TKR Electron/Gamma hits: MC-Data Comparison overview

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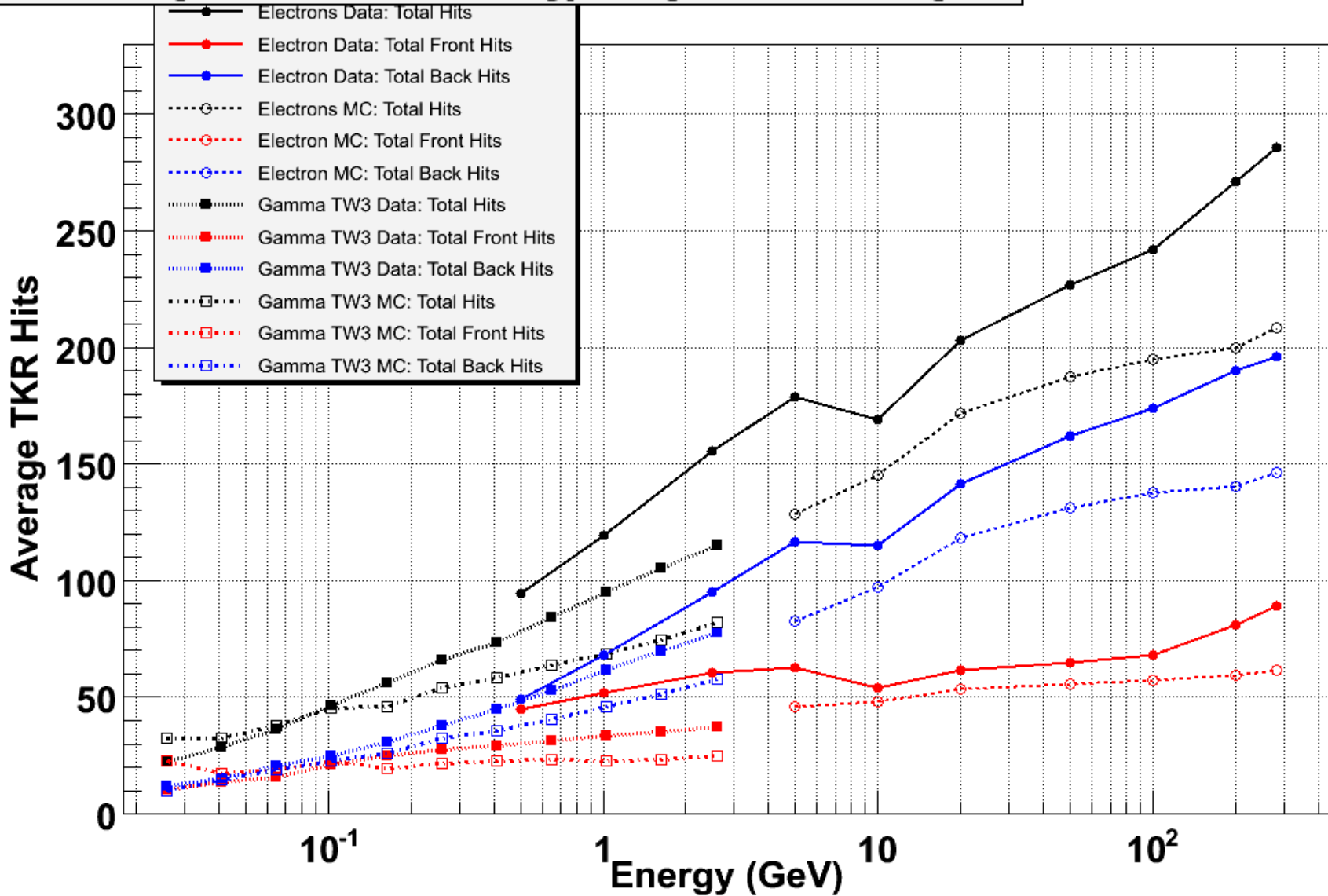
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TKR Hits in electron/gamma runs

- ## 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
- ## The CU has been used as standalone detector, i.e. no geometrical cuts have been imposed
  - ### Electron Cuts:
    - At least one track
    - Last layer in the track == Layer 0 (Tkr1LastLayer == 0)
    - GTCC Fifo is not full (EventGtccFifo==0)
    - CalRawEnergy >300 to reject pion like events
    - CalRawEnergy cut to reject double particles
  - ### Gamma Cuts: Class A.1… see Bari's PSF vrvs talk
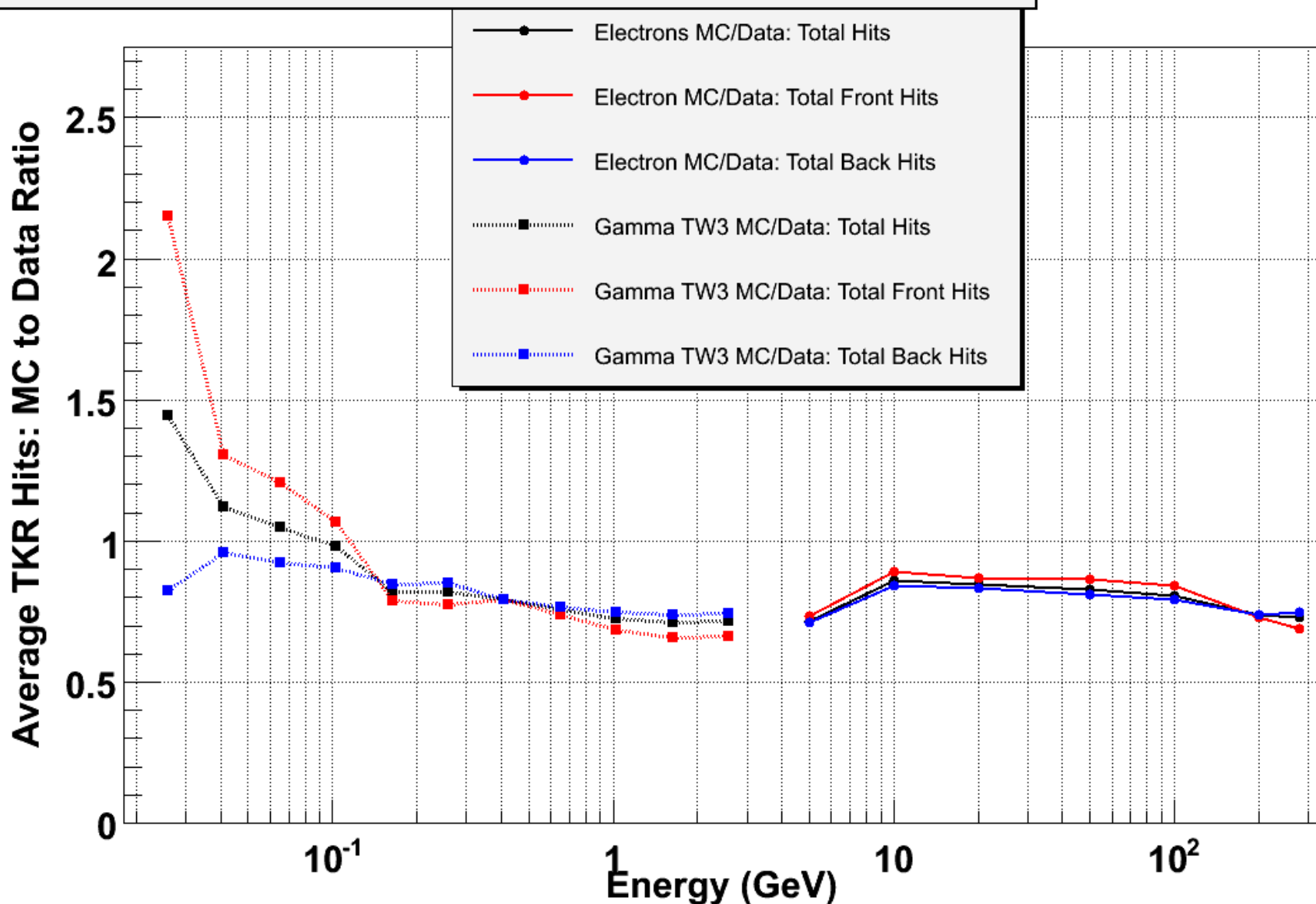
Summary at 0 deg

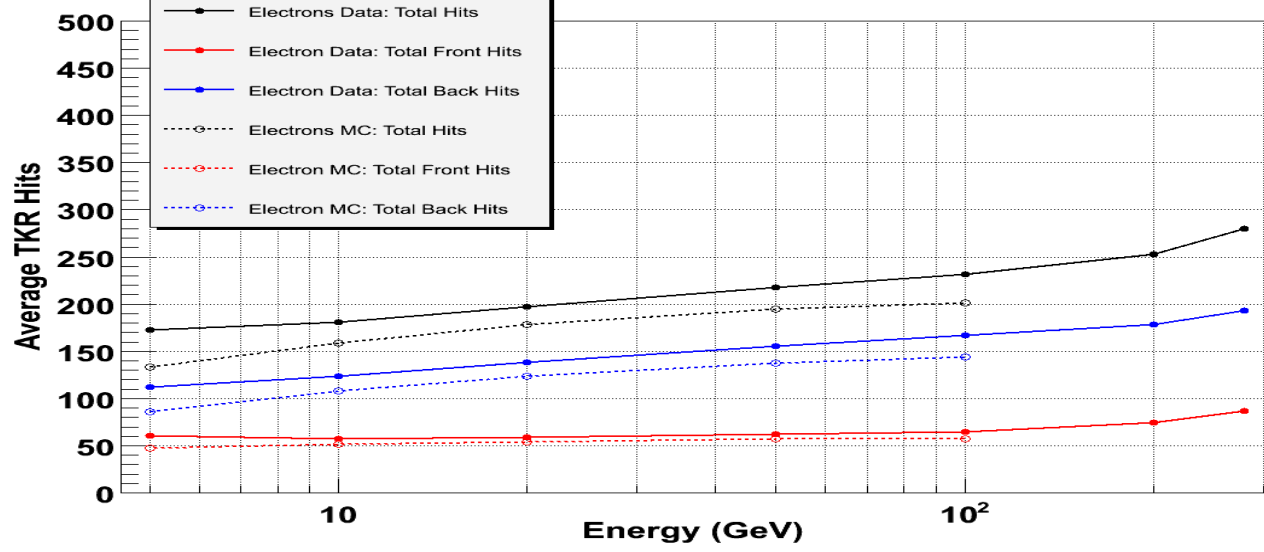Average TKR Hit Vs Energy, Angle = 0 deg

MC to Data Ratio at 0 deg

MC/Data Ratio: Average TKR Hit Vs Energy, Angle = 0 deg

Legend:
- Electrons MC/Data: Total Hits
- Electron MC/Data: Total Front Hits
- Electron MC/Data: Total Back Hits
- Gamma TW3 MC/Data: Total Hits
- Gamma TW3 MC/Data: Total Front Hits
- Gamma TW3 MC/Data: Total Back Hits

Y-axis: Average TKR Hits: MC to Data Ratio
X-axis: Energy (GeV)
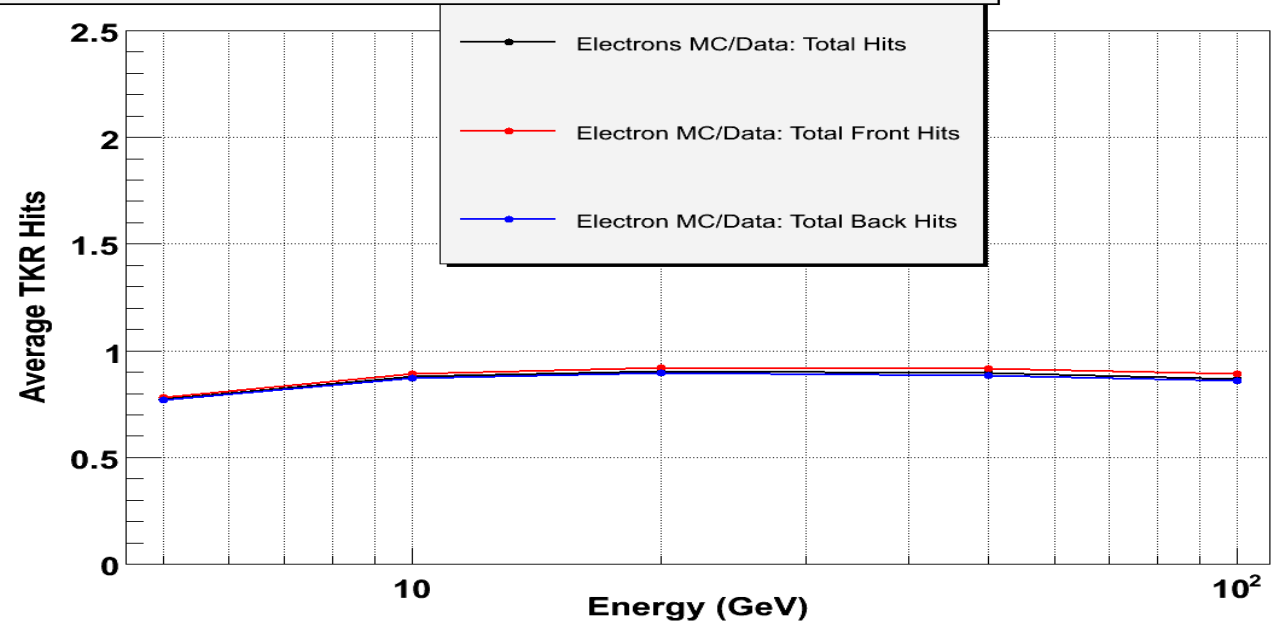
Summary at 10 deg

Summary at 20 deg

Average TKR Hit Vs Energy, Angle = 20 deg

- Electrons Data: Total Hits
- Electron Data: Total Front Hits
- Electron Data: Total Back Hits
- Electrons MC: Total Hits
- Electron MC: Total Front Hits
- Electron MC: Total Back Hits

MC/Data Ratio: Average TKR Hit Vs Energy, Angle = 20 deg

- Electrons MC/Data: Total Hits
- Electron MC/Data: Total Front Hits
- Electron MC/Data: Total Back Hits
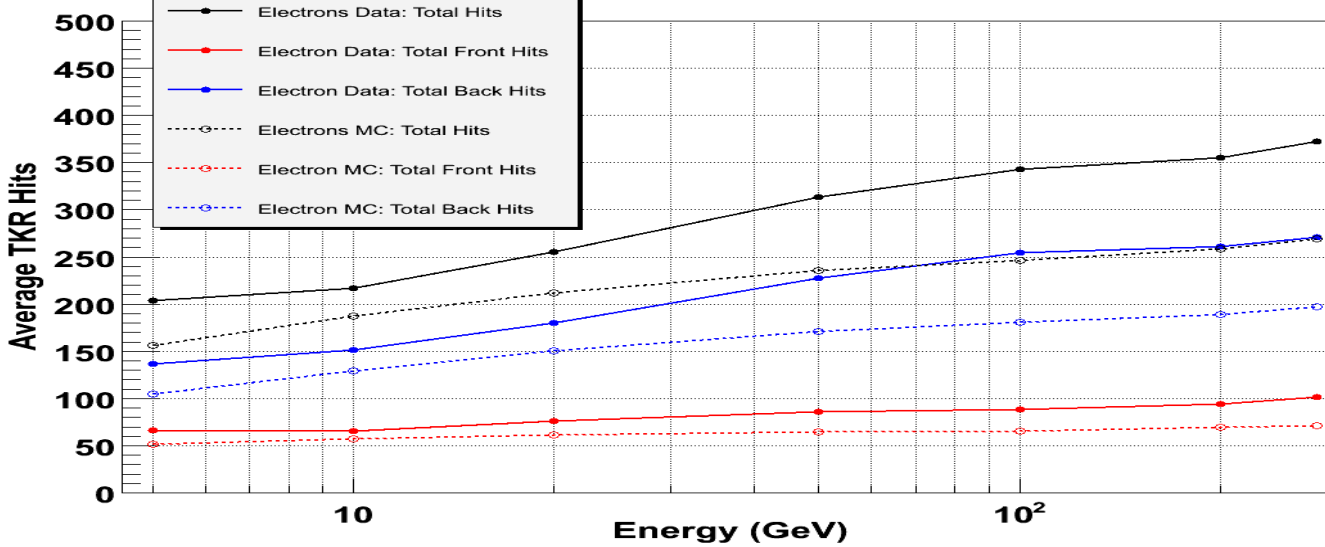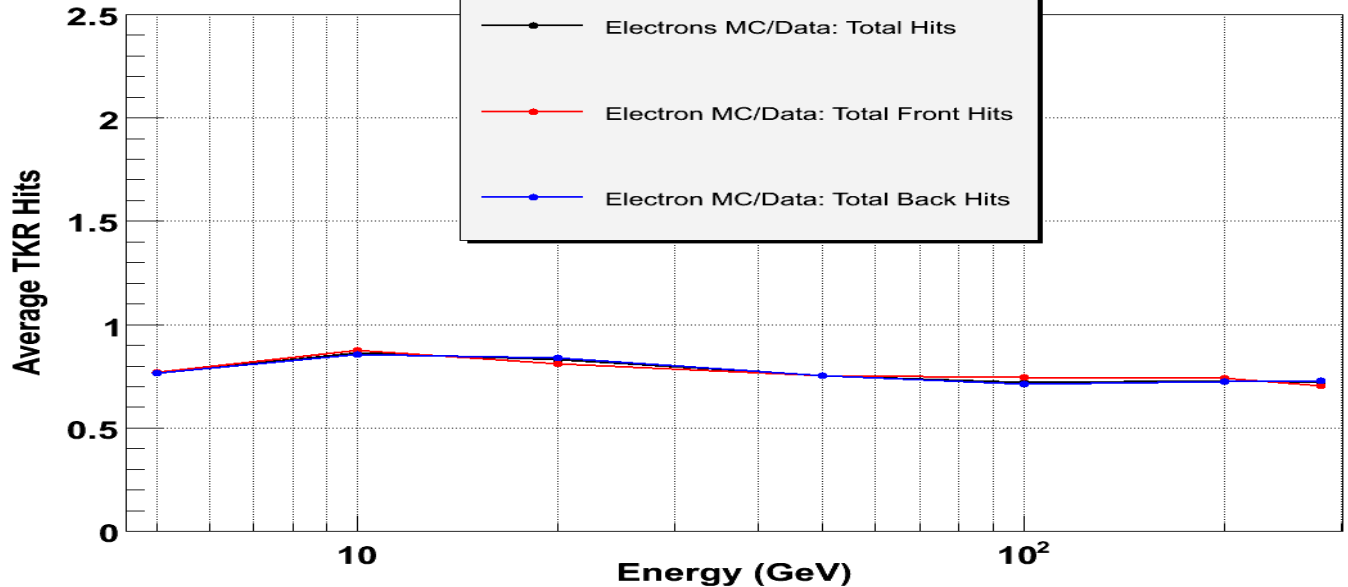
Summary at 30 deg

Average TKR Hit Vs Energy, Angle =   30 deg

Legend:
- Electrons Data: Total Hits
- Electron Data: Total Front Hits
- Electron Data: Total Back Hits
- Electrons MC: Total Hits
- Electron MC: Total Front Hits
- Electron MC: Total Back Hits
- Gamma TW3 Data: Total Hits
- Gamma TW3 Data: Total Front Hits
- Gamma TW3 Data: Total Back Hits
- Gamma TW3 MC: Total Hits
- Gamma TW3 MC: Total Front Hits
- Gamma TW3 MC: Total Back Hits

Y-axis: Average TKR Hits
X-axis: Energy (GeV)
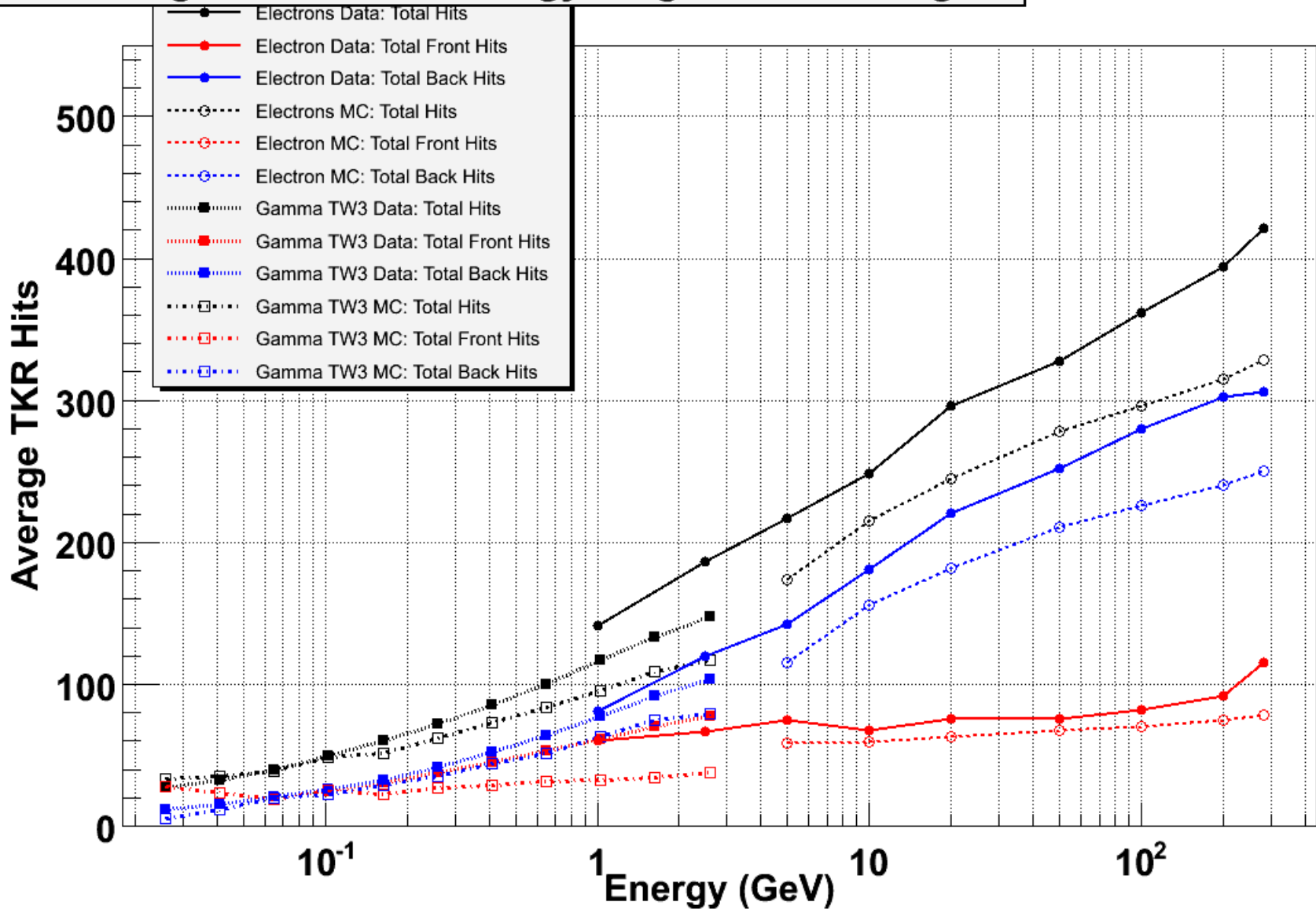
MC to Data Ratio at 30 deg

MC/Data Ratio: Average TKR Hit Vs Energy, Angle =   30 deg

Legend:
- Electrons MC/Data: Total Hits
- Electron MC/Data: Total Front Hits
- Electron MC/Data: Total Back Hits
- Gamma MC/Data: Total Hits
- Gamma MC/Data: Total Front Hits
- Gamma MC/Data: Total Back Hits

Average TKR Hits: MC to Data Ratio

Energy (GeV)
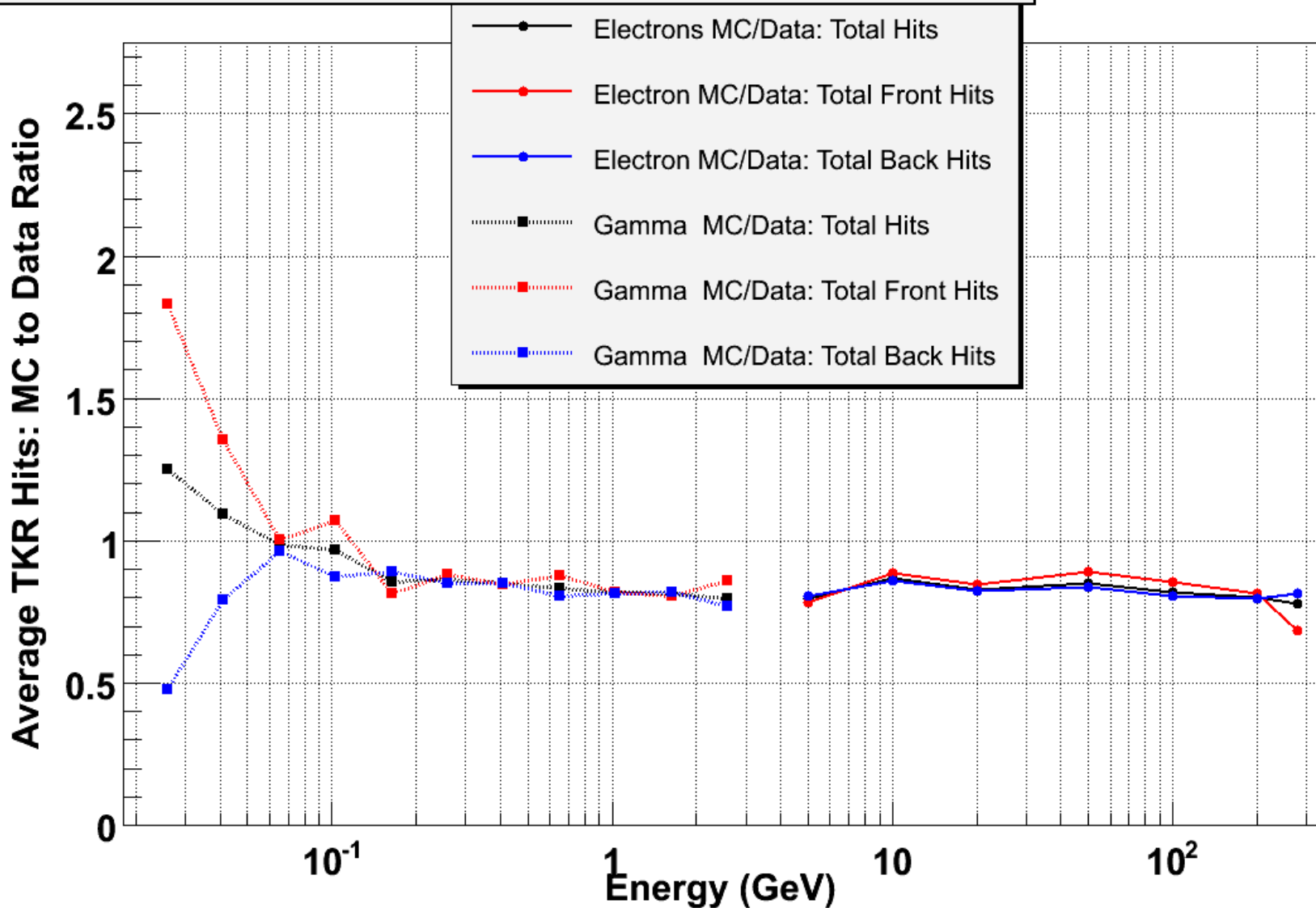
Conclusion

- The TKR is an unconventional detector, it is an imaging quasi pre-shower calorimeter
  - The EM shower in the TKR is very young
- How to increase the hits:
  - Physics
    - We need to explore additional processes in Geant4, in particular in the low energy range (up to 100 GeV) where many physic lists are available (e.g. Penelope)
  - Digit
    - The number of hits depend on the threshold to fired silicon strip channels