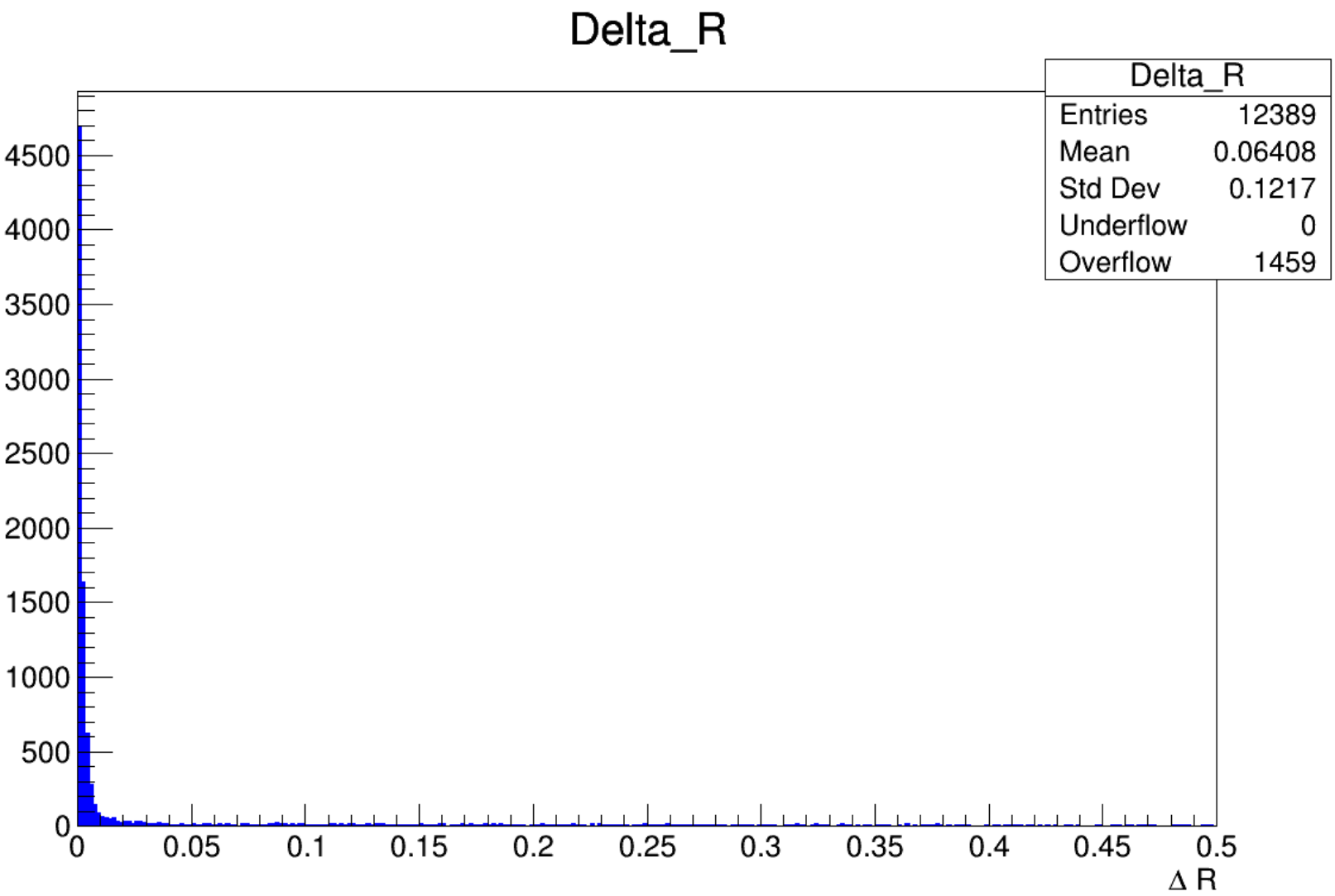


$min\Delta R < 0.01$, all particles included.

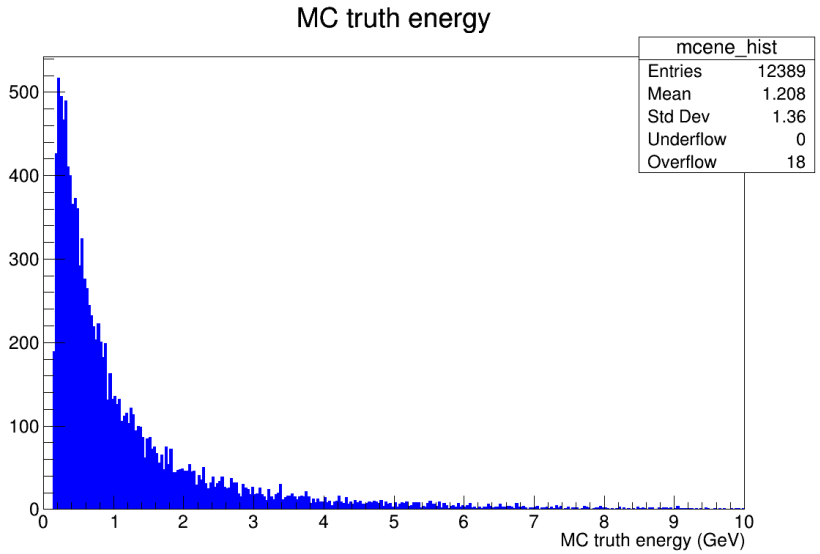
$\Delta E/E$, all particles (new)

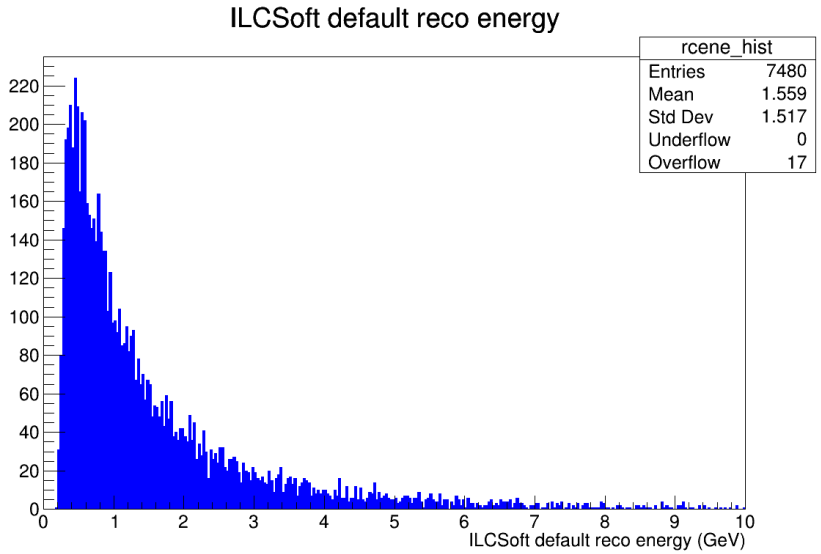


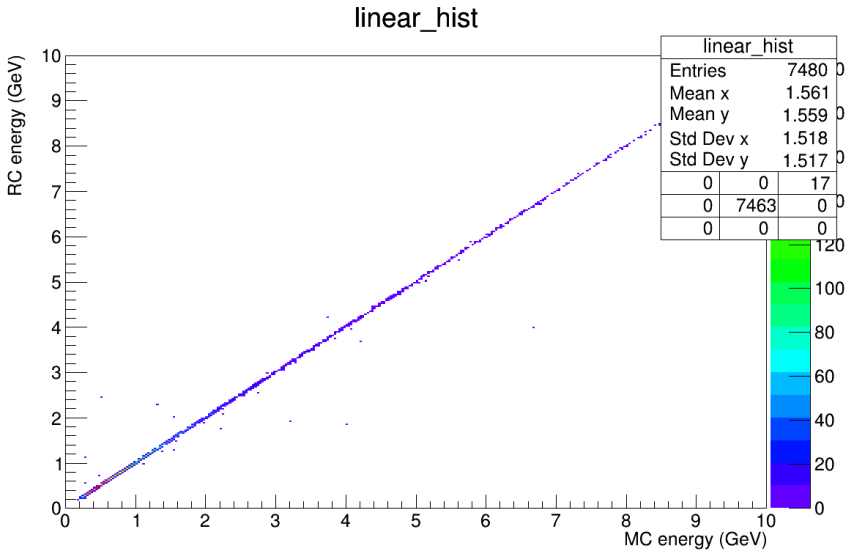
ΔR matching, $\pi^{\pm}$

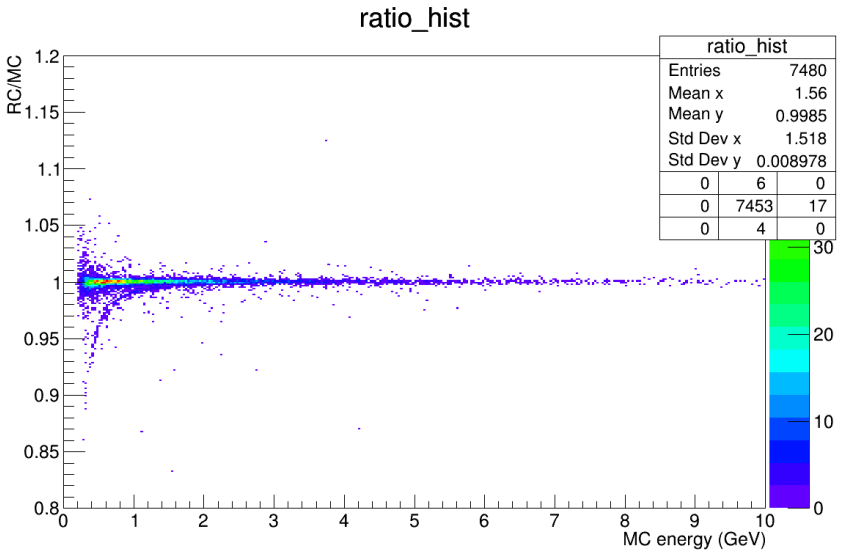


Energy Distributions, $\pi^{\pm}$



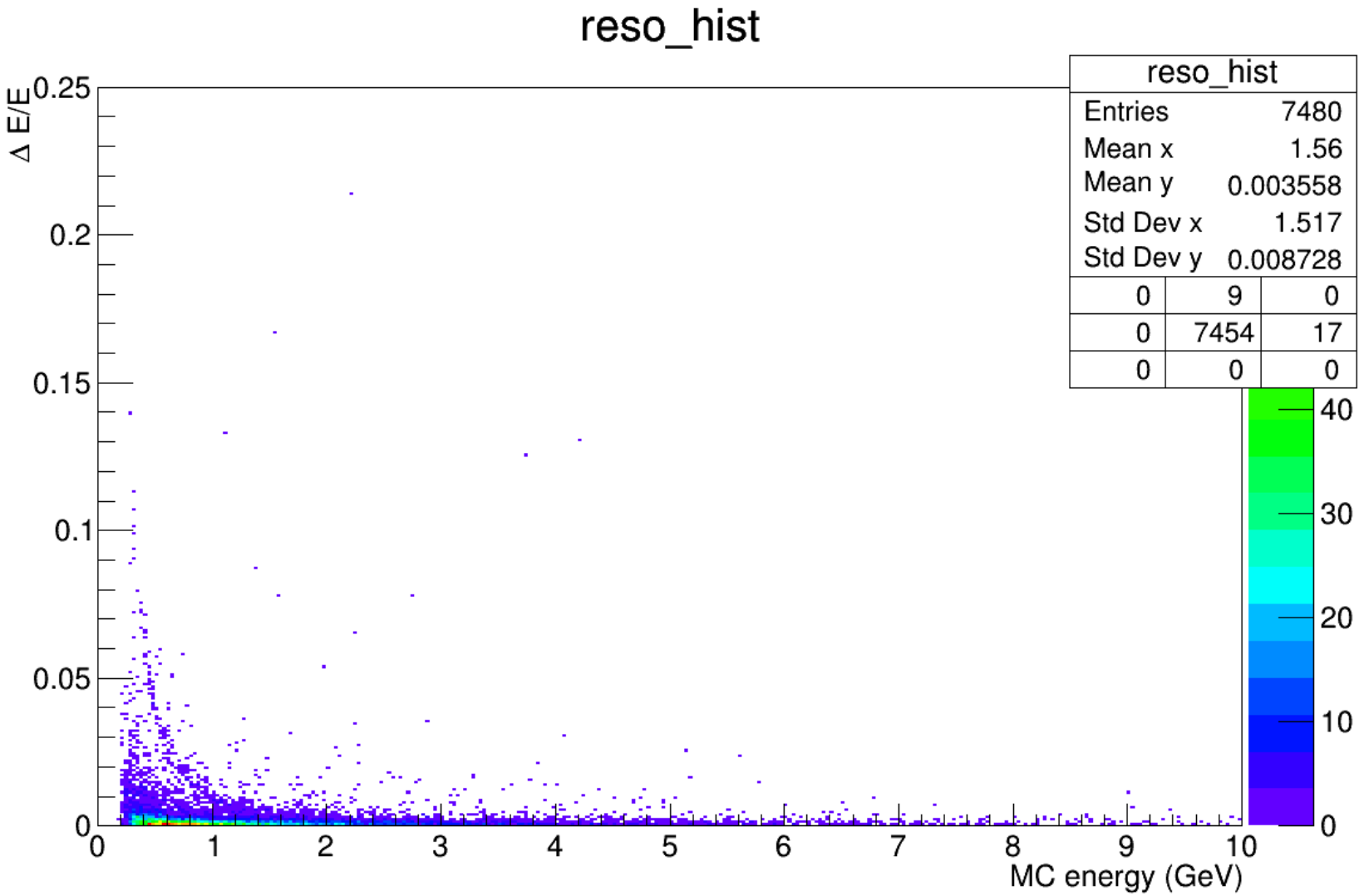






$min\Delta R < 0.01$, only $\pi^{\pm}$

$\Delta E/E$, $\pi^{\pm}$ (new)



All distributions, all particles

Including the new resolution plots:
`http://wwwae.ciemat.es/~carrillo/calice/`

Short term plans

Validation of the reconstruction chain, from simulated hits to PF algo for SDHCAL defined in ILDConfig.

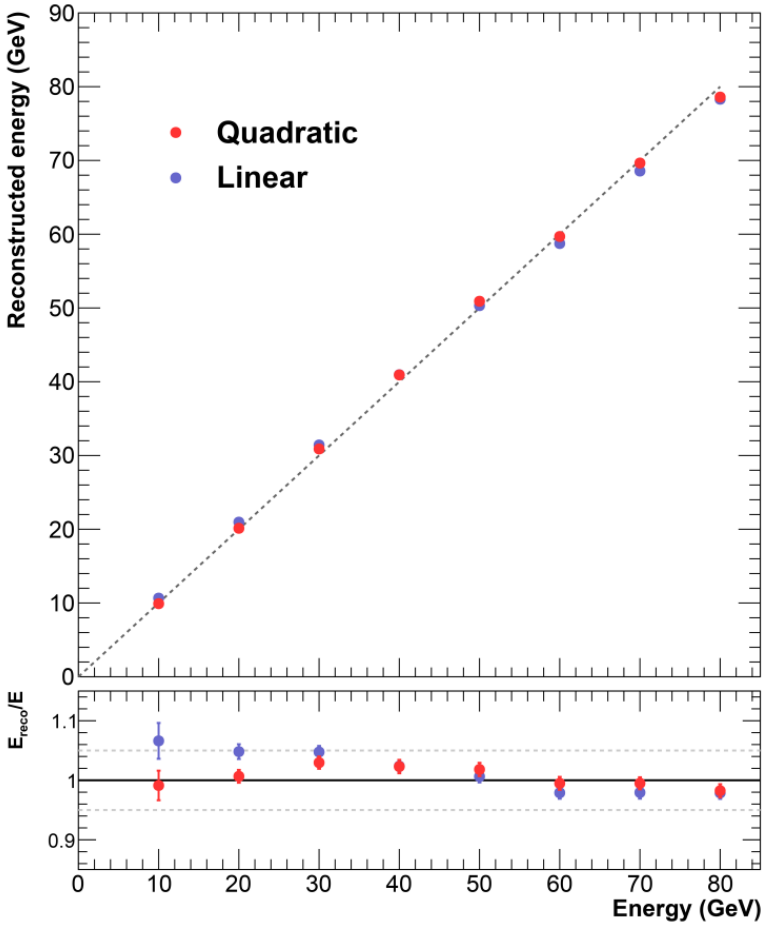
- **Produce the linearity plots** and the other plots that Guillaume did in his thesis.
- Stablish a validation procedure for the SDHCAL in ILD/ILCSoft.
- Run the validation on the diquark data set and perform the same studies as done by Guillaume.
- Present the results in the SDHCAL collaboration meeting.
- Present the results in the ild-software-conveners and ild-physics-conveners.
- Study The next large-scale simulation of samples at 250 GeV (which should start production now).

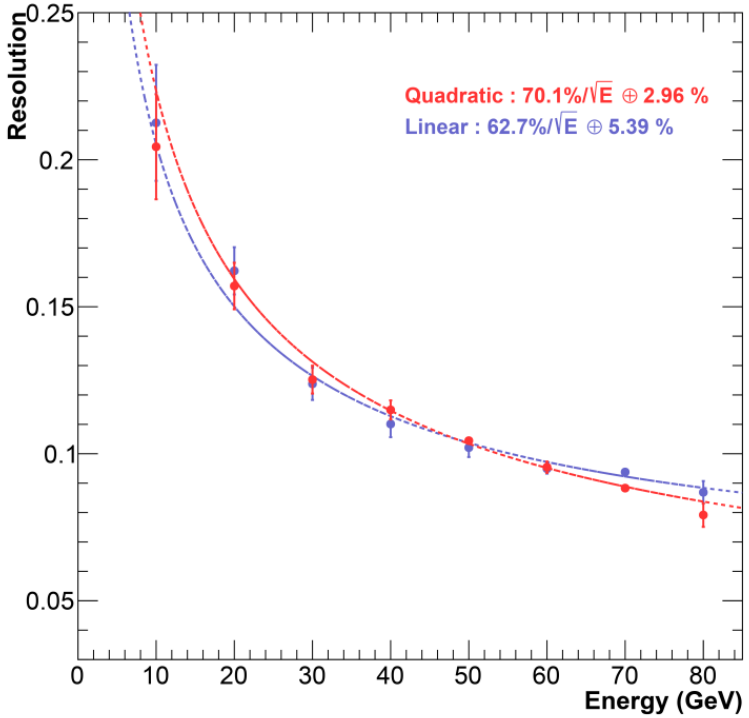
By this point we should be ready to start a physics analysis. All software and information will be stored in the gitlab repository that Hector has created.

Long term plans

- Identify an analysis that we would like to pursuit. My suggestion was $H \to cc$.
- Learn about $H \to bb$. This is a necesary step for $H \to cc$.
- Signal samples are around.
- Identify background samples.
- Involve Juan and Maria.
- Does machine leanring make sense here? (My guess yes).
- Run a standard analysis.

Plots to reproduce with the 250 GeV simulation





The linearity of the reconstructed energy w.r.t MC thruth, would also check if the simulation and reconstruction goes fine.

Plots to reproduce with the 250 GeV simulation

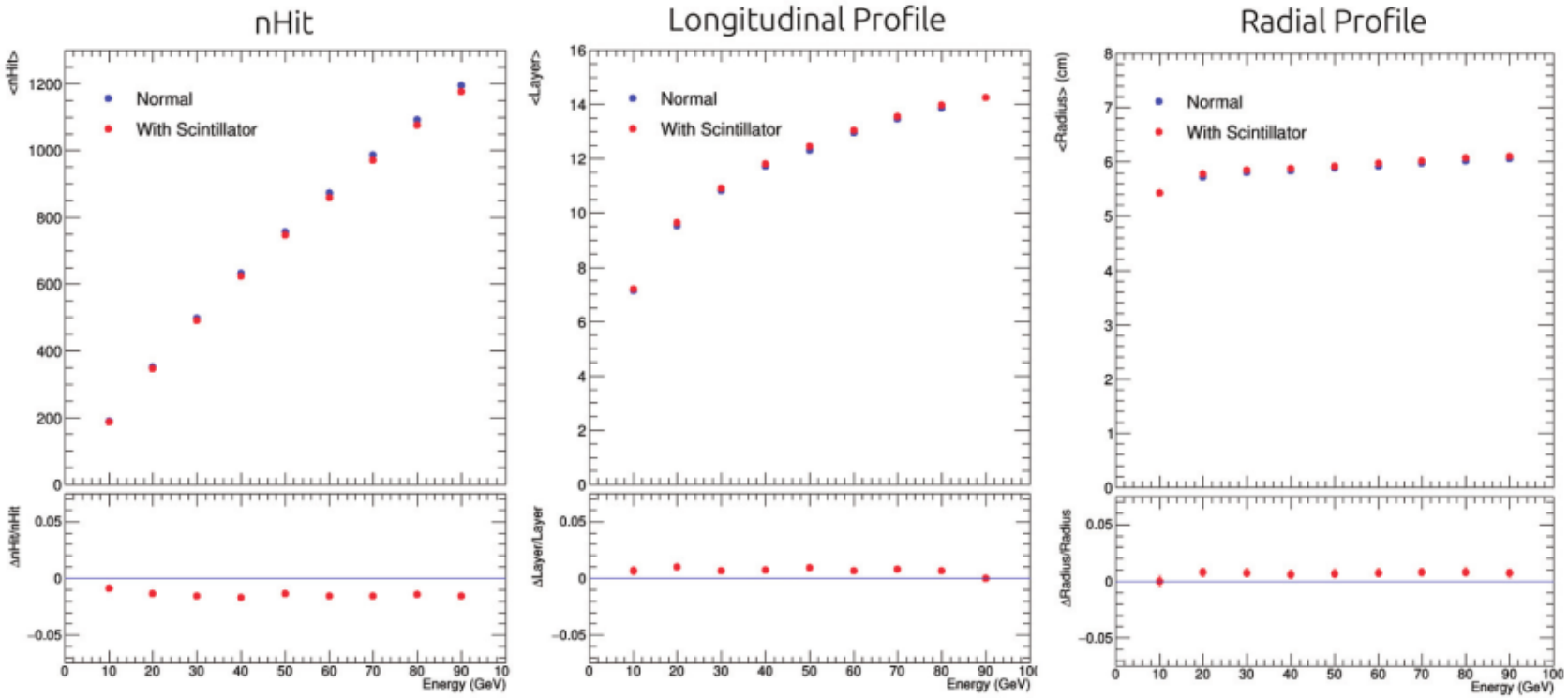


FIGURE 7.3 – *Comparaison du nombre de hits moyen (à gauche), de la valeur moyenne du profil longitudinal (au centre) et de la valeur moyenne du profil transverse (à droite) entre la configuration normale du SDHCAL (en bleu) et la configuration hybride (en rouge).*

As advice by Bo during Thursday meeting.