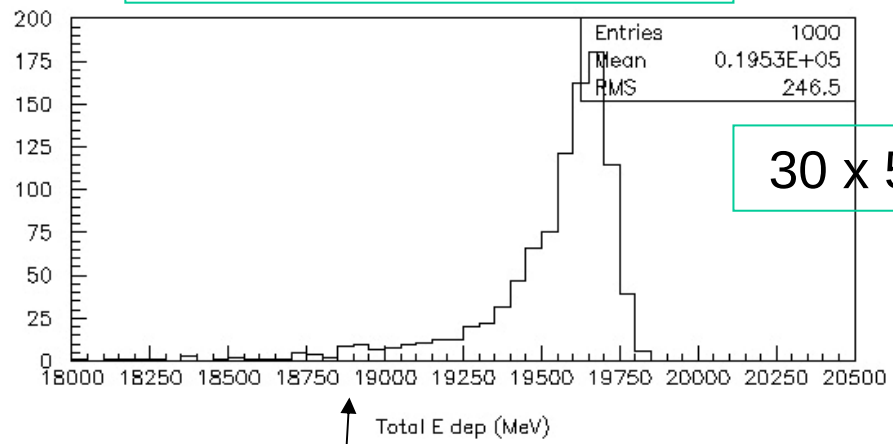
Alternative Sampling Configurations – new study

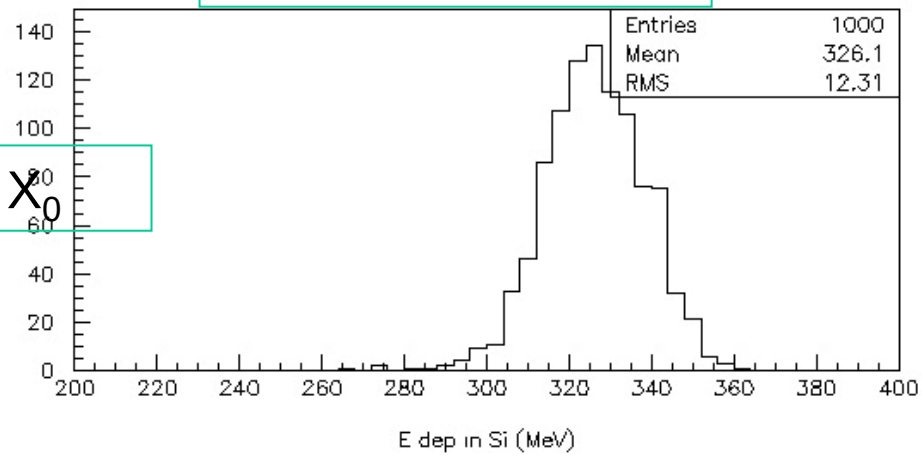
20 GeV photons

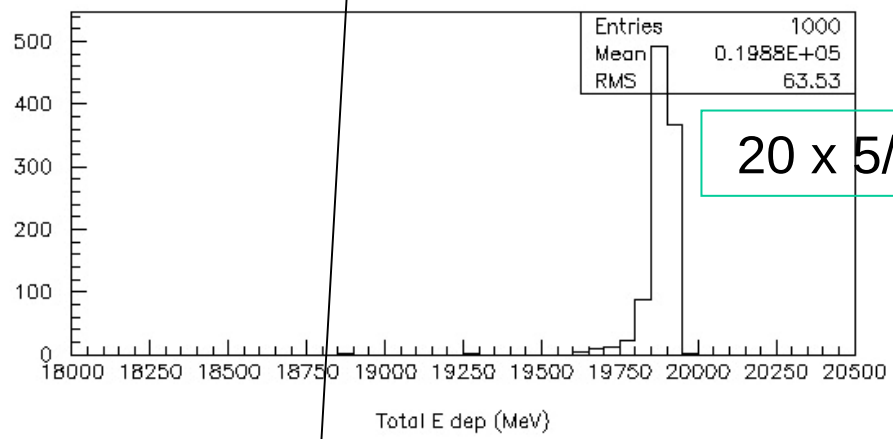
Total absobed energy



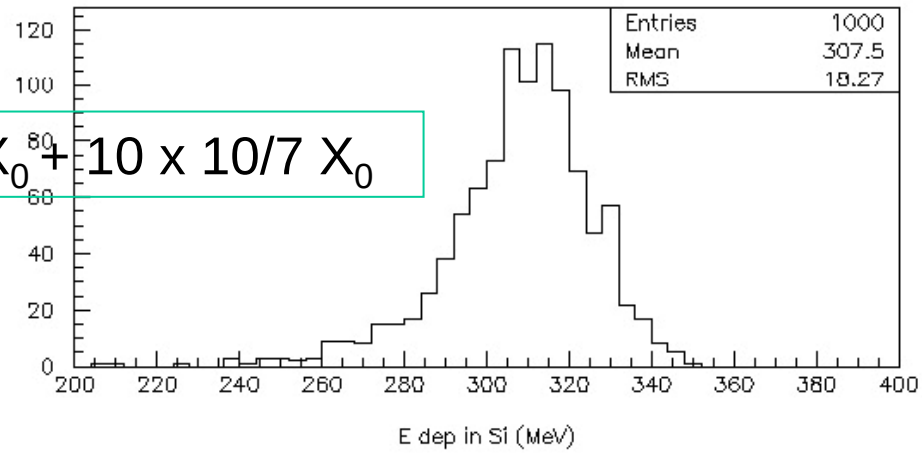
30 x 5/7 X_0

Dep energy in Si





20 x 5/7 X_0 + 10 x 10/7 X_0

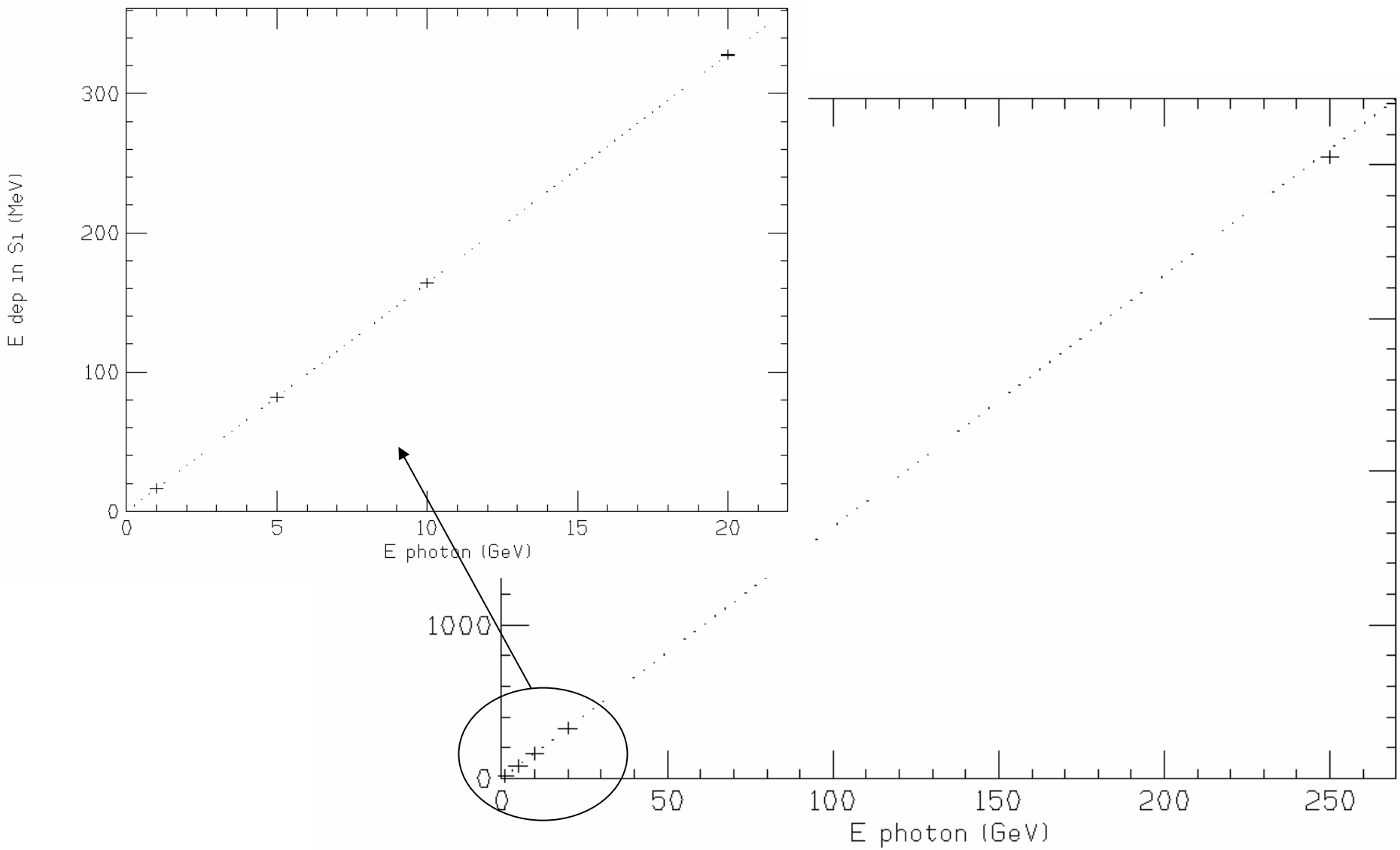


Leakage into HCal

Response

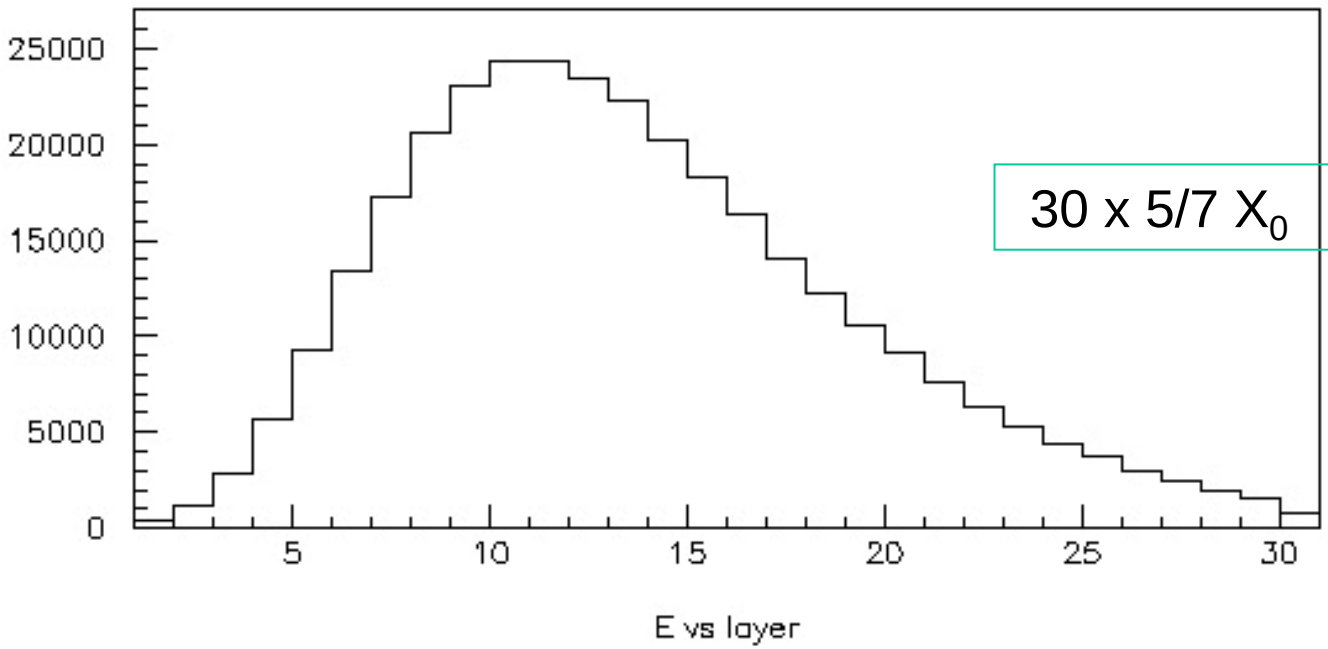
20 x 5/7 X_0 + 10 x 10/7 X_0

photons

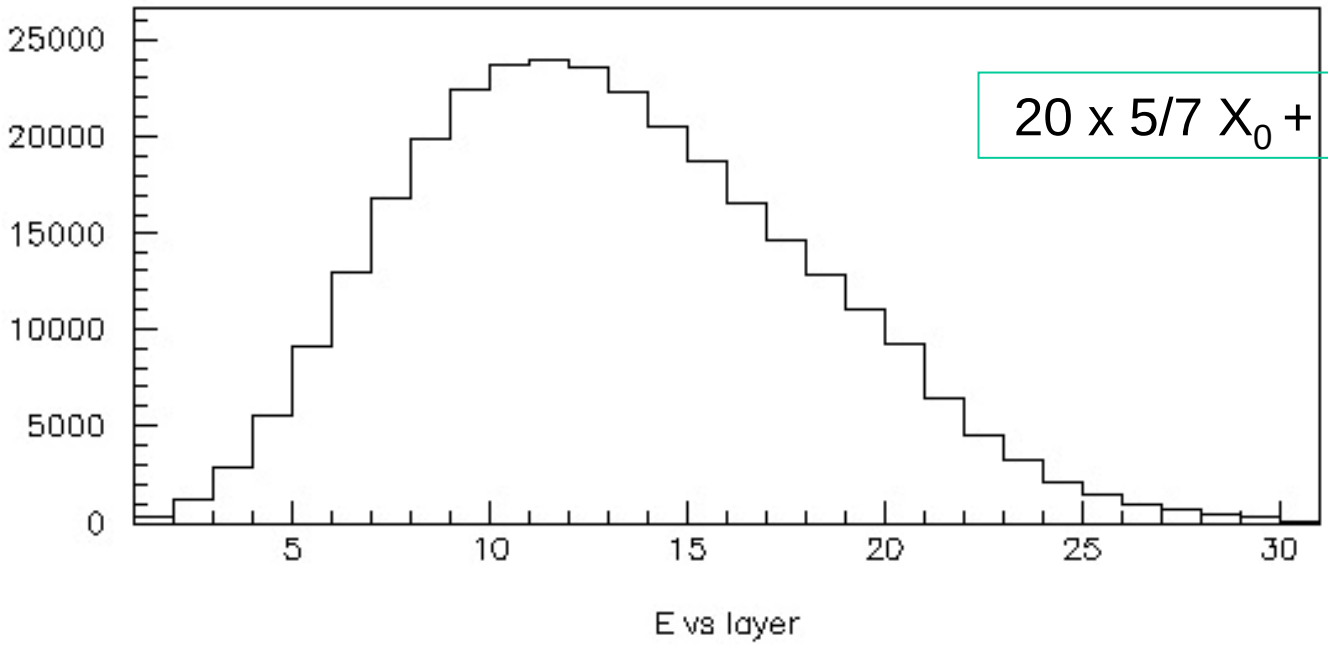


Longitudinal Profiles

20 GeV photons



30 x 5/7 X_0

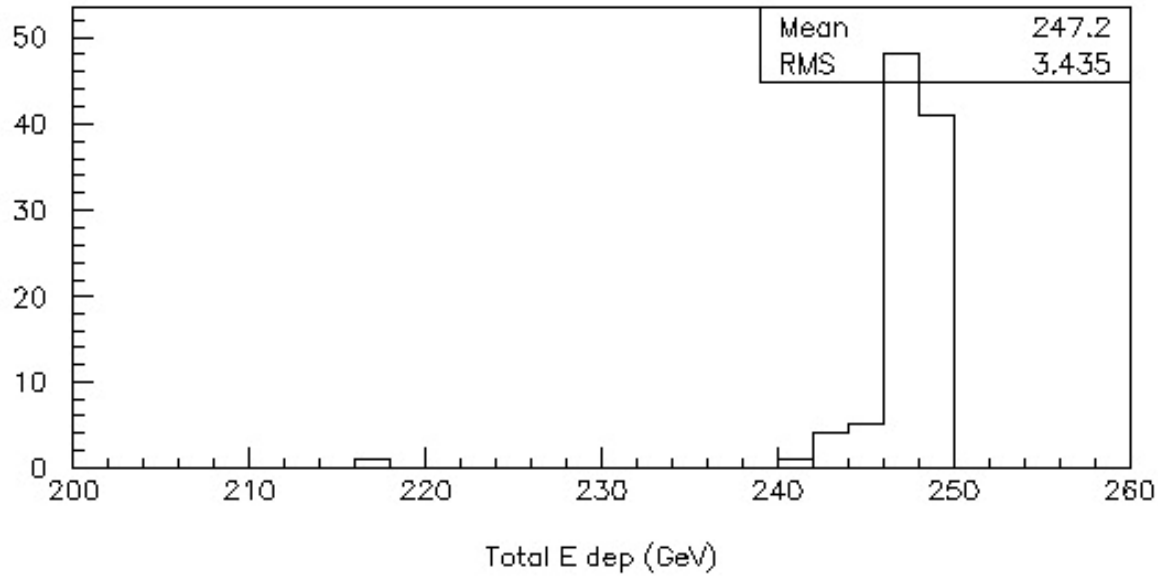


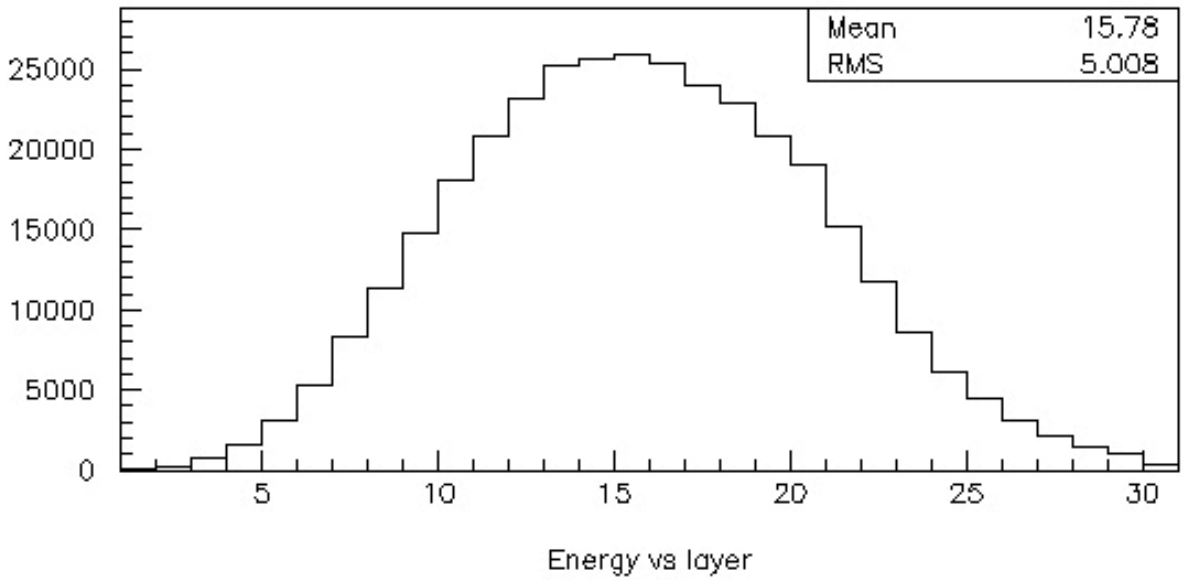
20 x 5/7 X_0 + 10 x 10/7 X_0

higher energy

20 x 5/7 X_0 + 10 x 10/7 X_0

250 GeV photons

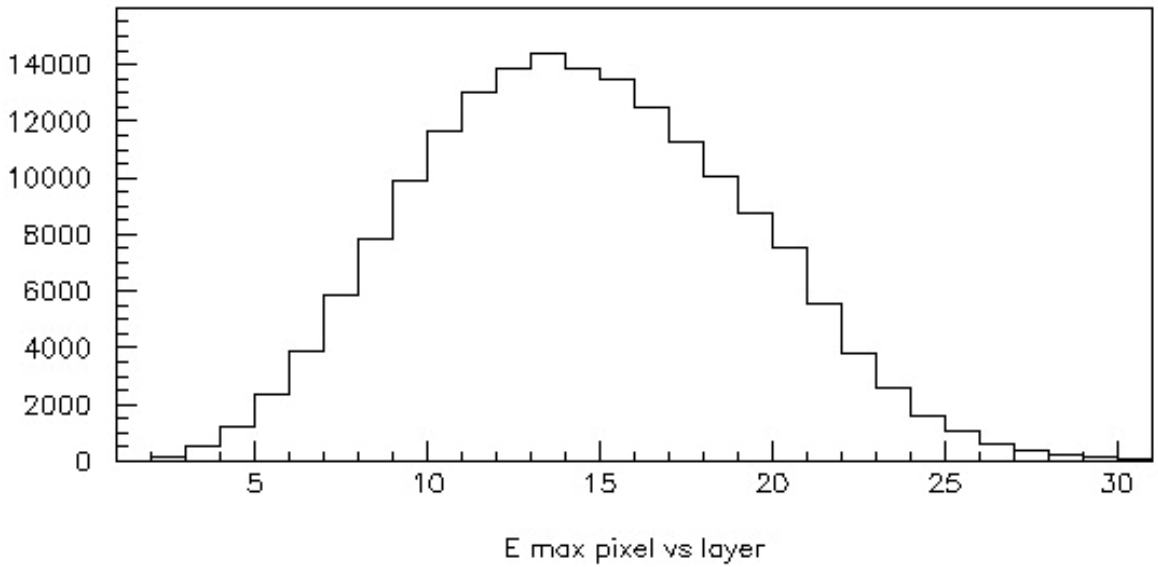




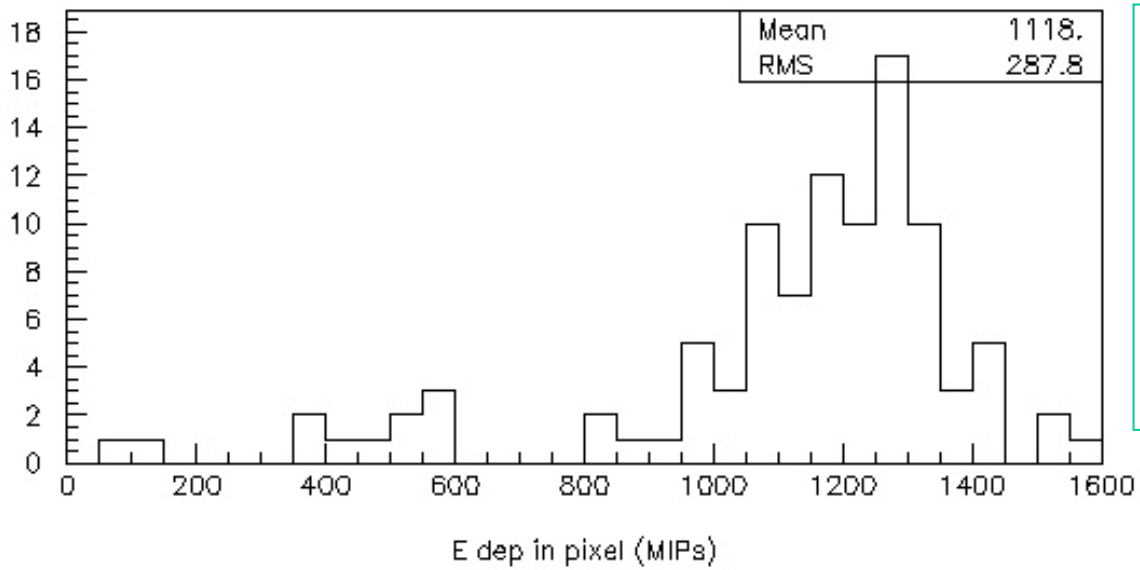
high energy response in pixel

$20 \times 5/7\ X_0 + 10 \times 10/7\ X_0$

250 GeV photons



E max pixel vs layer



E dep in pixel (MIPs)

Max pixel in layer 12 (E dep in MIPs)

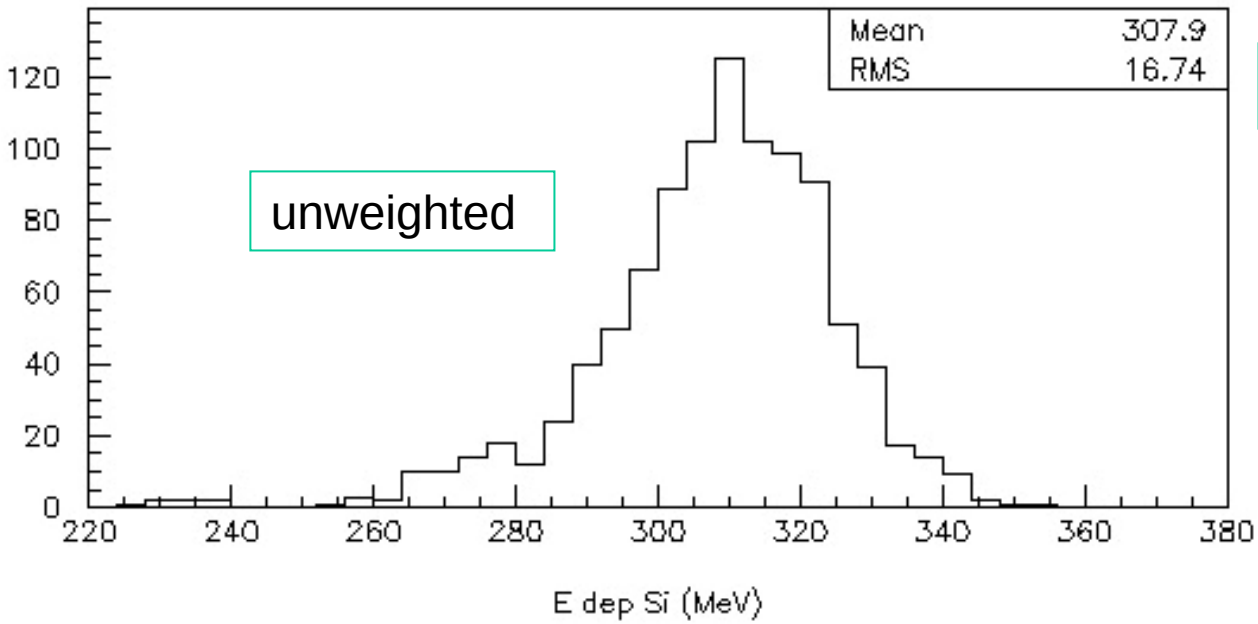
(124 KeV/MIP for 320 μm Si)

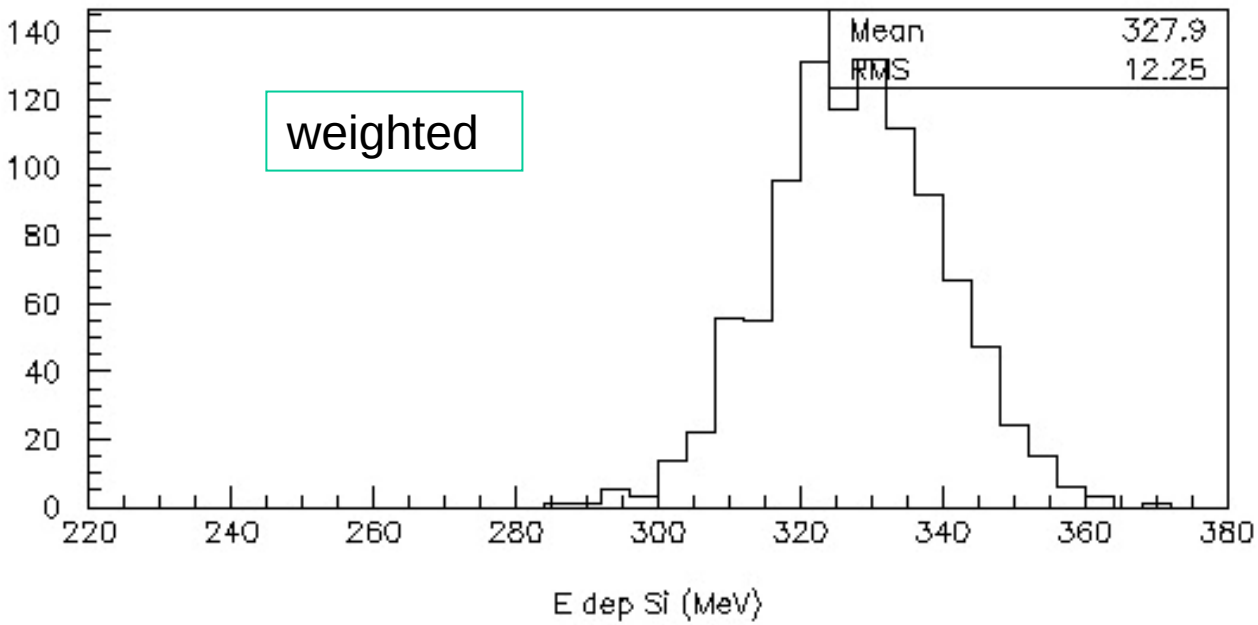
5 mm x 5 mm pixels (real prototype hex. pixels have smaller area; factor 0.65)

Weighting the layers

20 GeV photons

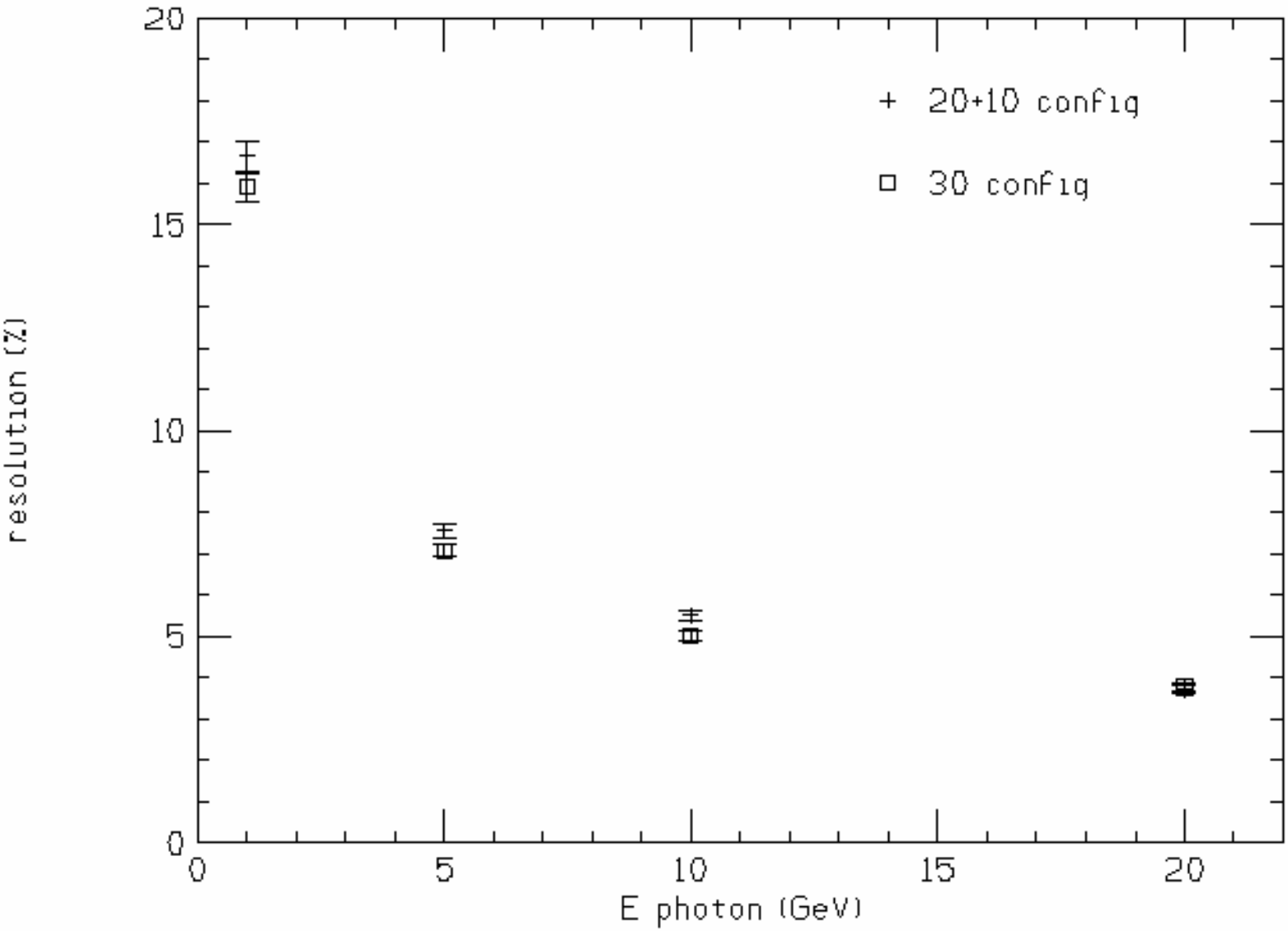
20 x 5/7 X_0 + 10 x 10/7 X_0





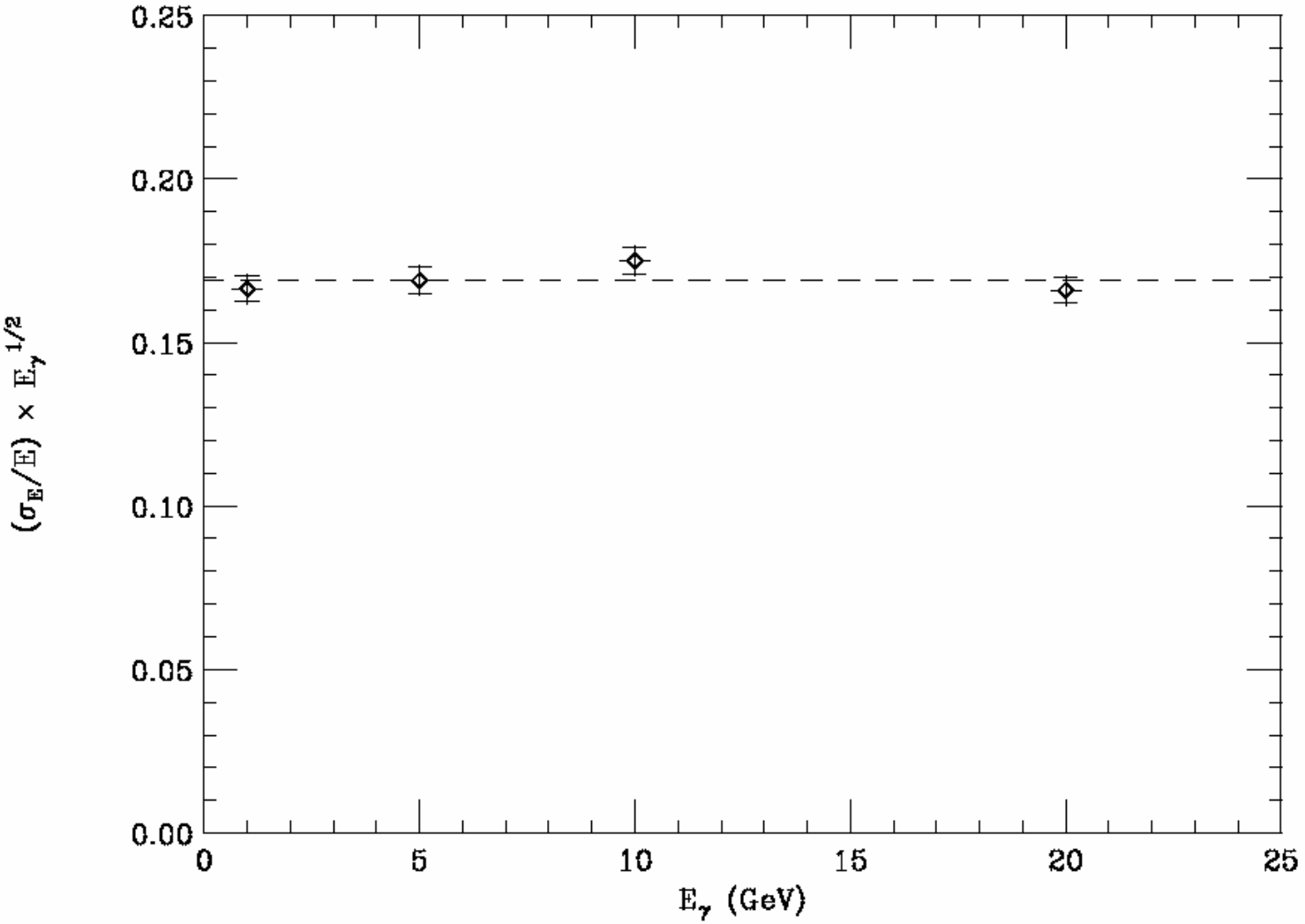
Resolution Comparison

photons



20+10 resolution

photons



Conclusions on 20+10 config

- Containment is much better
  - How important is the leakage for the HCal ?
- Resolution is nearly the same (k / sqrt(E(GeV)))
  - 20+10: k=0.169 $\pm$ 0.002, E$\leq$20 GeV or more
  - 30: 0.159 $\pm$ 0.002, E$\leq$10 GeV (0.169 at 20 GeV)
  - Best weighting: 21-30/1-20 = 2.0
- Response for 20+10 remains linear at higher energy
- SiD cost is not much different