EM shower study

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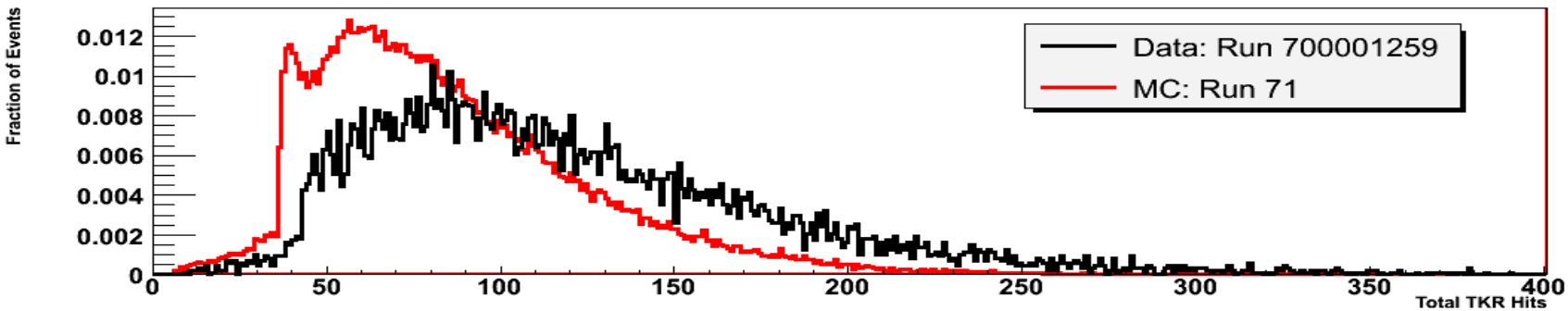
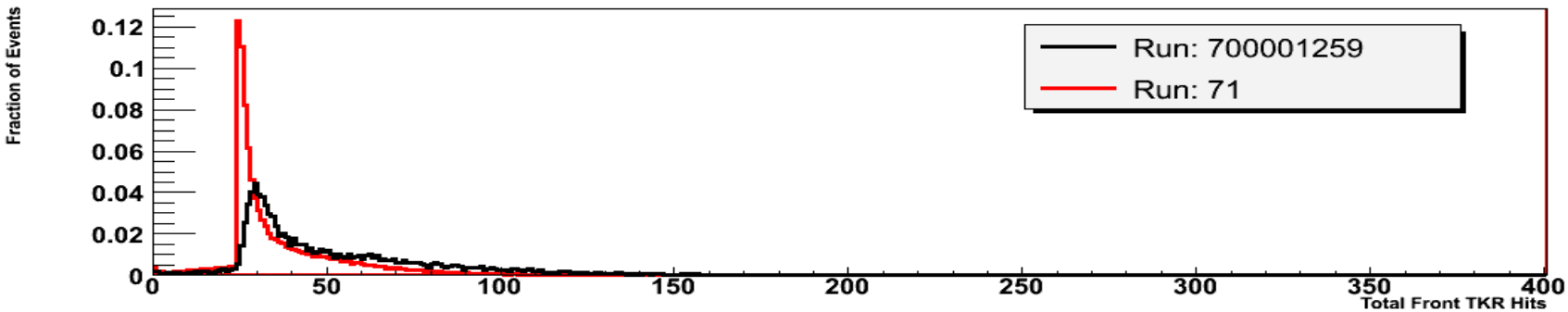
TKR Hits in electron runs

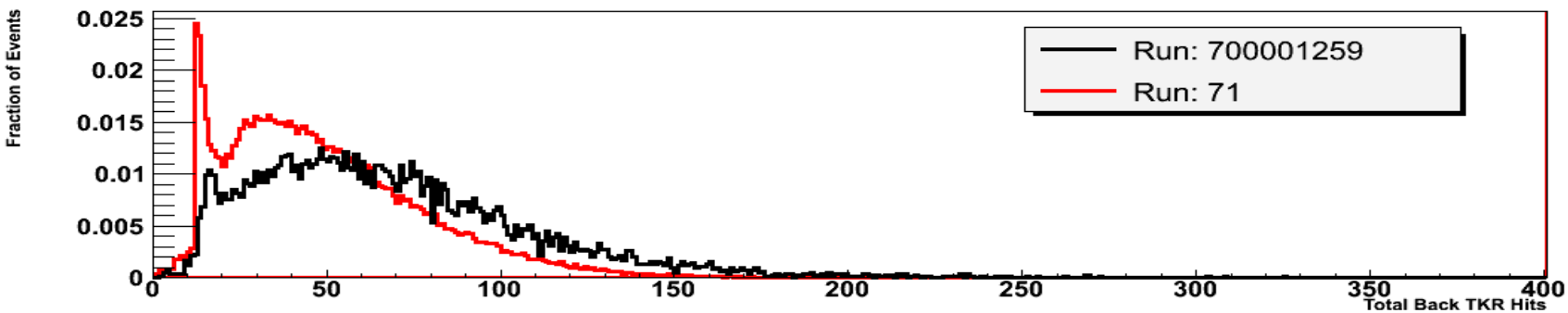
- **The TKR hits have been studied**
  - **Whole TKR**
  - **Front TKR (plane > 12) thin planes**
  - **Back TKR (plane ≤ 12) thick and light planes**
- **The BT and Merit root files have been used (latest version available)**
- **The CU has been used as standalone detector, i.e. no geometrical cuts have been imposed**
  - **Cuts:**
    - **At least one track**
    - **Last layer in the track == Layer 0 (Tkr1LastLayer == 0)**
    - **GTCC Fifo is not full (EventGtccFifo==0)**

Electrons 1 GeV, 0°

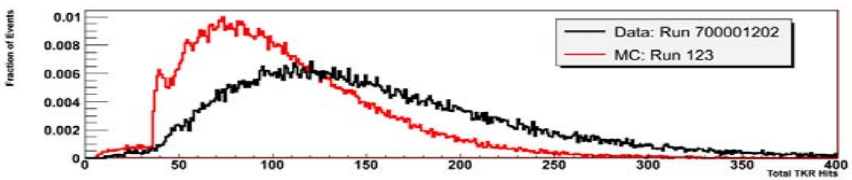
Black: Data Red: MC

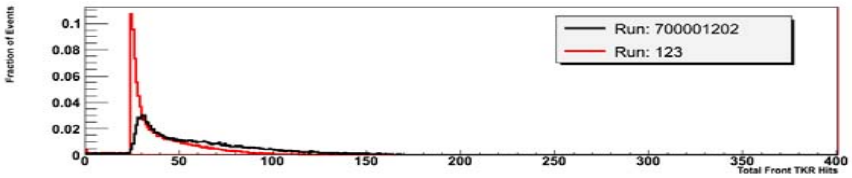


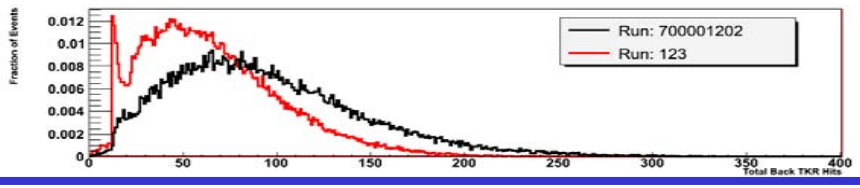


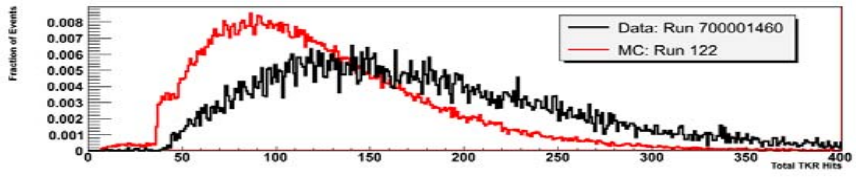


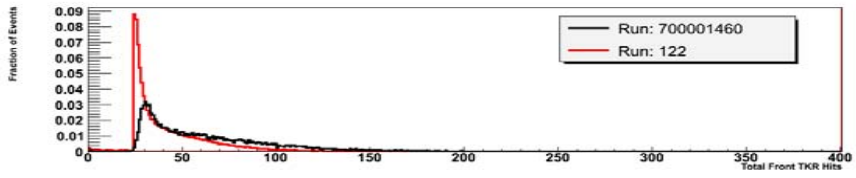
Electrons 2.5, 5, 10 and 20 GeV, 0°

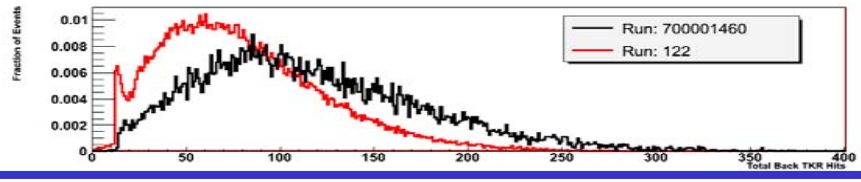


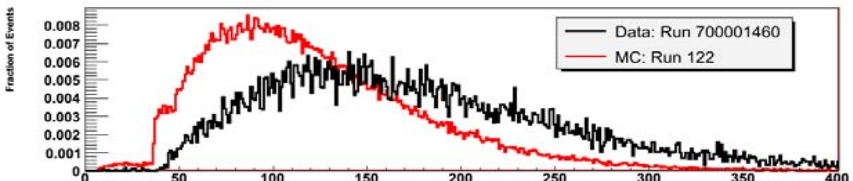


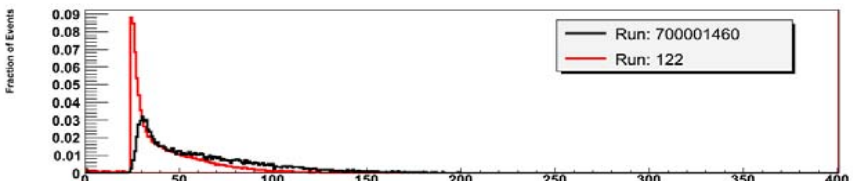


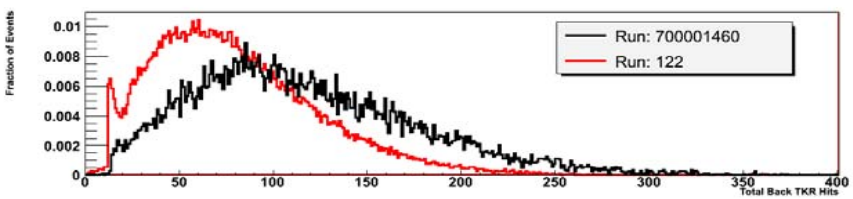


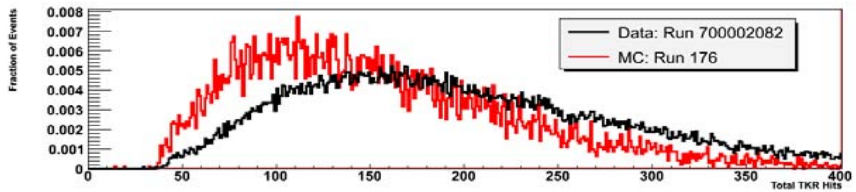


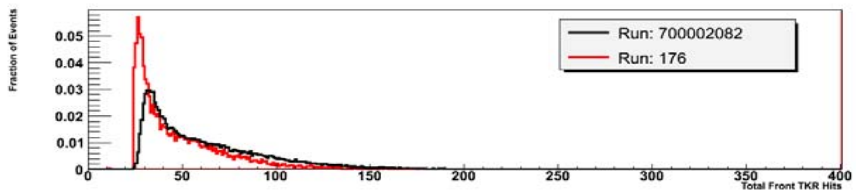


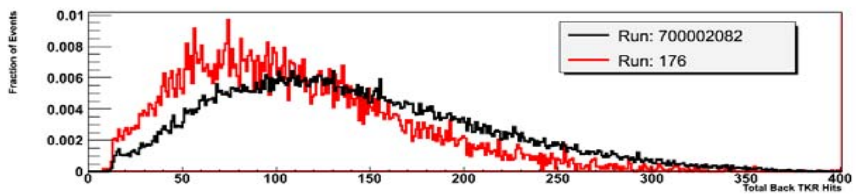




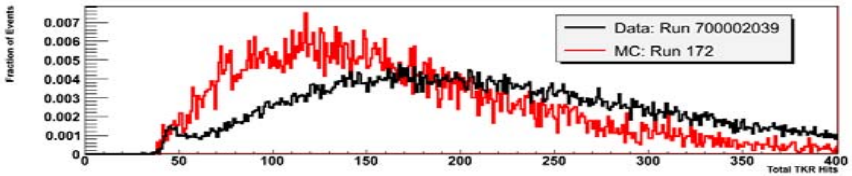


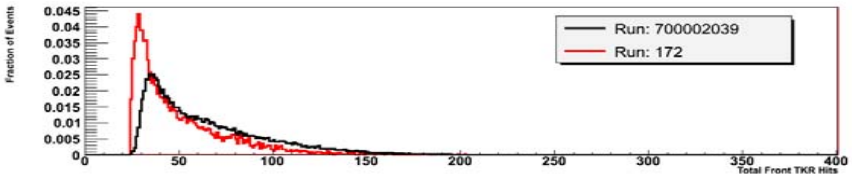


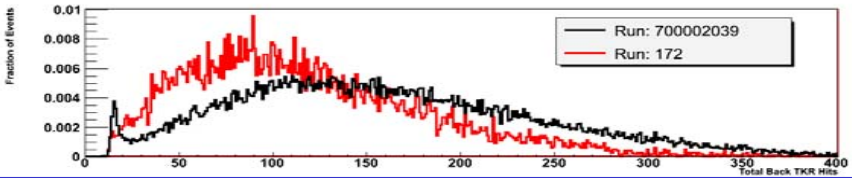


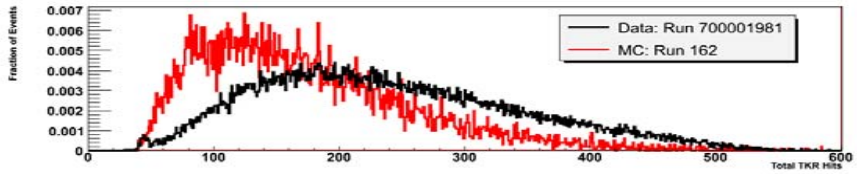


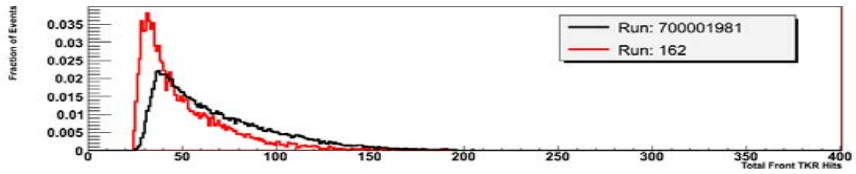
Electrons 50, 100, 200 and 280 GeV, 0°

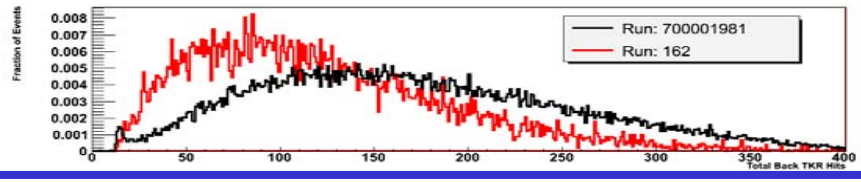


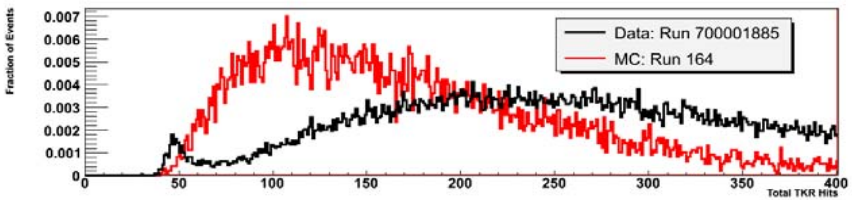


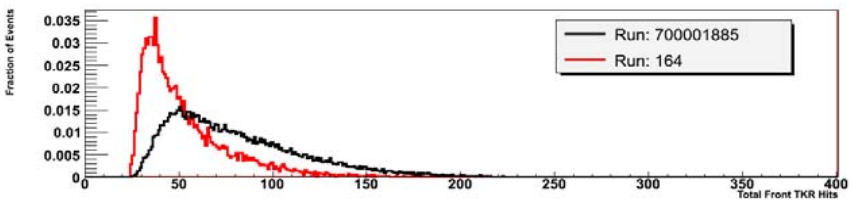


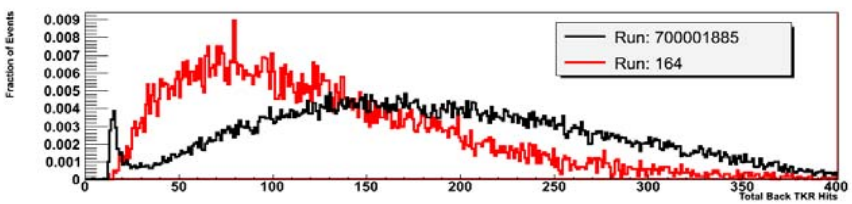


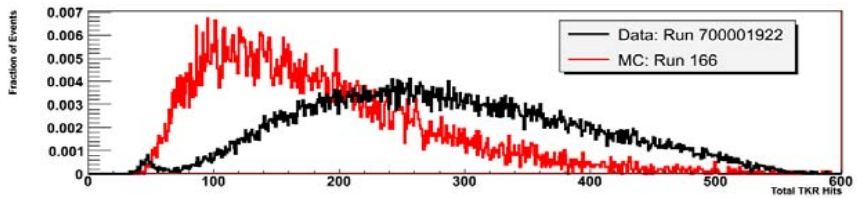


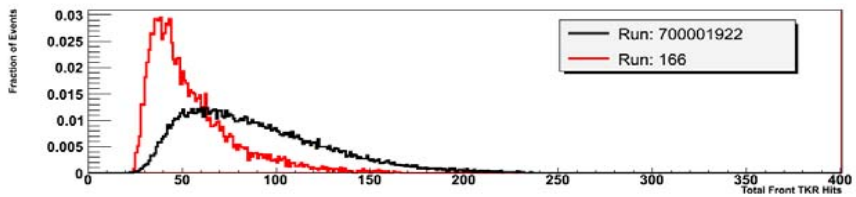


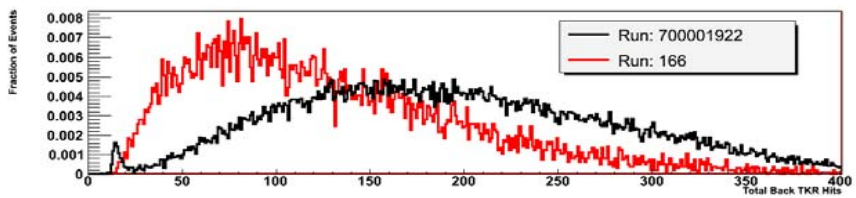






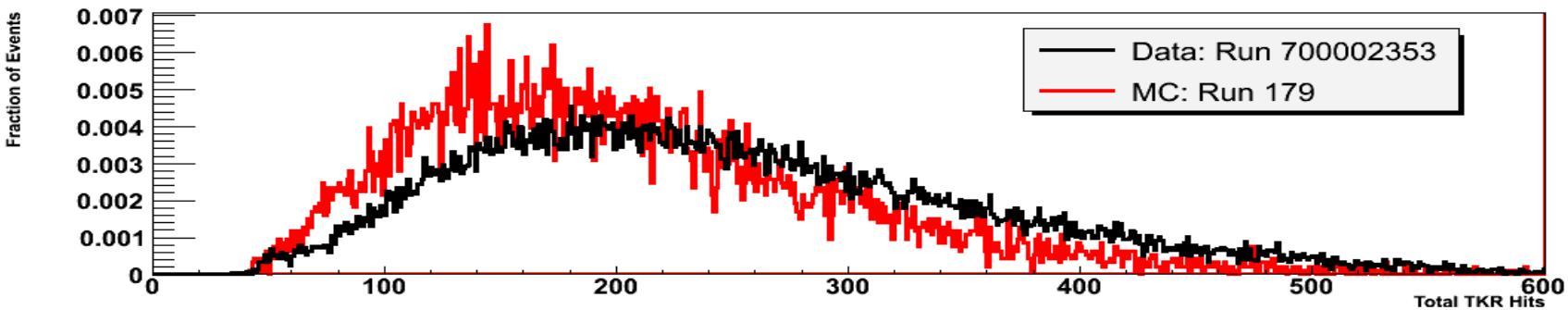


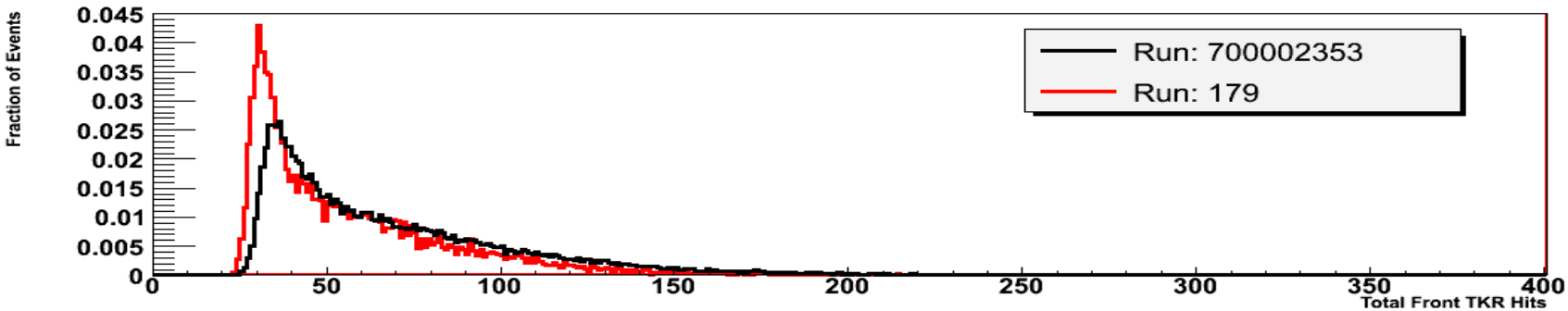


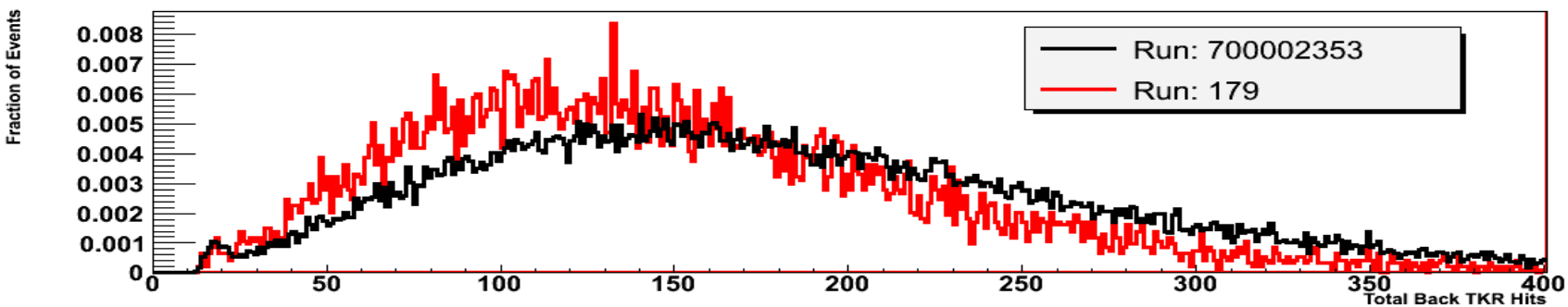


Electrons 10 GeV, 30°

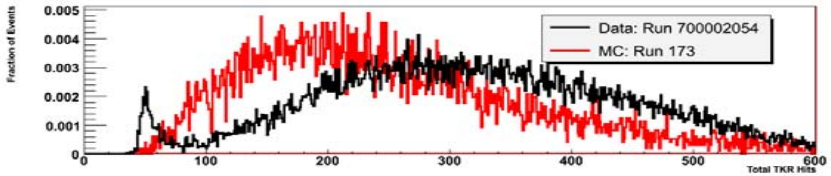
Black: Data Red: MC

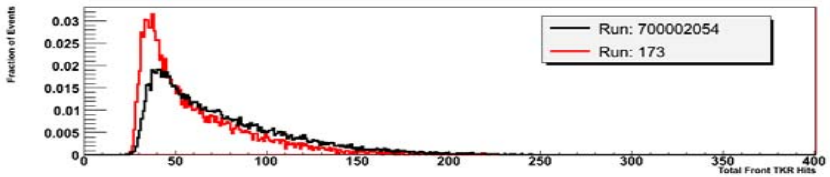


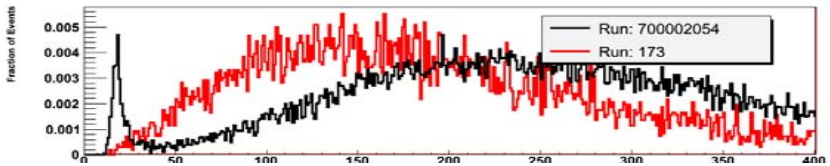


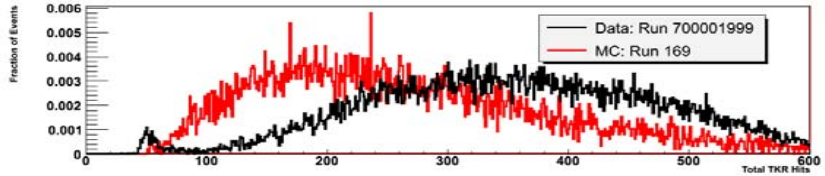


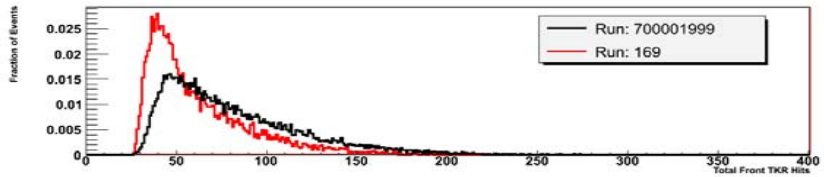
Electrons 50, 100, 200 and 280 GeV, 30°

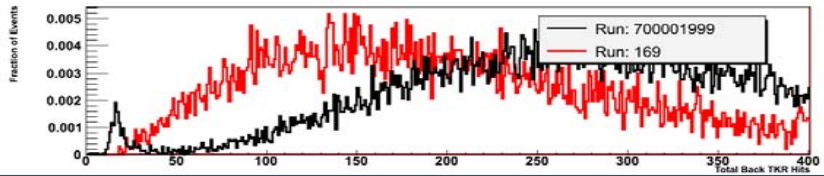


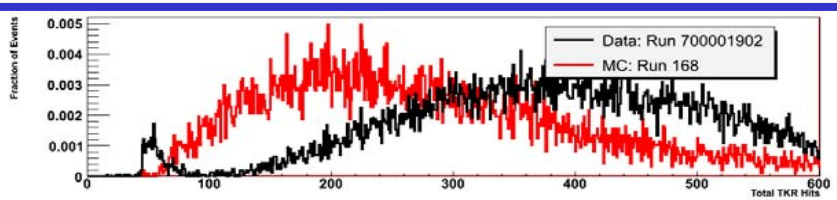


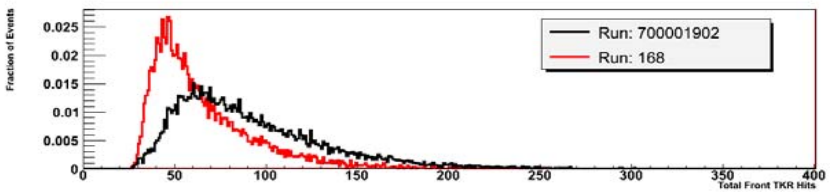


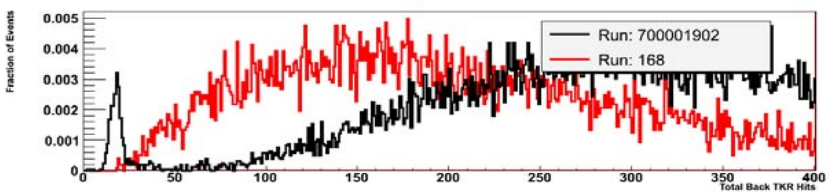


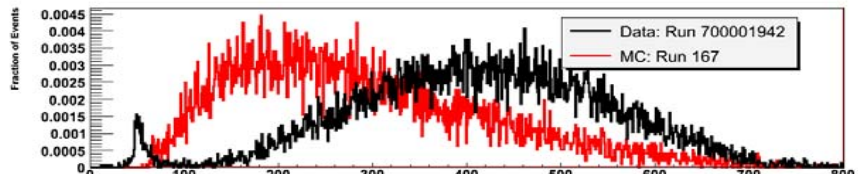


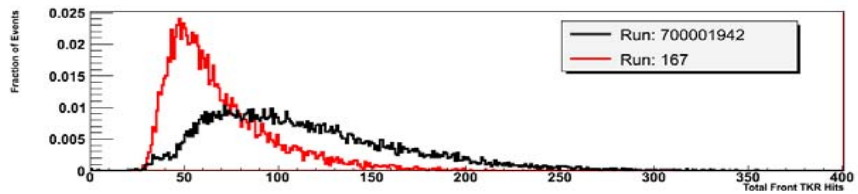


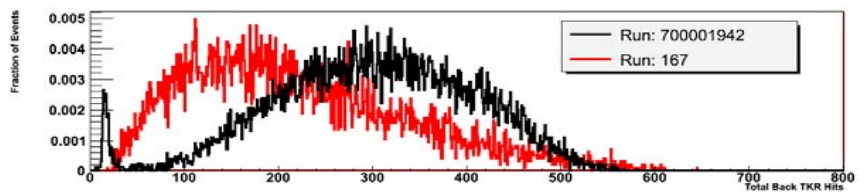










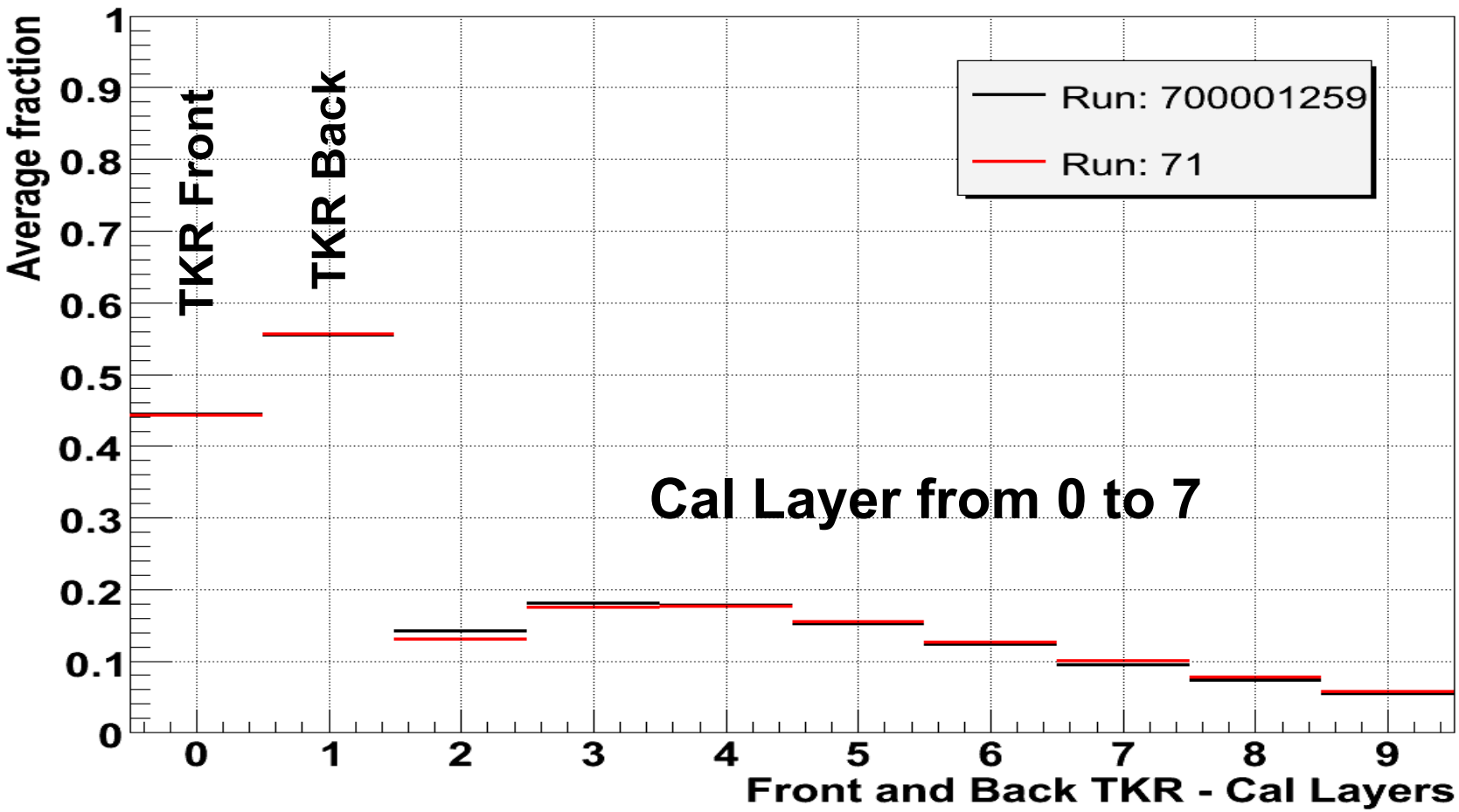


EM shower profile study

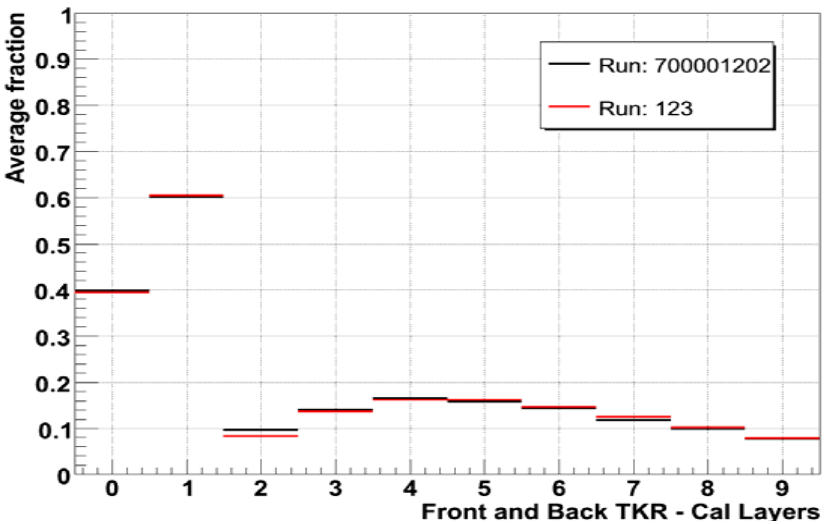
- The EM shower has been studied both in TKR and CAL, by means of fraction of hits in the front and back TKR and of fraction of the energy deposited in the CAL layers
  - Front TKR hits fraction= $\sum_{Plane>12} Hit_i \Big/ \sum_{All} Hit_i$
  - Back TKR hits fraction = $\sum_{Plane\leq 12} Hit_i \Big/ \sum_{All} Hit_i$
  - Cal Layer N Fraction = $CalELayerN \Big/ \sum_{N} CalELayerN$
- A cut in CAL Total Raw Energy has been imposed to reject double particles

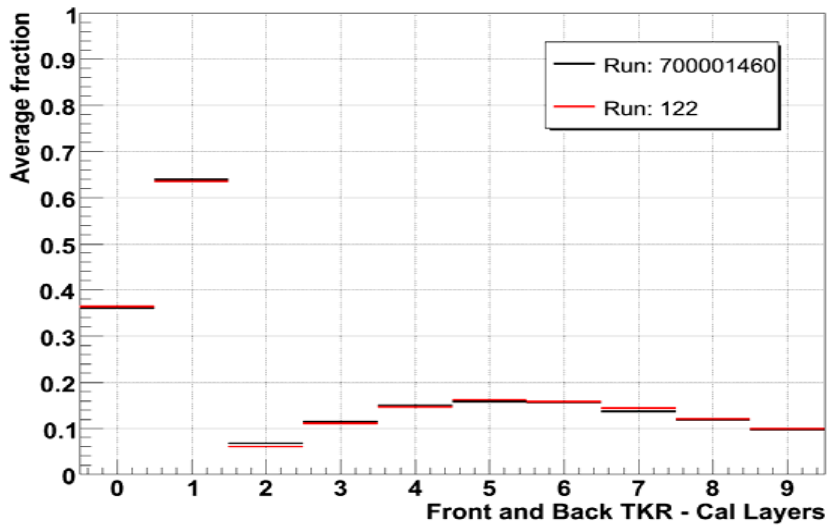
Electrons 1 GeV, 0°

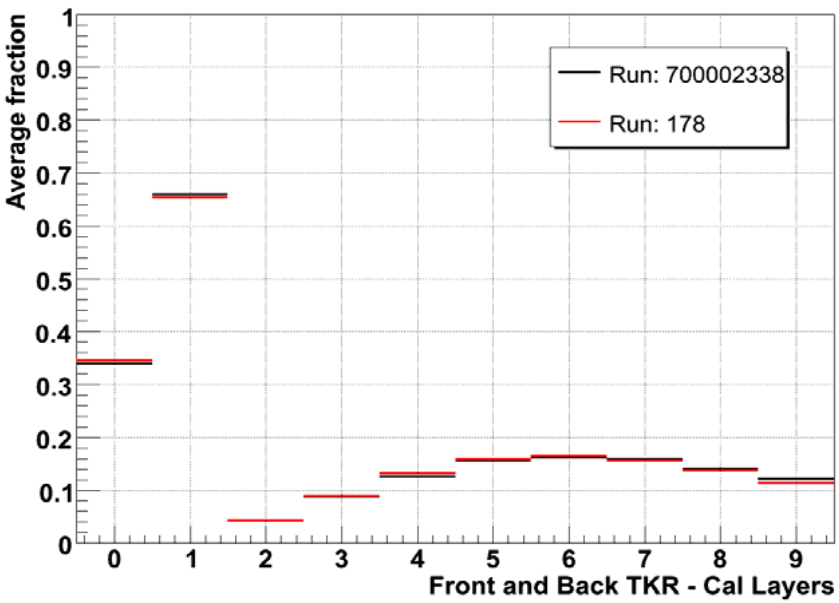
Black: Data Red: MC

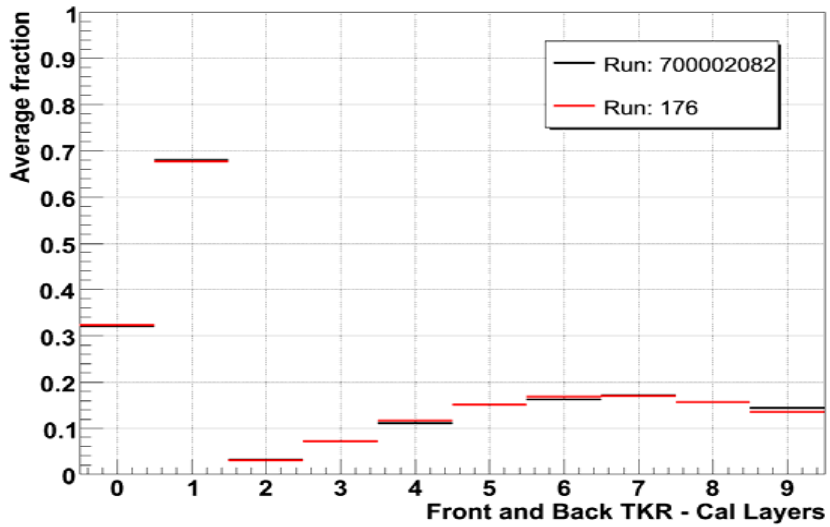


Electrons 2.5, 5, 10 and 20 GeV, 0°

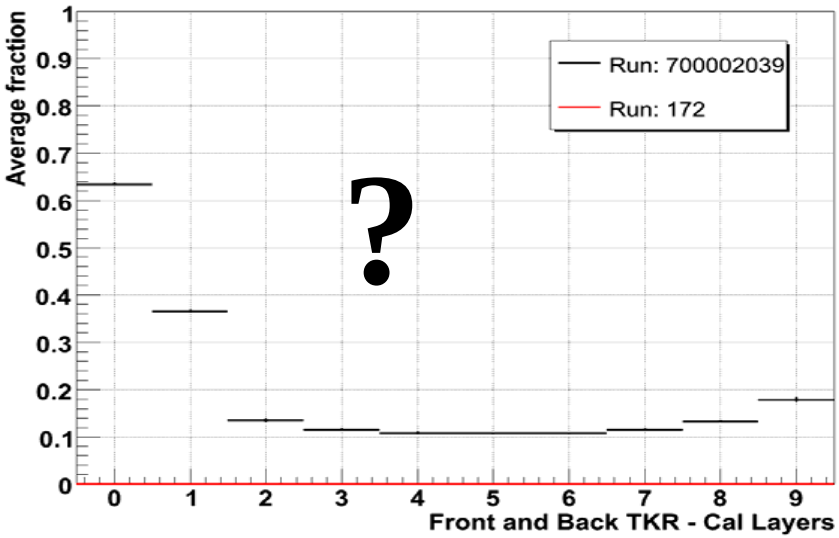


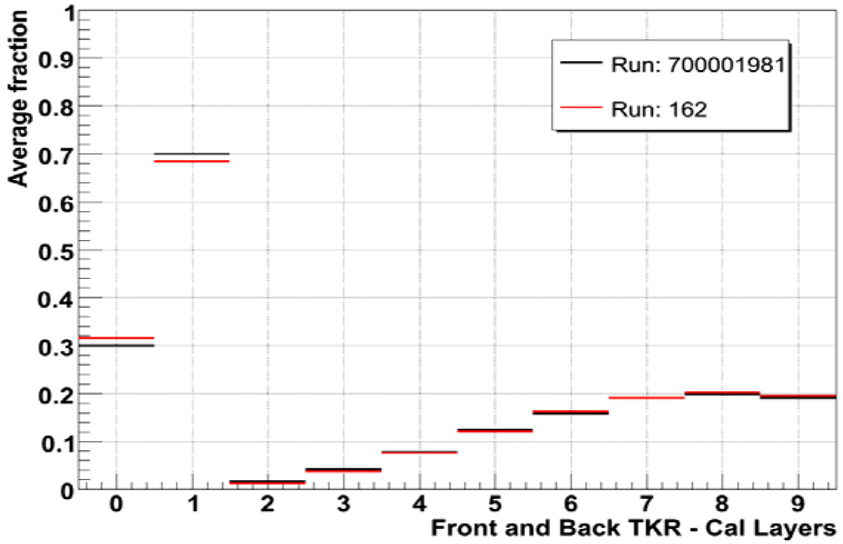


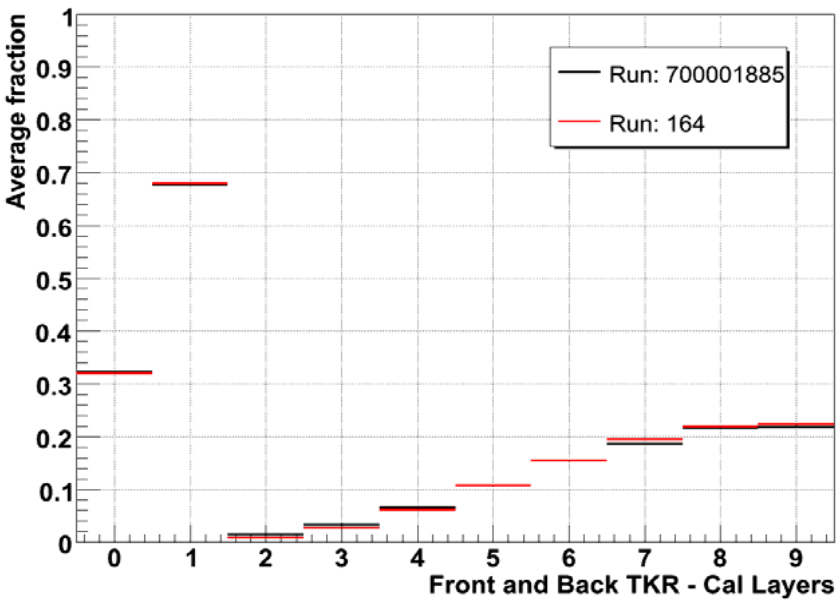


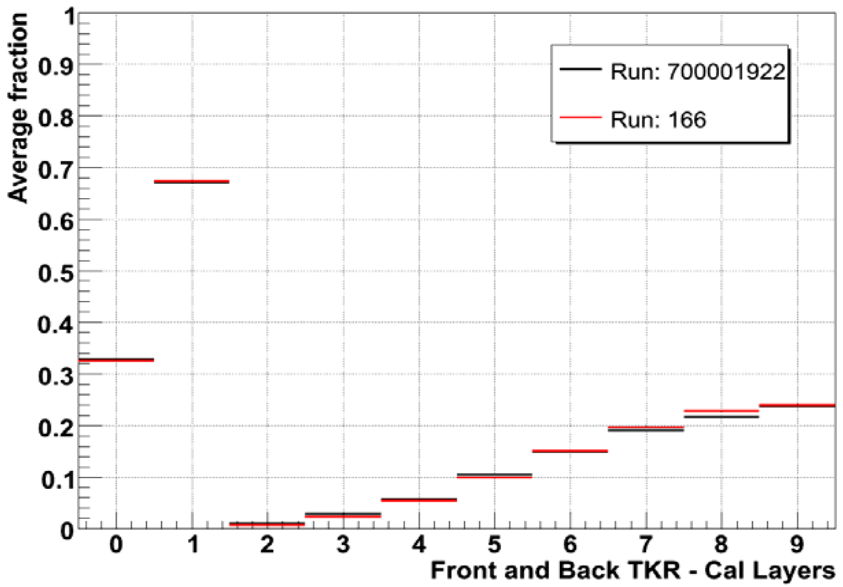


Electrons 50, 100, 200 and 280 GeV, 0°



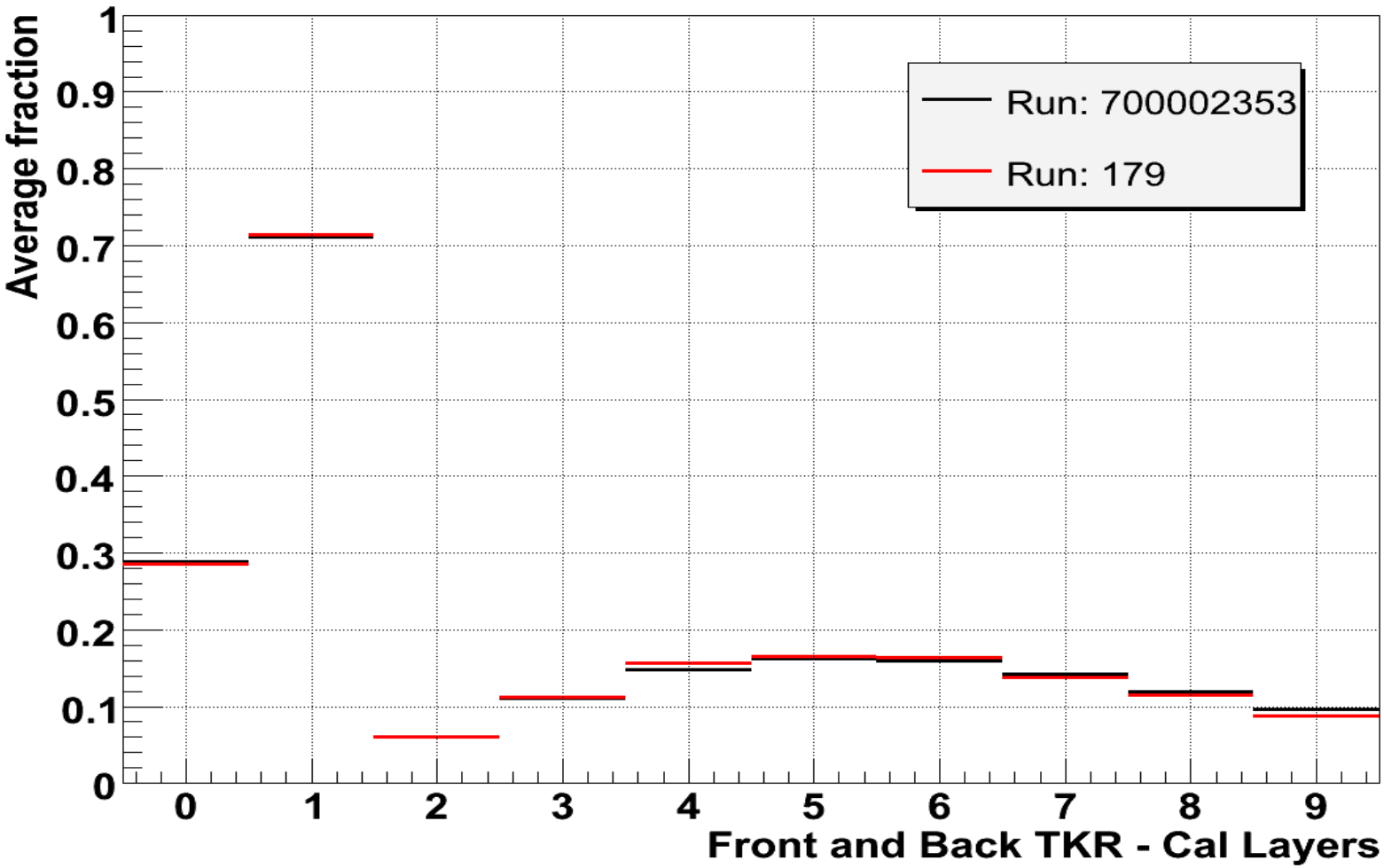




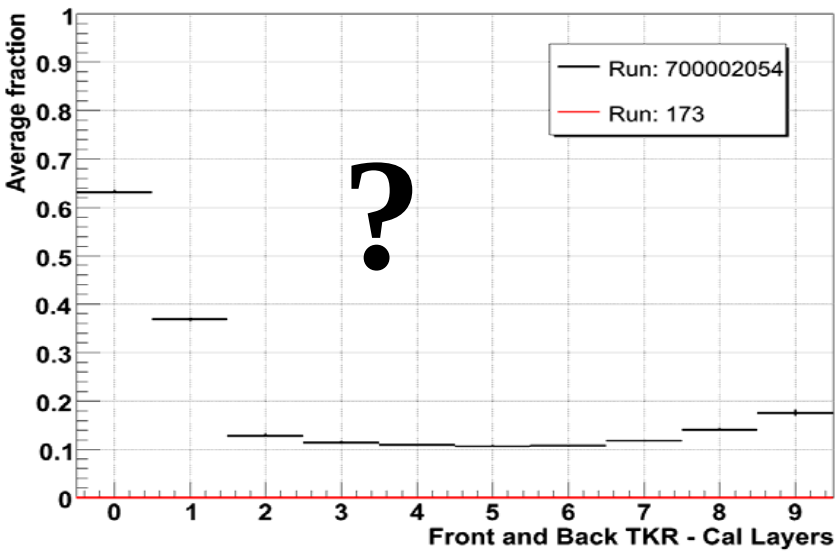


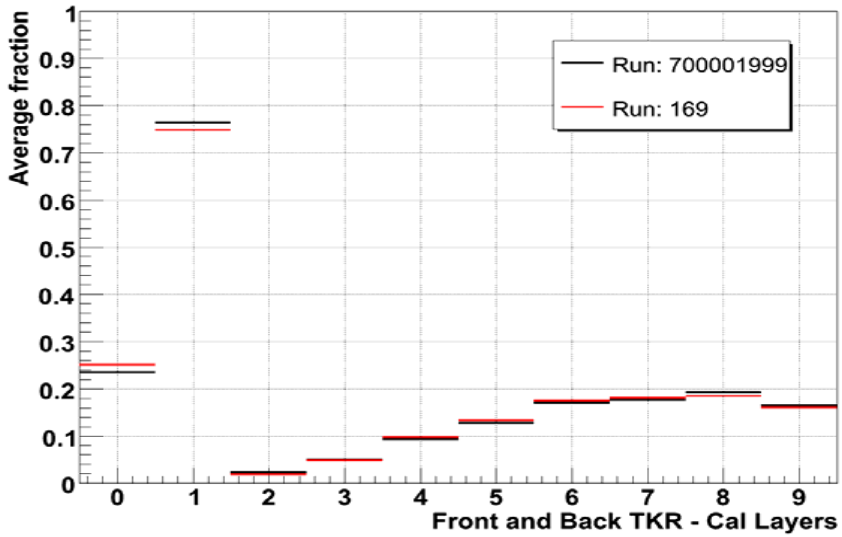
Electrons 10 GeV, 30°

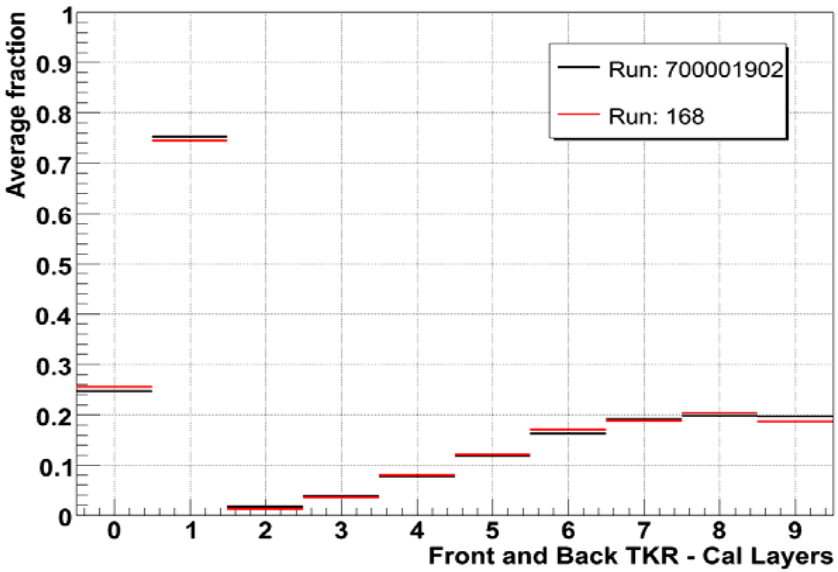
Black: Data Red: MC

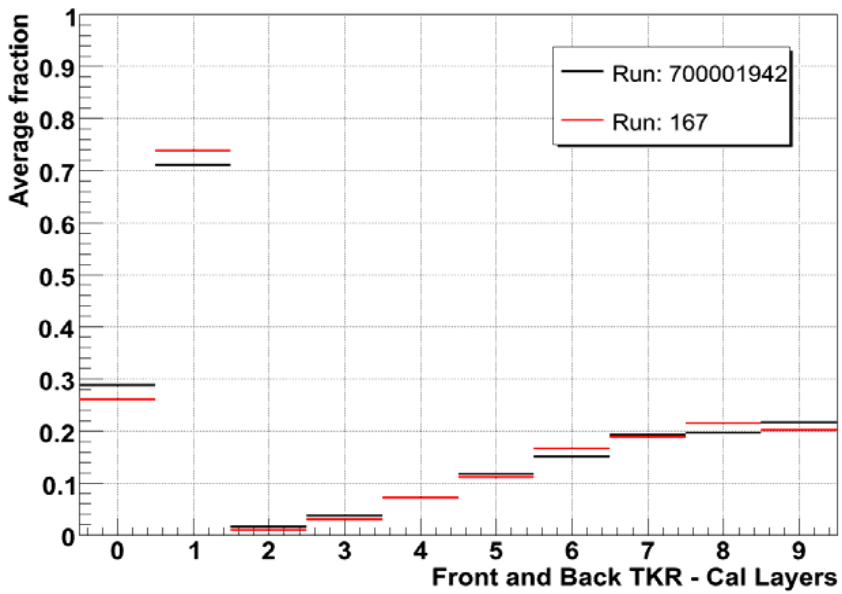


Electrons 50, 100, 200 and 280 GeV, 30°

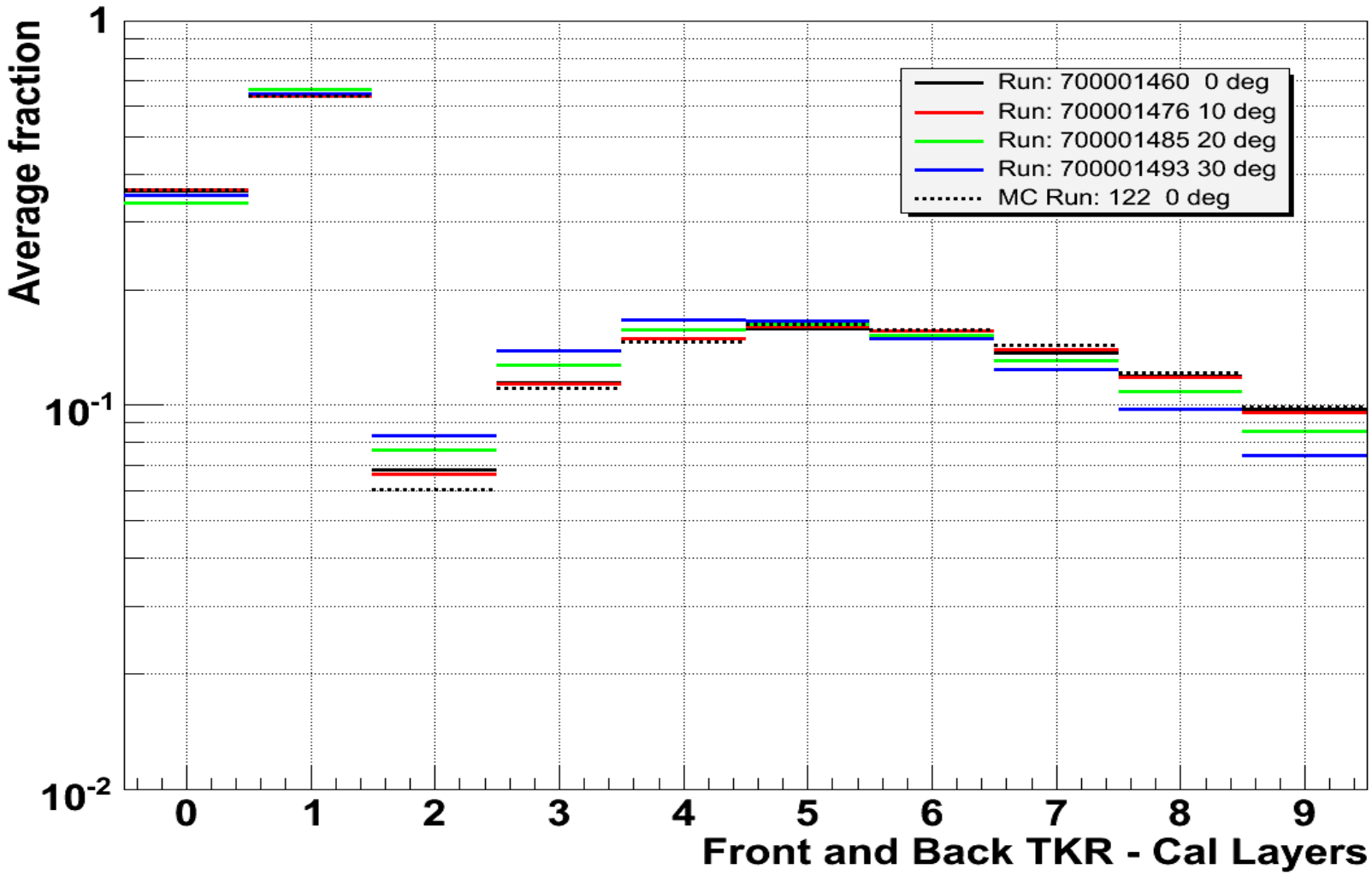




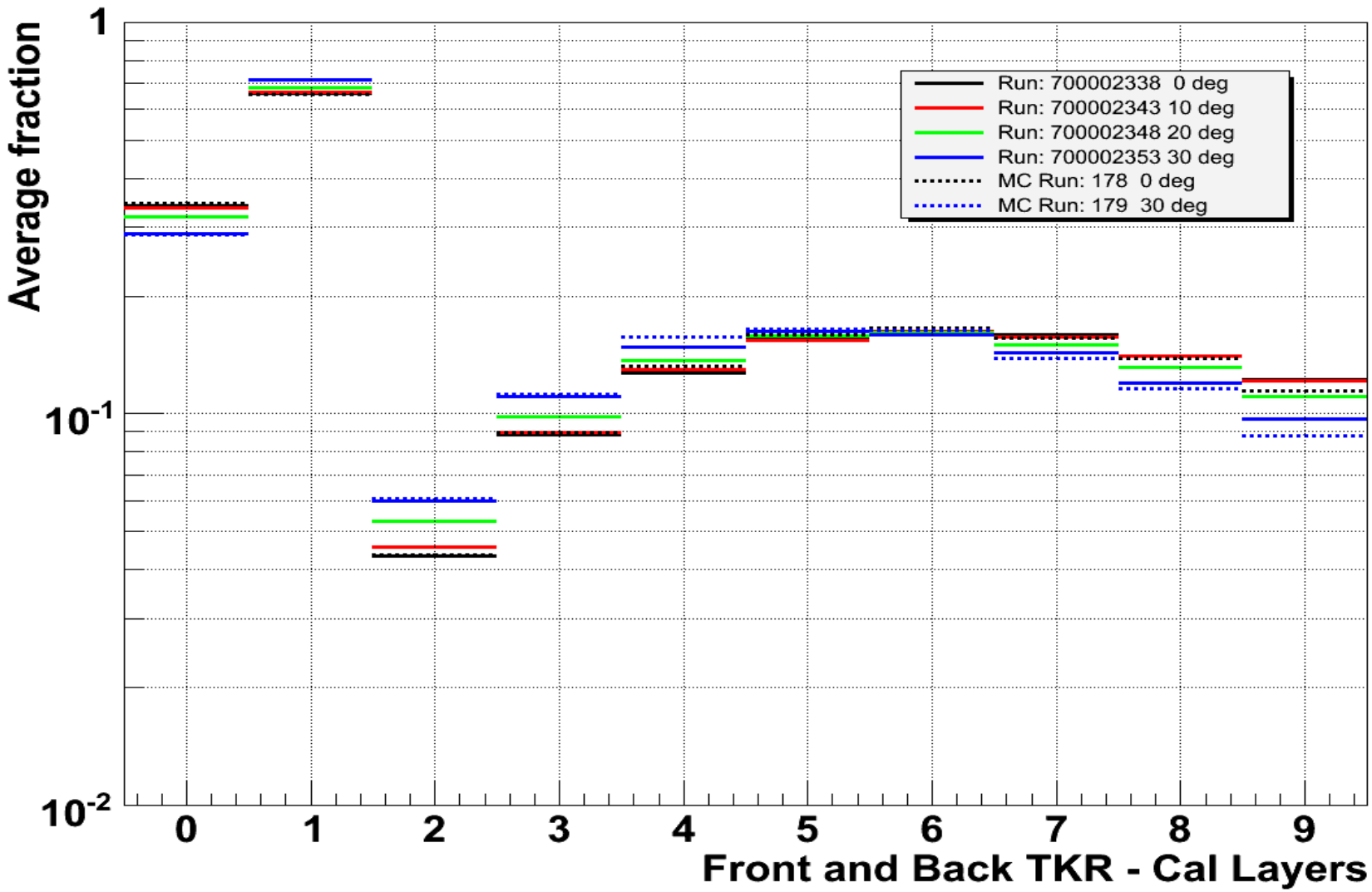




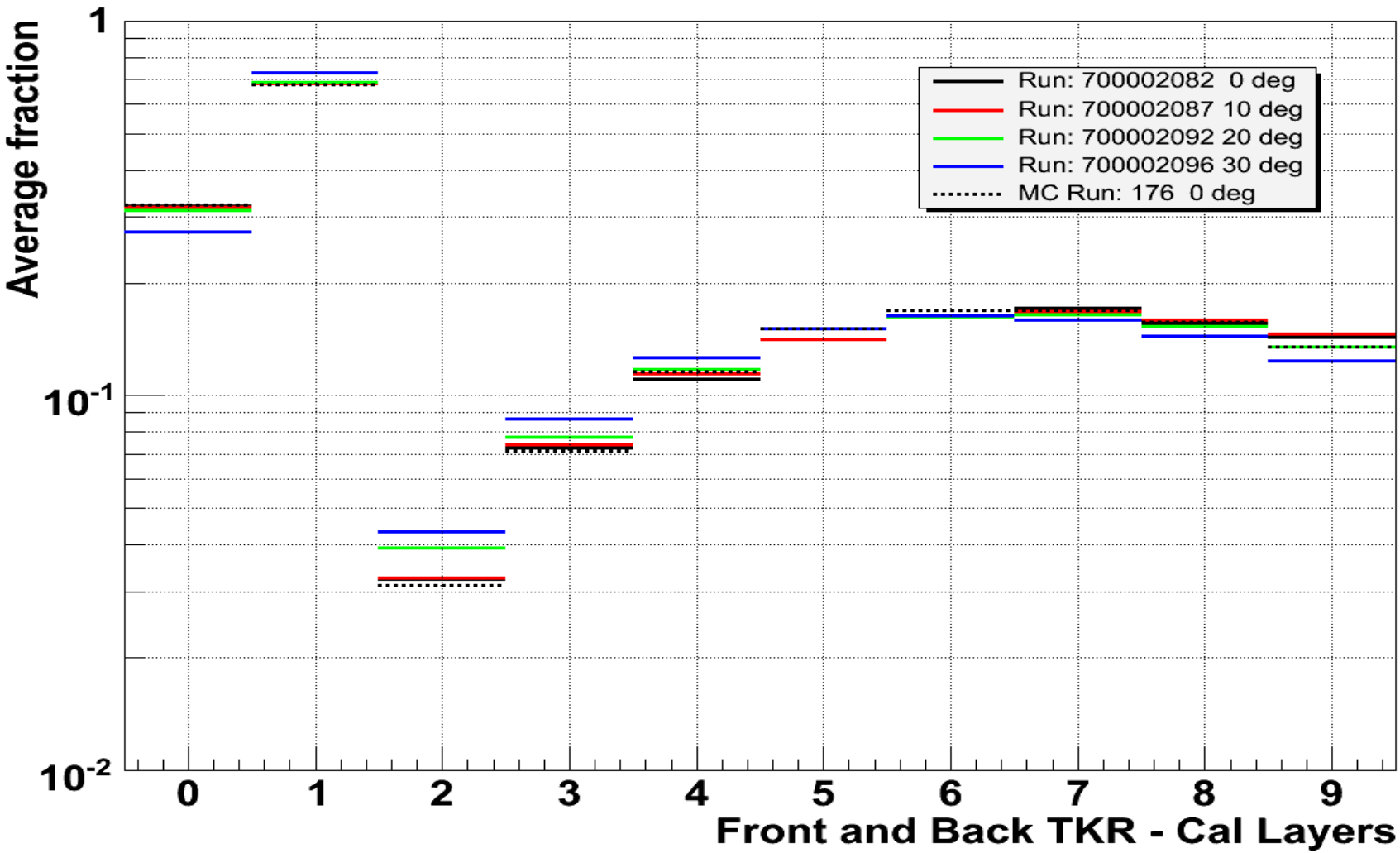
Electrons 5 GeV from 0 to 30 deg



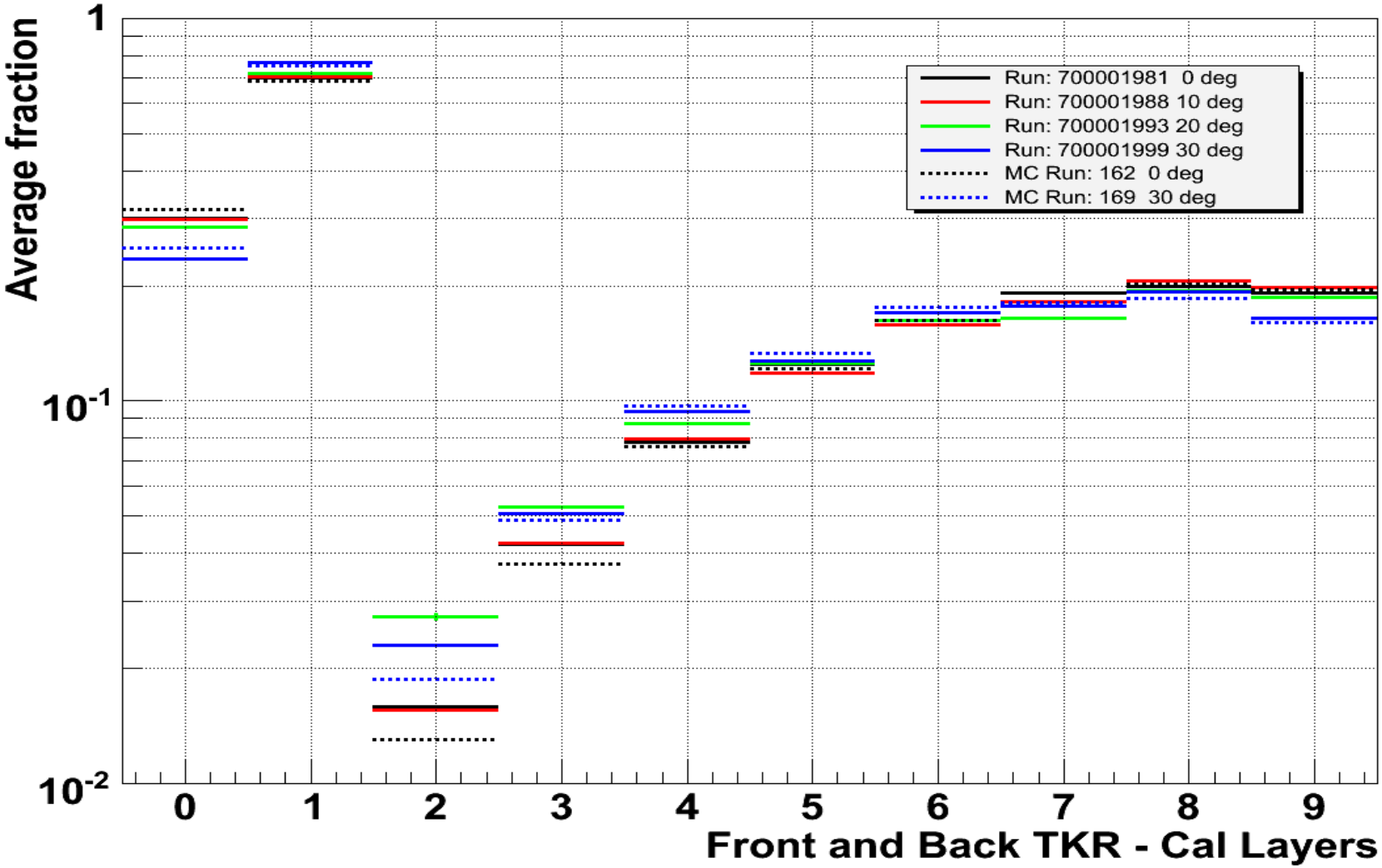
Electrons 10 GeV from 0 to 30 deg



Electrons 20 GeV from 0 to 30 deg



Electrons 100 GeV from 0 to 30 deg



Conclusions

- It seems that the EM shower profile is well described in the MC, even though there are discrepancies in the overall TKR Hits and Cal Energy distributions
- Puzzle at 10 GeV 30 deg: data (Run 2353) seems to be in nearly good agreement with MC (Run179)
- Possible explanations:
  - Low EM cross section in the MC
  - Coarse table of the cross section as function of the energy in MC
  - Not all the energy deposition is visible (threshold and calibration problem?)
- The current MC includes thicker W layer
- Proper cuts should be used for the CAL Energy