Effect of new G10 definition on longitudinal profiles

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- The G10 material used to model the PCB in the previous Mokka simulation has a density of 1.7 g/cm3, mixure of C/H/O

- Marc Anduze measured density of PCB actually used in the prototypes: 2.64 g/cm3

- PCB also contains many copper traces

- new “G10” material defined by Gabriel Musat, implemented in Mokka:
  add a fraction of copper to previous material, to give the correct final density

  density_Cu = 8.96 g/cm3 , density_oldG10 = 1.7 g/cm3

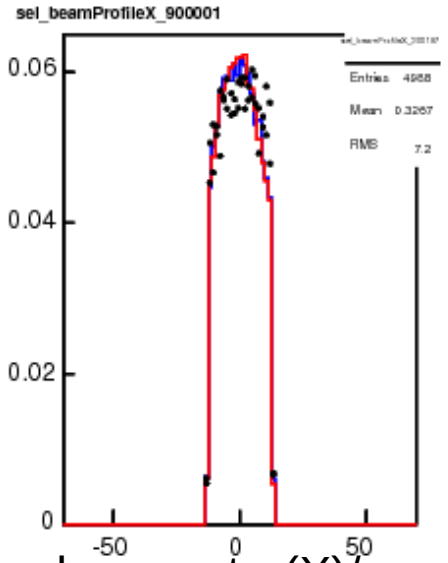
  density_newG10 = 2.64 g/cm3
  density_newG10 = x*density_Cu + (1-x)*density_oldG10
  So x ~ 13% (by volume) (equal to 43% by mass)

- expect to see some change on shower shapes?

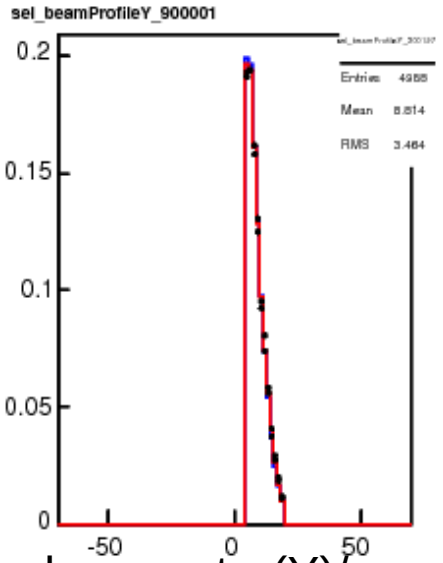
Marcel produced some simulation with new g10 definition
2006 configuration @ 10, 30, 45 GeV
Compare to data and standard simulation: standard event selection

30 GeV beam

Black = 2006 runs
Blue = original g10
Red = new g10+Cu

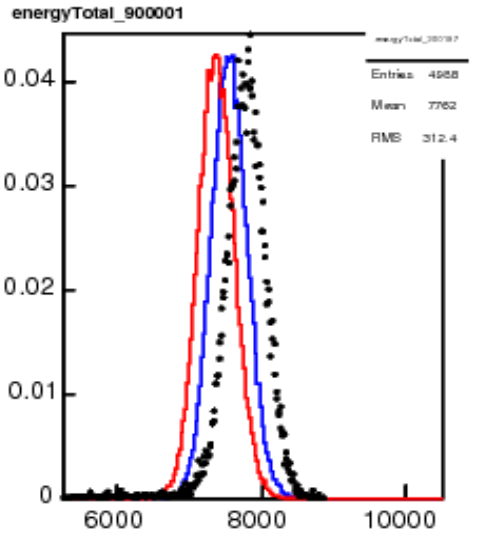


barycentre(X)/mm

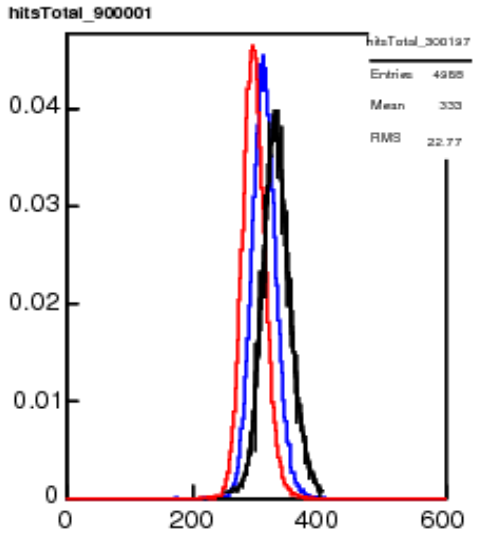


barycentre(Y)/mm

Beam position ~ OK

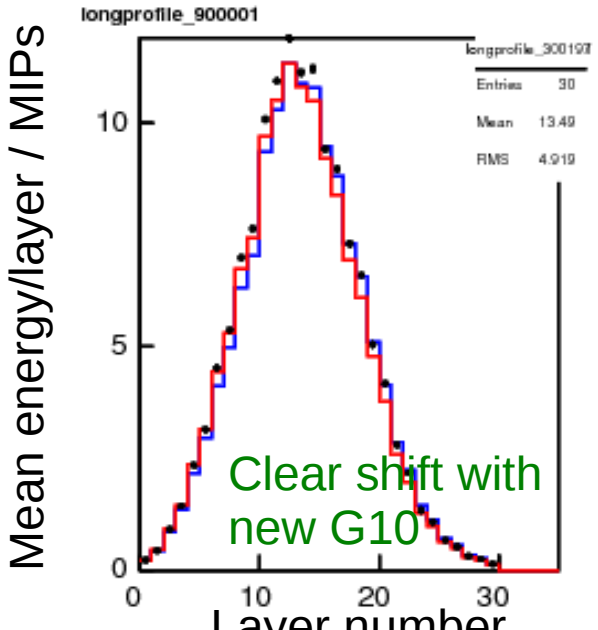


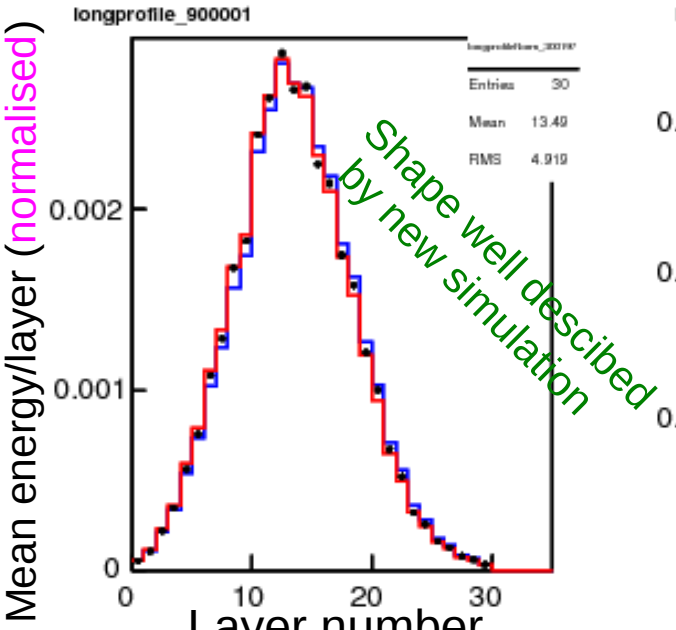
total energy/MIPs

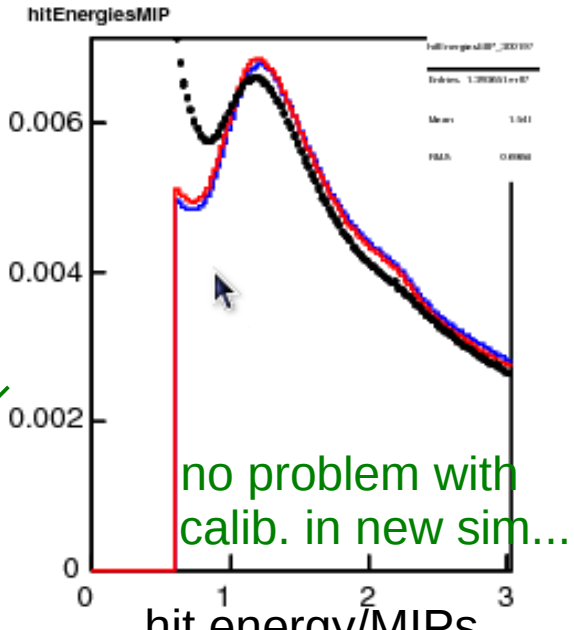


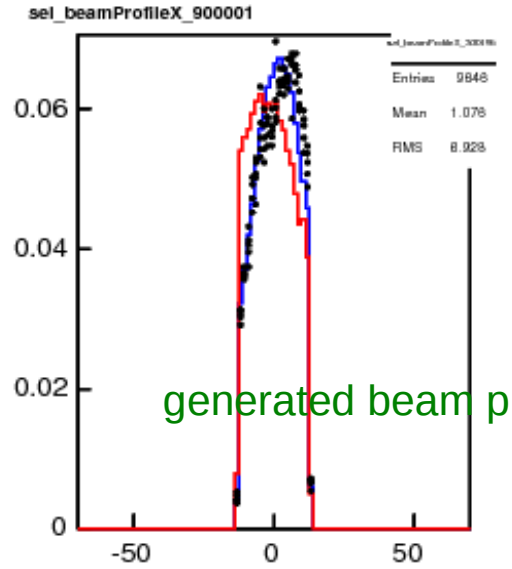
#hits

why is the agreement here so bad??

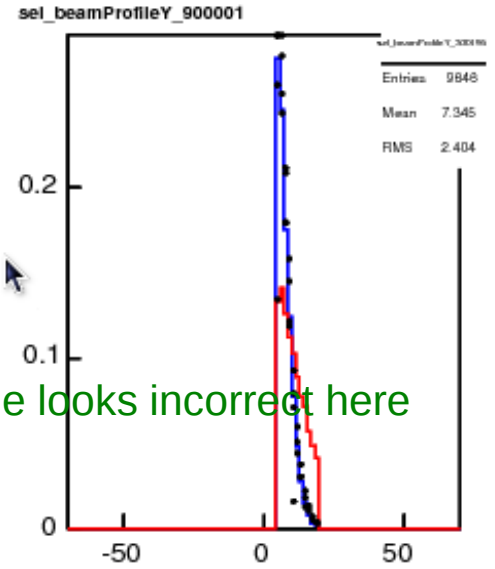








Barycentre (x) / mm

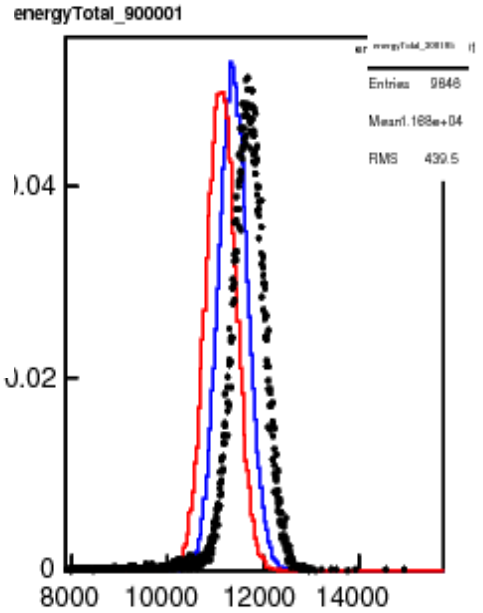


barycentre (y)

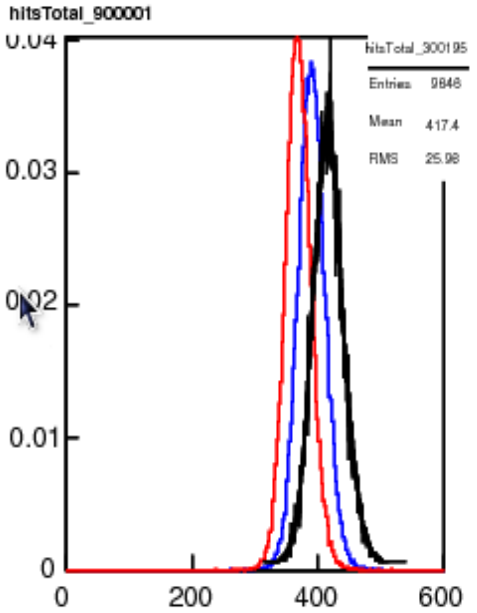
generated beam profile looks incorrect here

Black = 2006 runs
Blue = original g10
Red = new g10+Cu

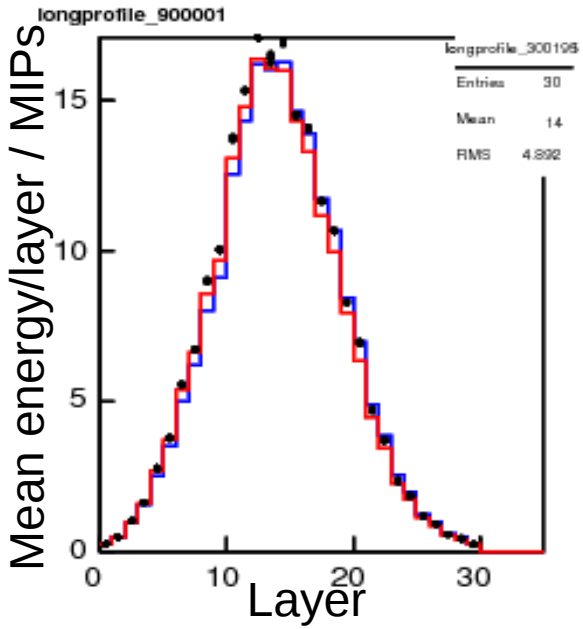
45 GeV



Total energy / MIP

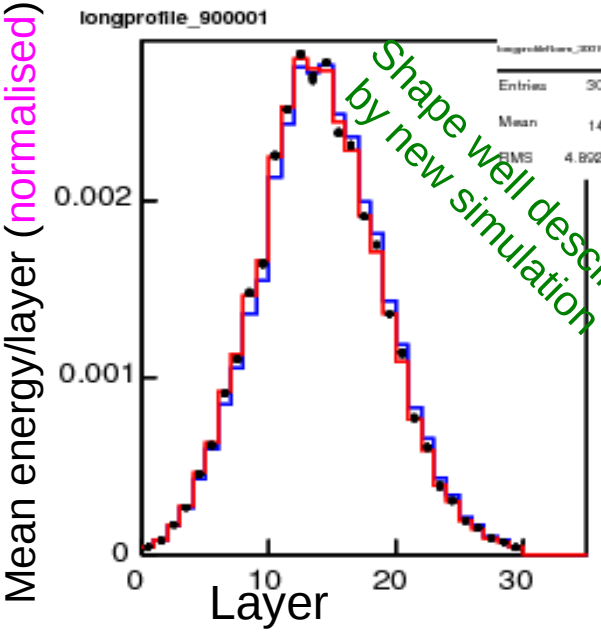


hits



Mean energy/layer / MIPs

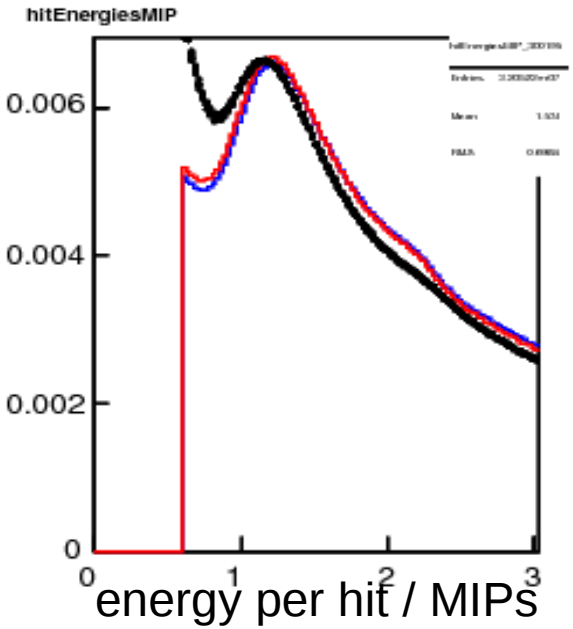
Layer



Mean energy/layer (normalised)

Layer

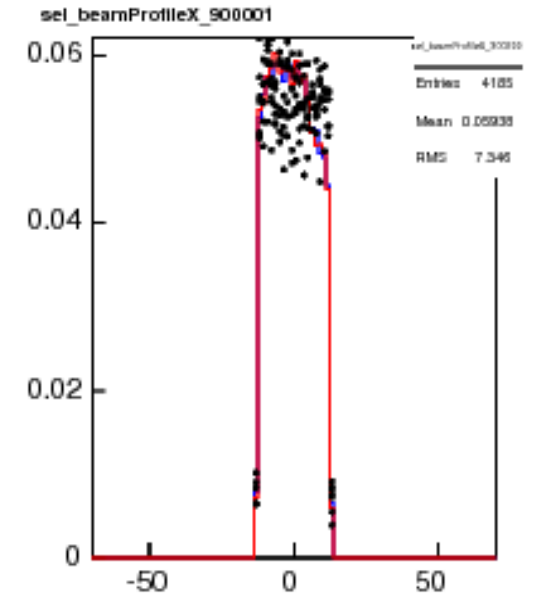
Shape well described by new simulation



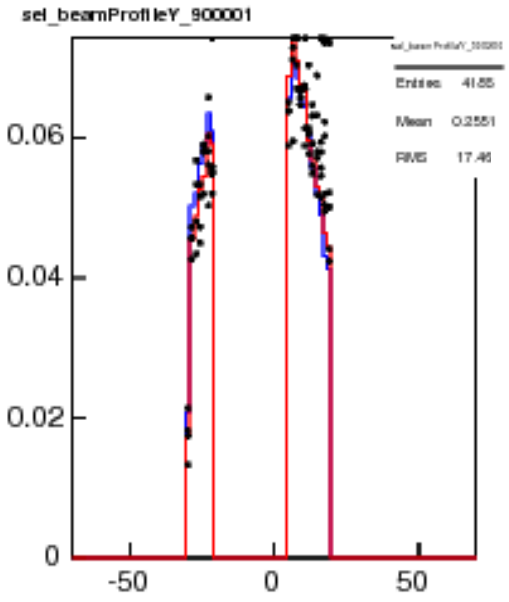
energy per hit / MIPs

Black = 2006 runs
Blue = original g10
Red = new g10+Cu

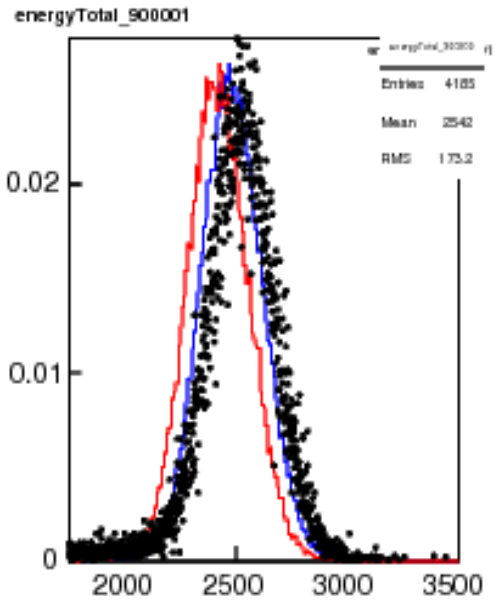
10 GeV



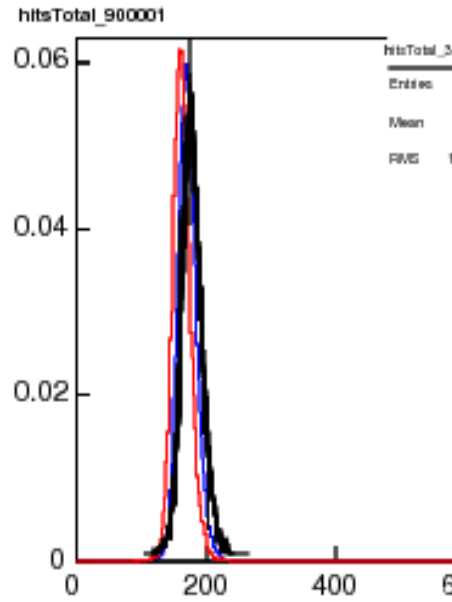
Barycentre (x) / mm



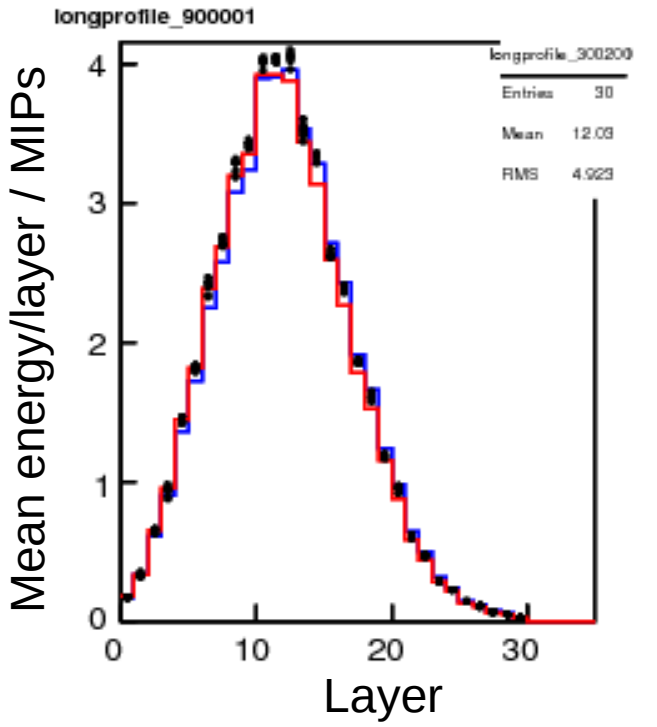
barycentre (y)

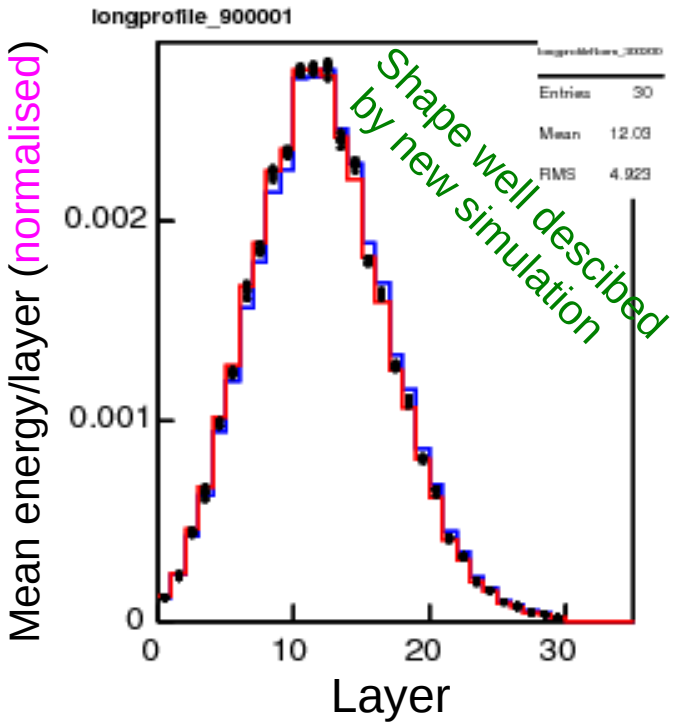


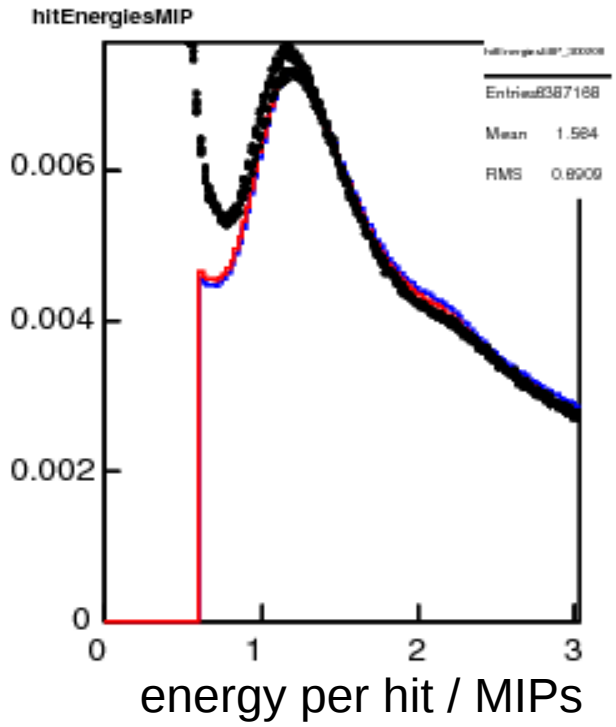
Total energy / MIP



hits







Summary

simulating PCB with added copper does shift longitudinal profiles
    Shower max a little earlier in the calo, as expected

Using new g10+Cu simulation gives much improved description of longitudinal shape

I seem to have some energy scale problem
    Not clear to me where it is...

Plans

look at transverse profiles