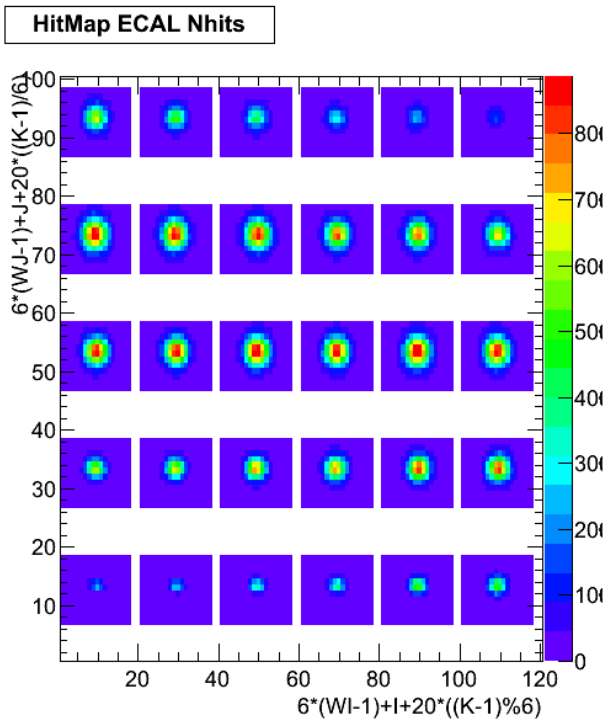
Monte Carlo digitisation and reconstruction – a few remarks

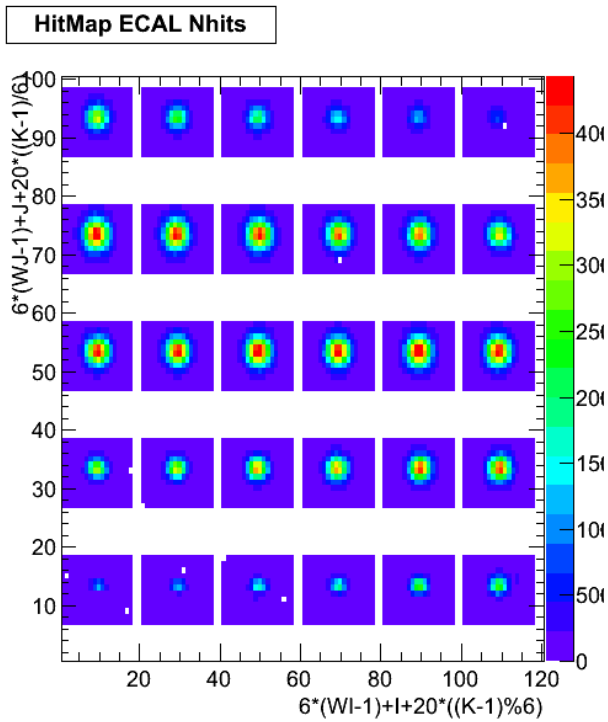
- MC production through Mokka – grid processing has gone well thanks to Shaojun Lu (MPI)
- Digitised and reconstructed MC – we have one test sample from Roman (e^- @ 45 GeV)
- Will compare ECAL for
  - This "MCreco" sample
  - Data @ 45 GeV Run300195
  - "Raw" Mokka output
  - Mokka with my old naïve noise simulation (Gaussian 0.12 MIP added to all cells with energy).

HitMaps

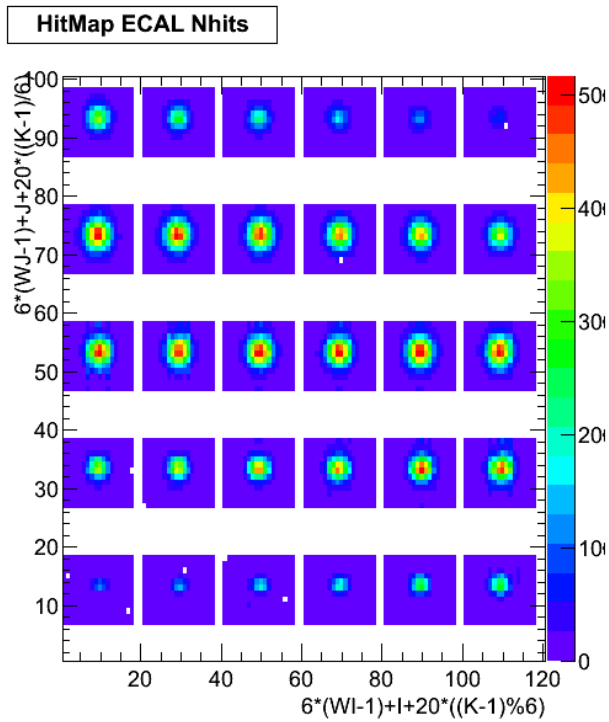
Raw MC



MCreco



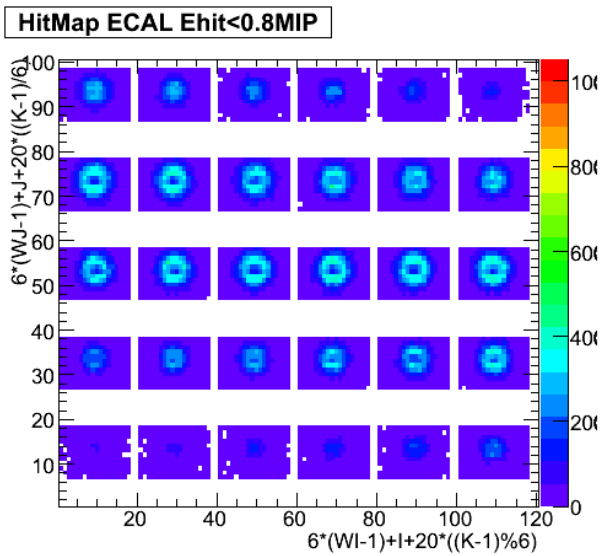
Data



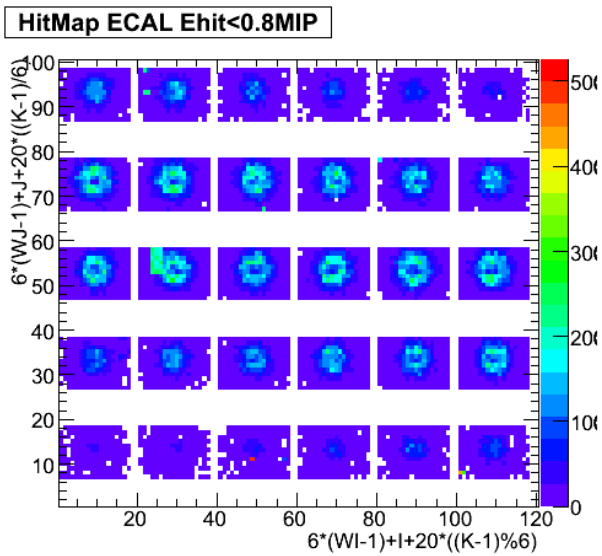
Dead cells look OK in MCreco

“Noise”Maps; i.e. hits <0.8 MIP

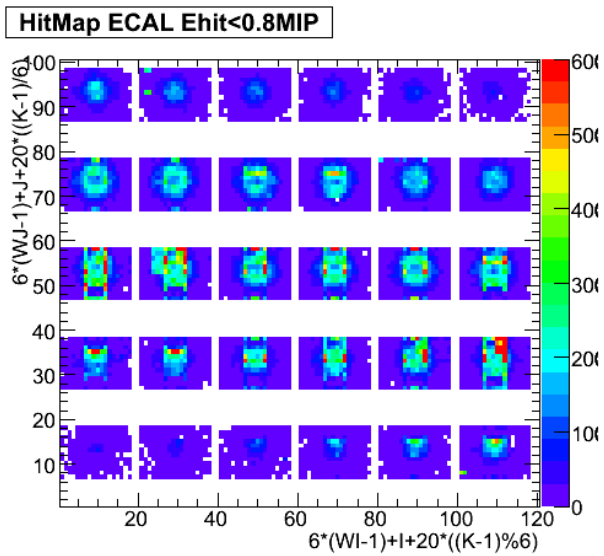
Raw MC



MCreco

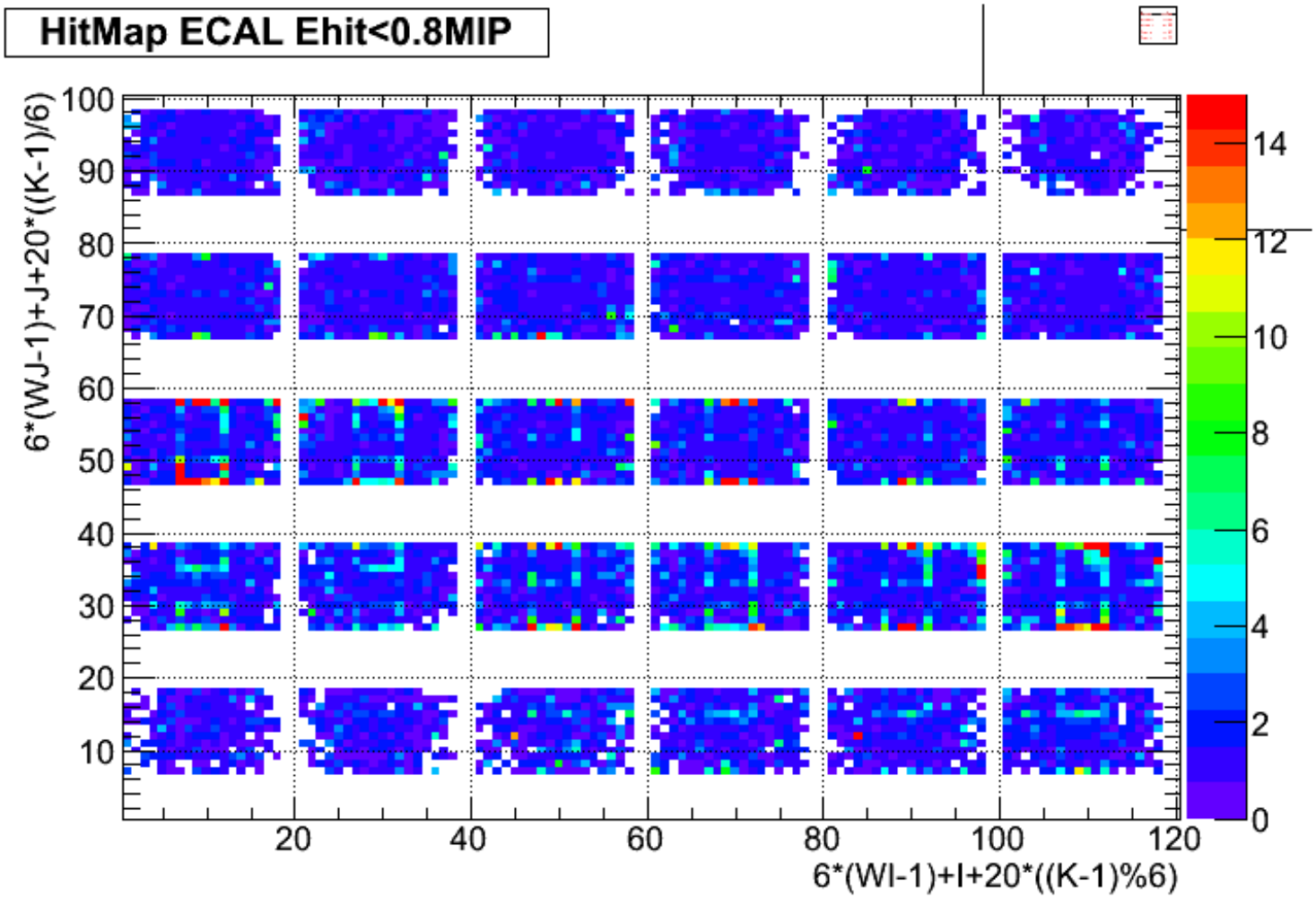


Data

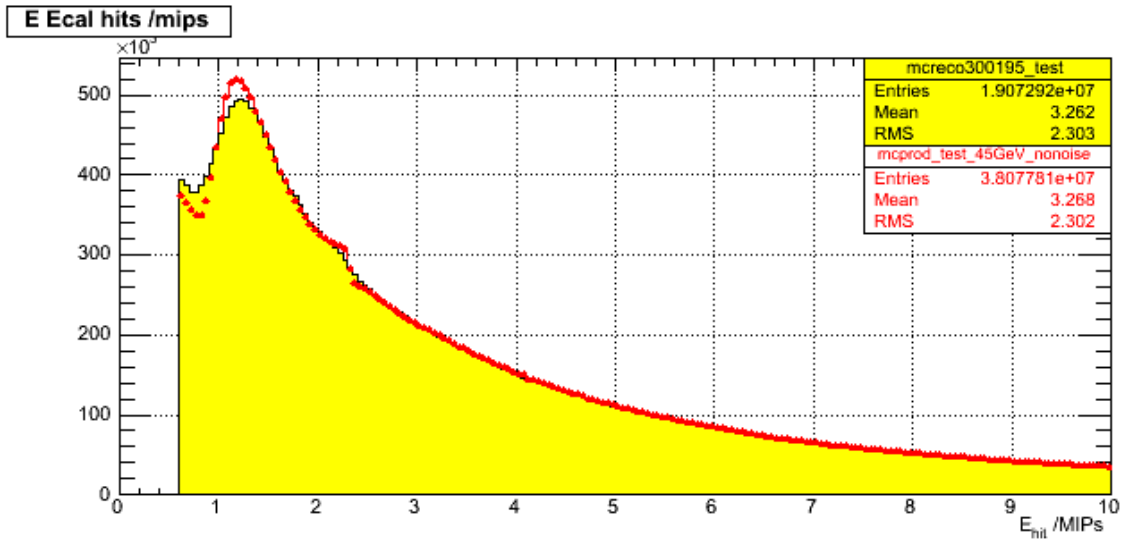


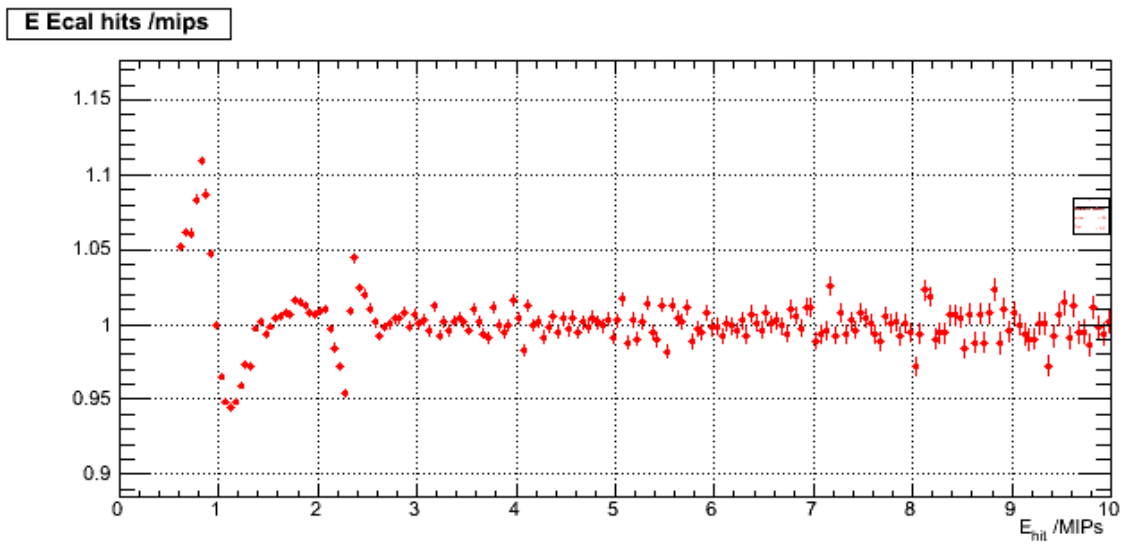
Some noisy cells appear in MCreco,
But main structure in data is “square event” related, and not simulated.

NoiseMap ratio Data/MCreco

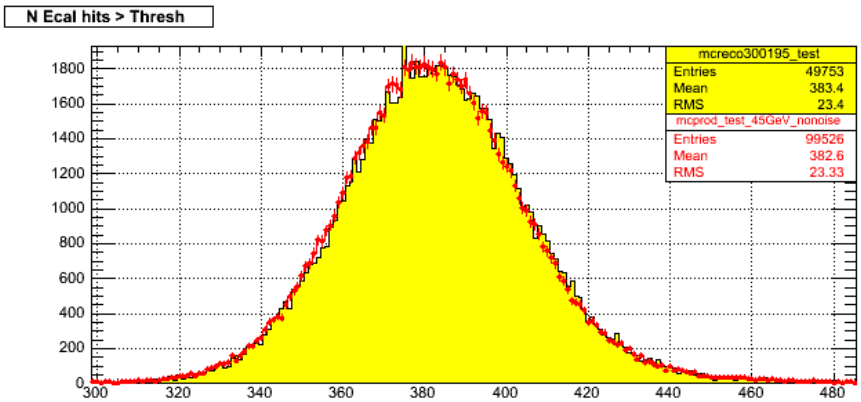


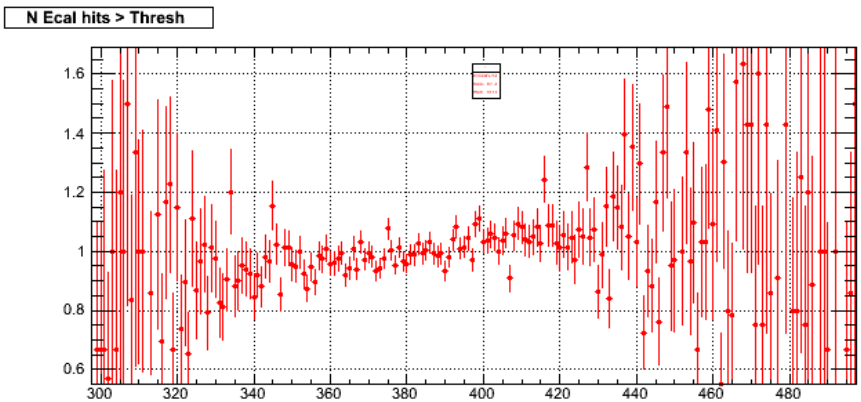
Ehit – MCreco c.f. raw MC.



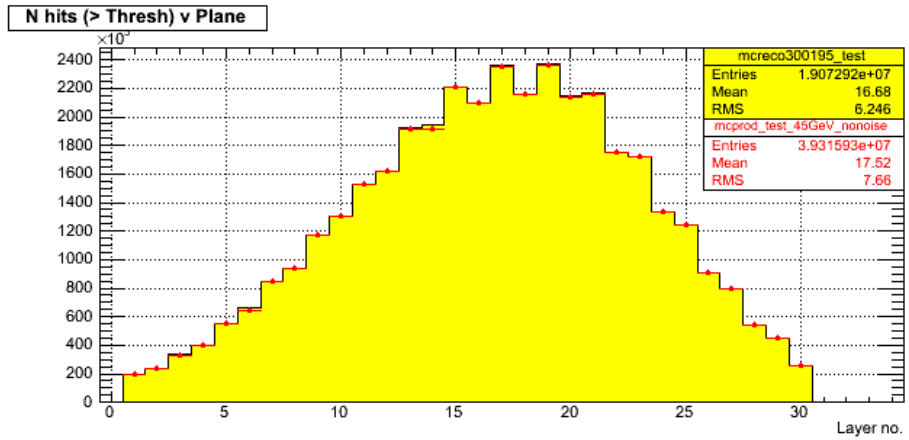


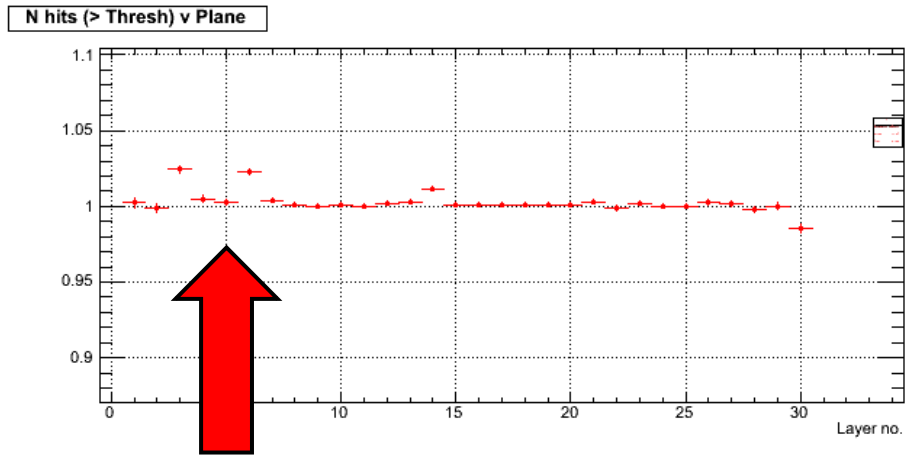
Nhits Hits/layer





Increases by ~1 hit in 400

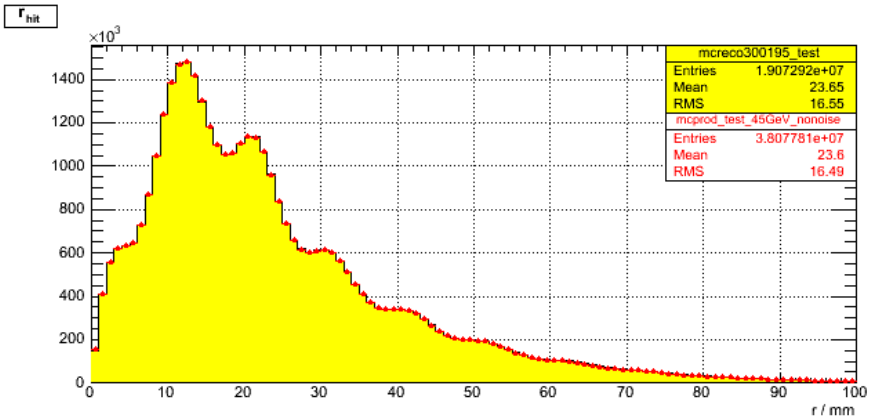


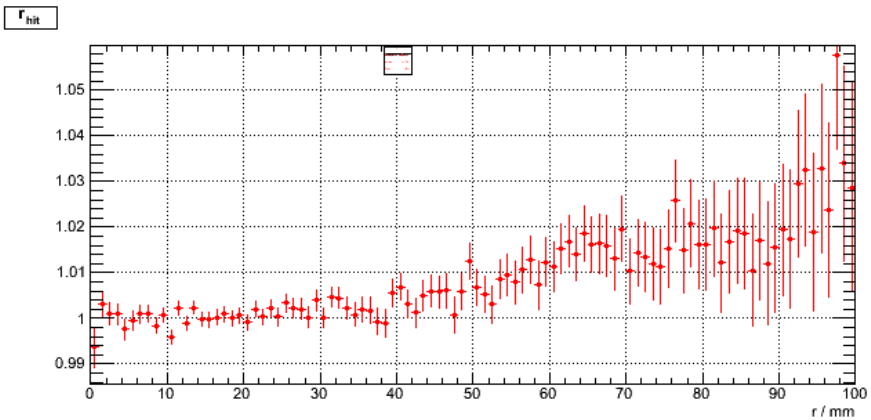


Concentrated in certain layers

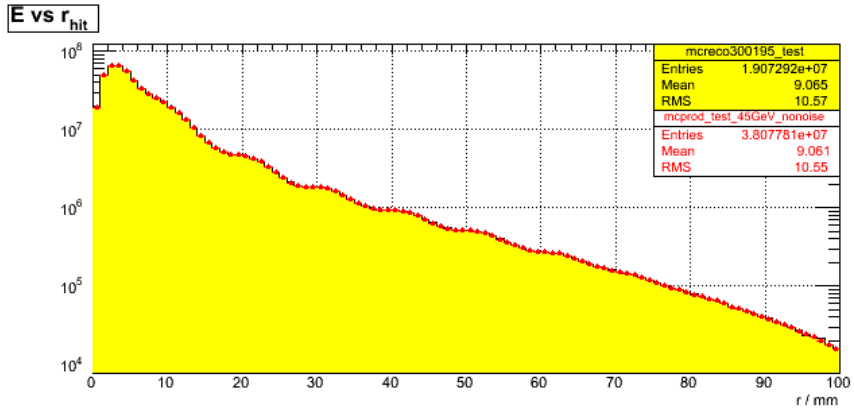
Hit radius (from barycentre)

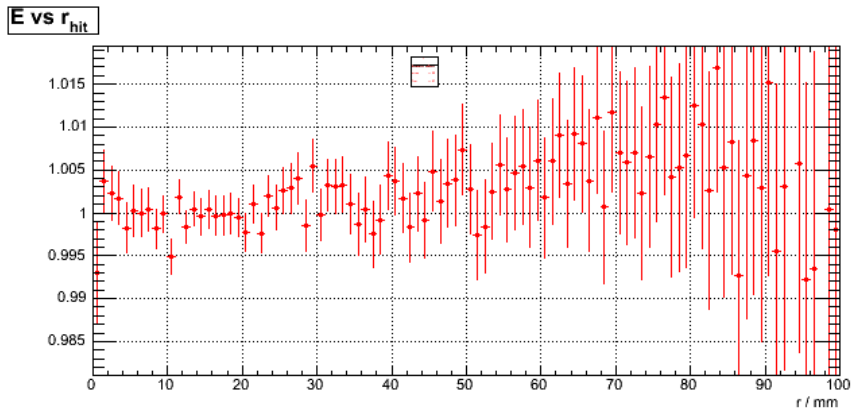
Weighted by number





Weighted by energy



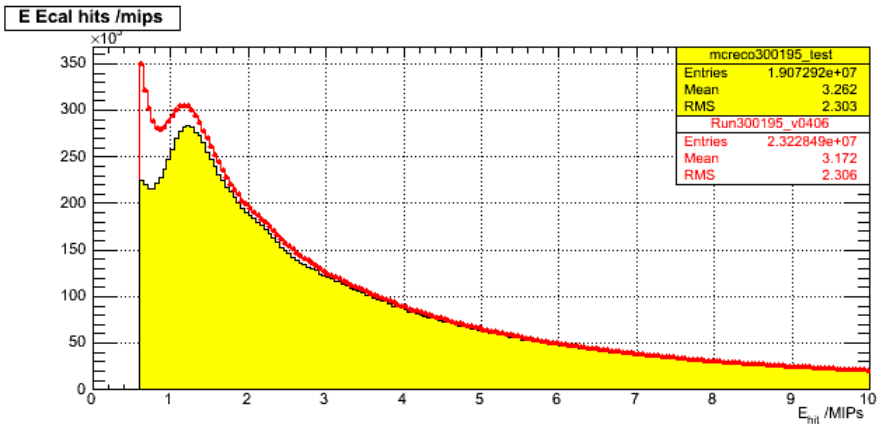


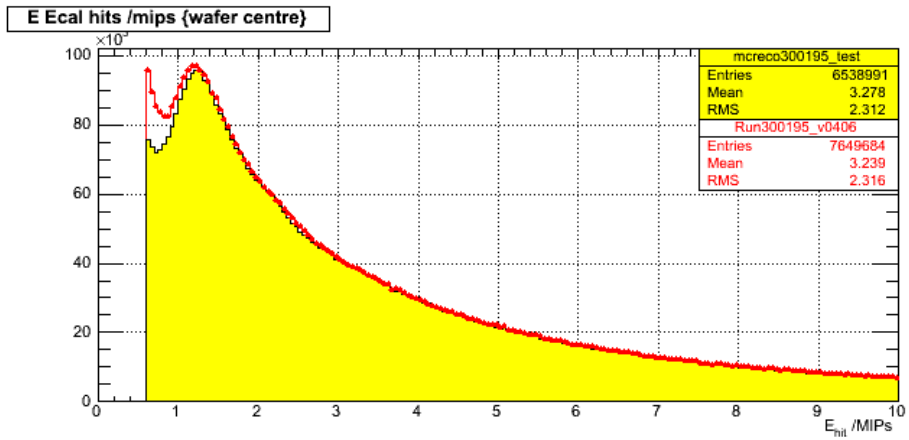
Extra hits tend to be far from shower and of low energy

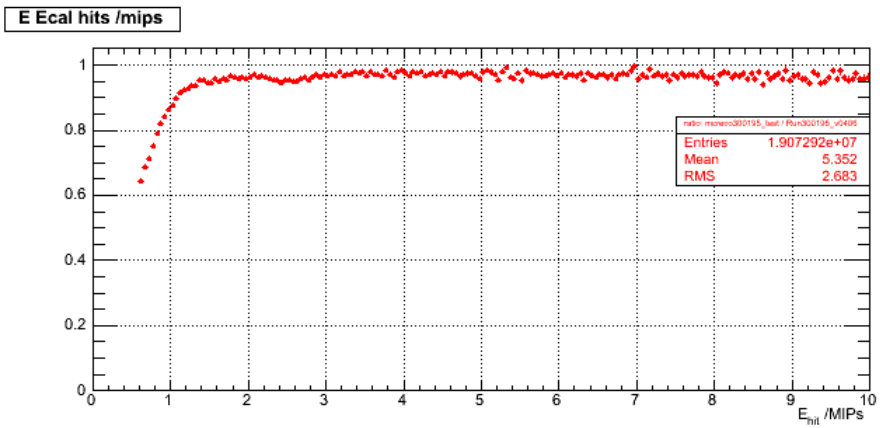
Ehit : MCreco/Data

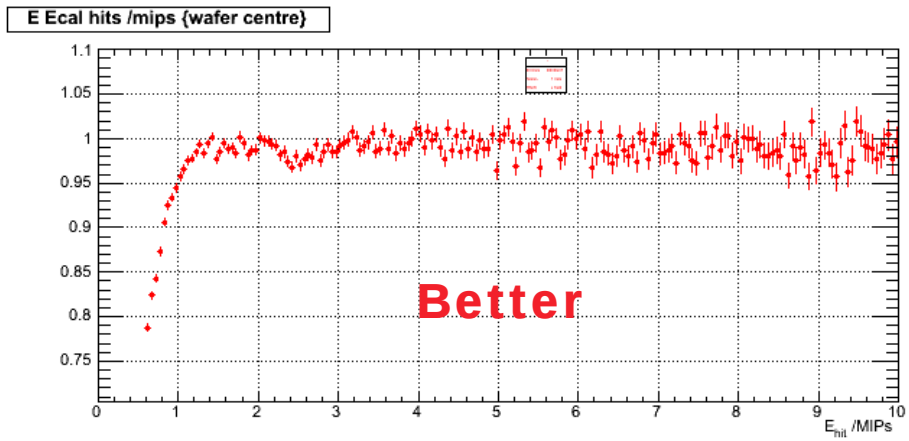
All events

Events in wafer centre





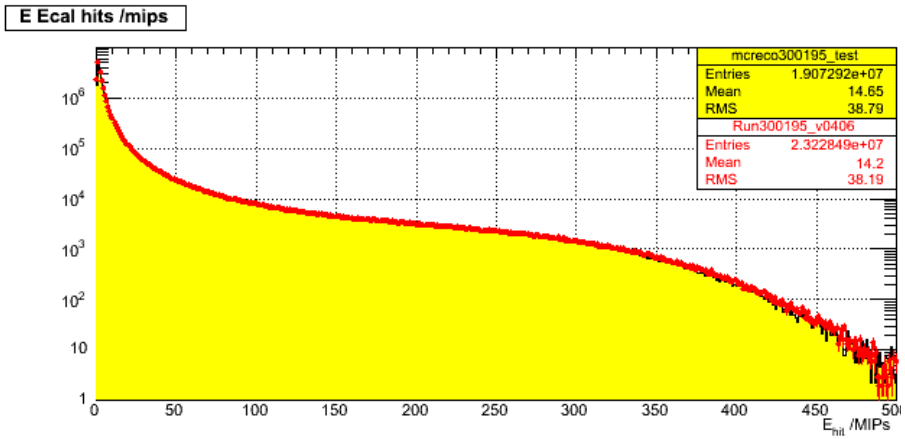


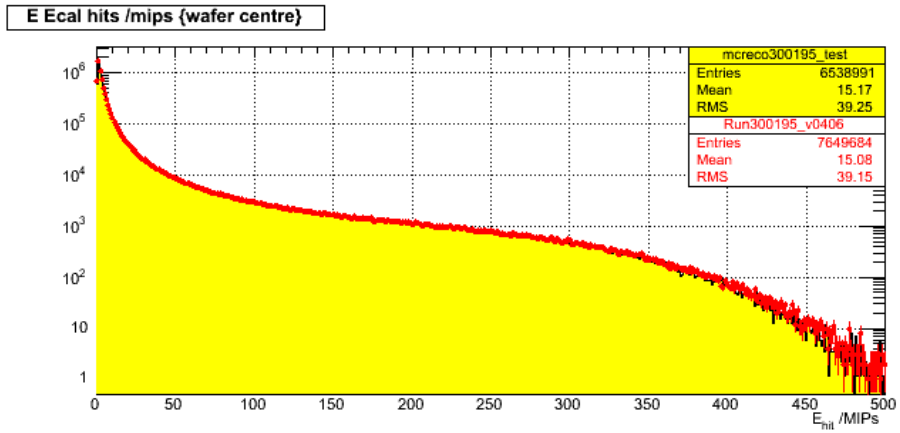


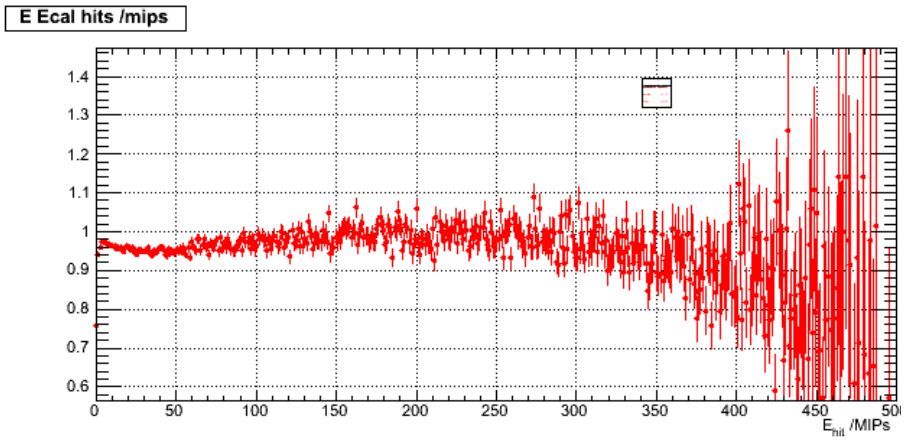
Ehit : MCreco/Data

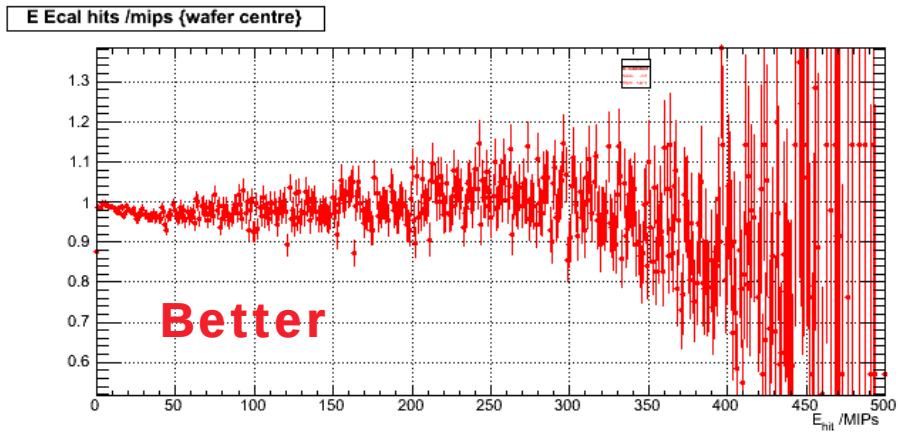
All events

Events in wafer centre





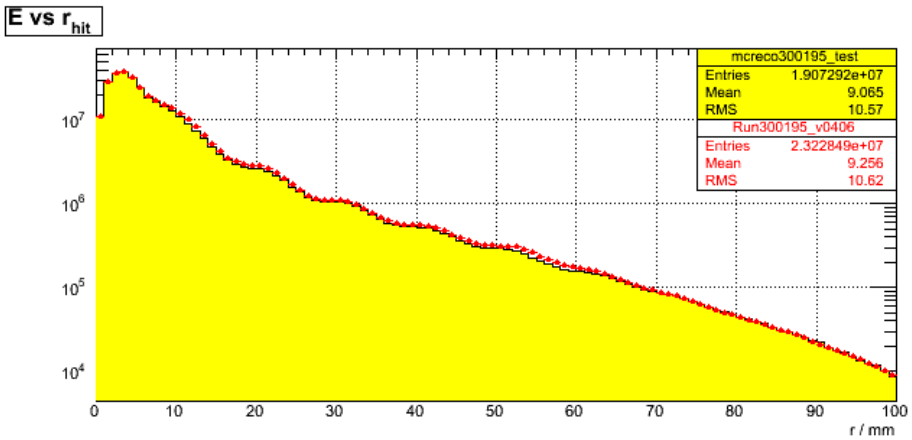


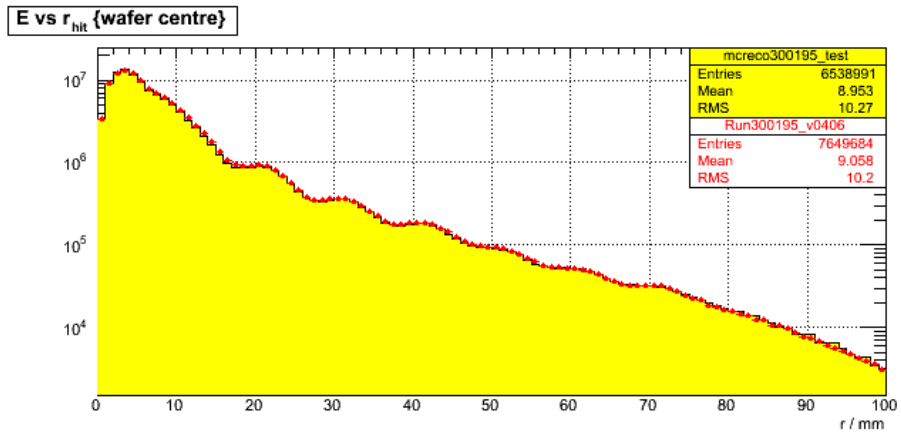


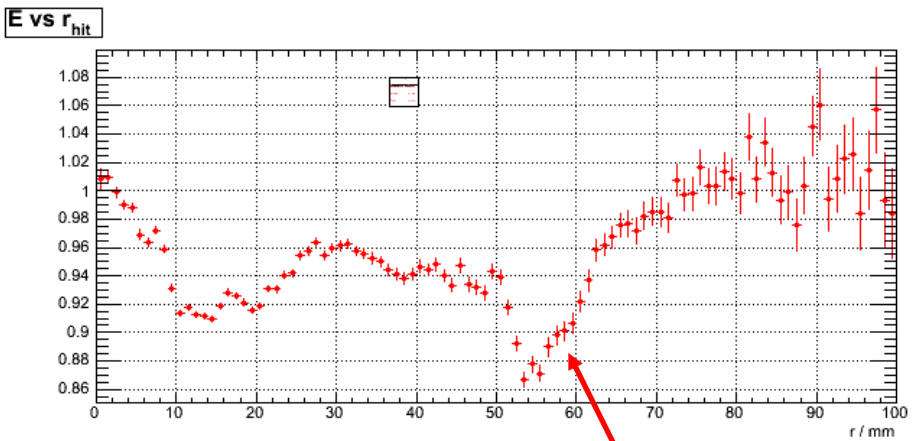
Radial distribution of hits

All events

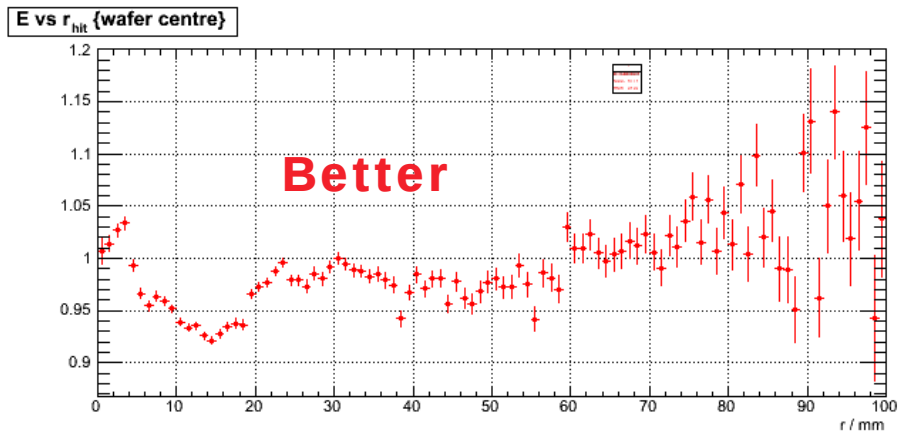
Events in wafer centre





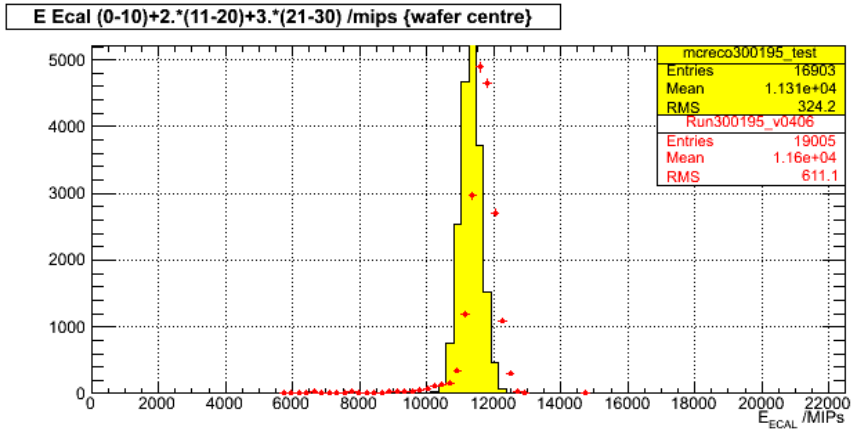


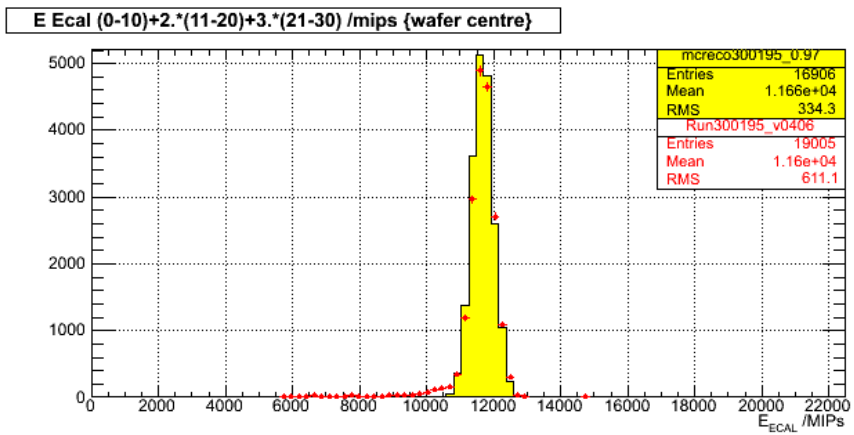
Square events?



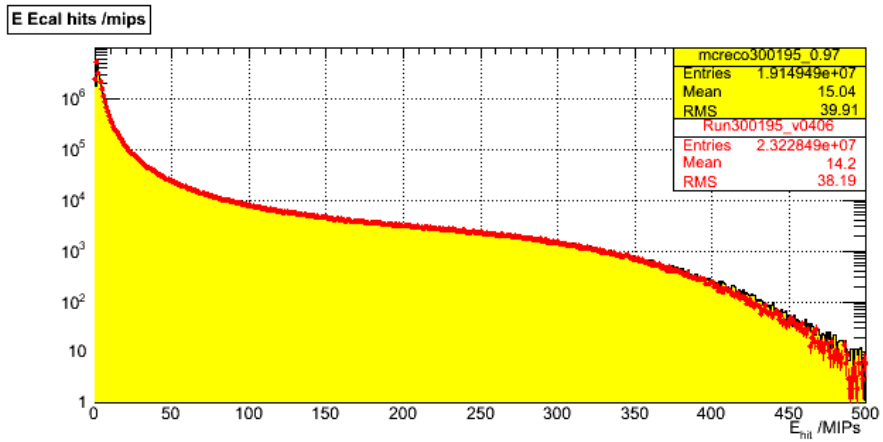
Calibration of MCreco?

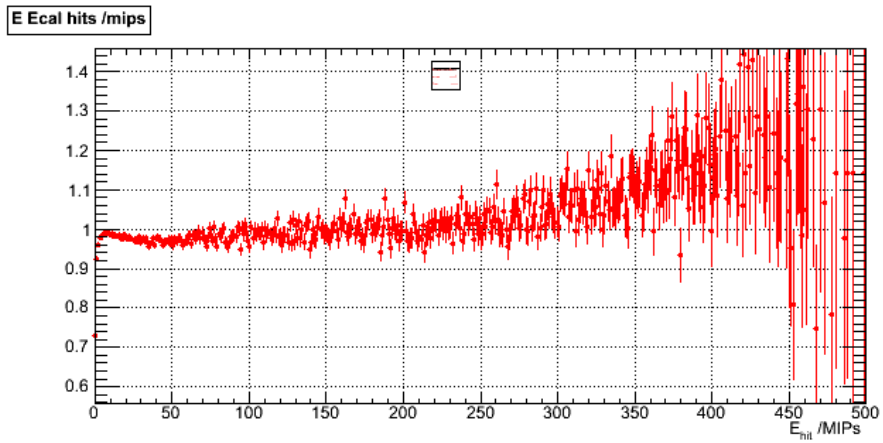
MCdigi is based on 147keV=1MIP





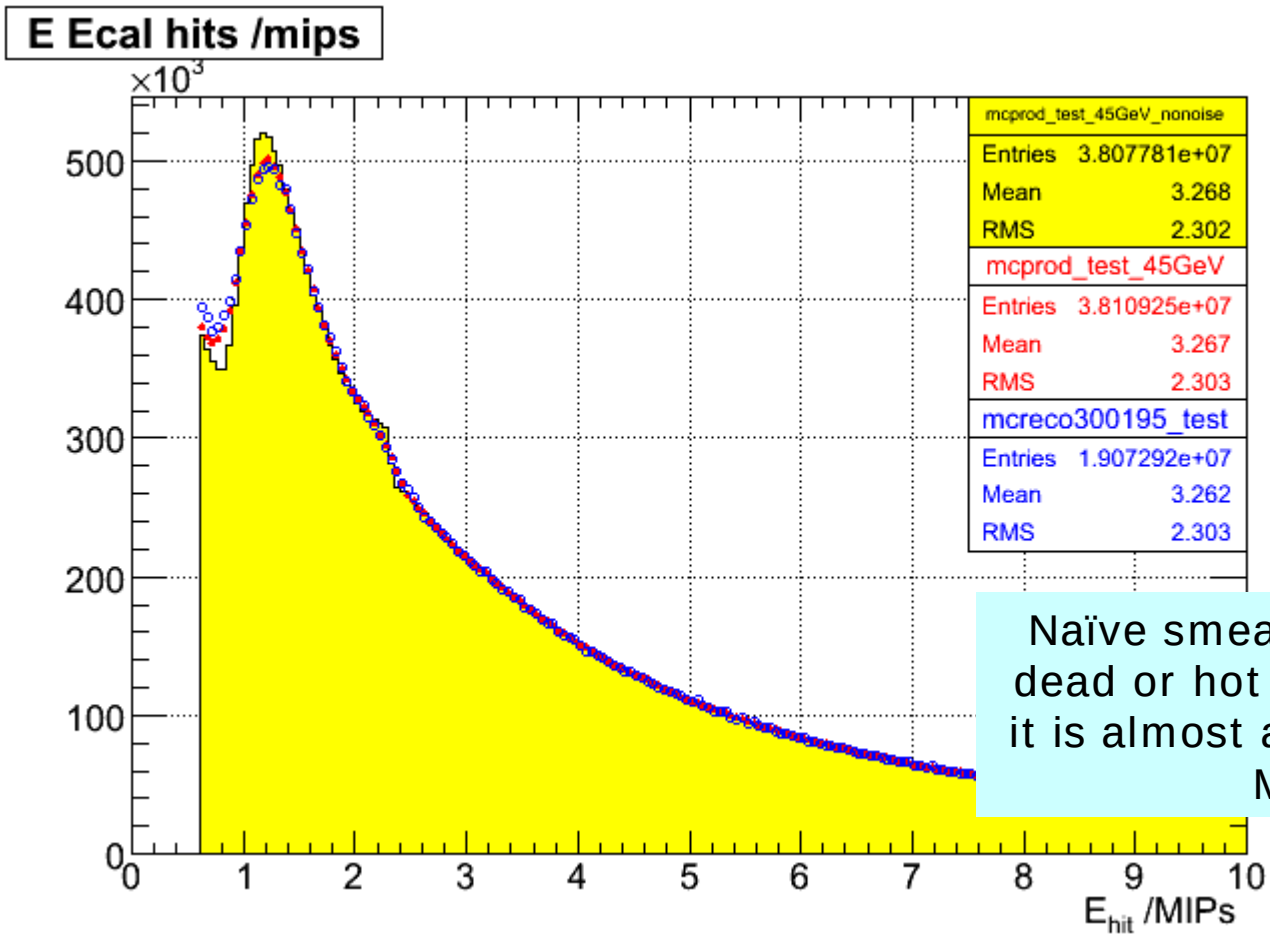
×0.97 gives better fit to total energy





Hit energies – better at low end
But worse in the tail

Compare with naïve noise smearing



Raw Mokka

Naïve smearing

Full MCreco

Naïve smearing doesn't give dead or hot cells, but globally it is almost as good as the full MCreco

Summary

- MCreco simulation of dead cells and (uncorrelated) noise looks reasonable.
- Effect is small in 2006 data. More important for 2007?
- Globally not very different to naïve simulation of average noise on all cells.
- Most obvious thing not covered is correlated noise, such as “square events”.
  - Do we understand this effect well enough to attempt to simulate the effect?
- If restricted to showers with barycentre away from interwafer gaps, agreement with data is not perfect, but generally OK to the few % level. Good enough?
- Any news on the importance of alignment in MC?
- Still need tracking and HCAL to work in MCreco files.