# PS tagged gamma energy reconstruction

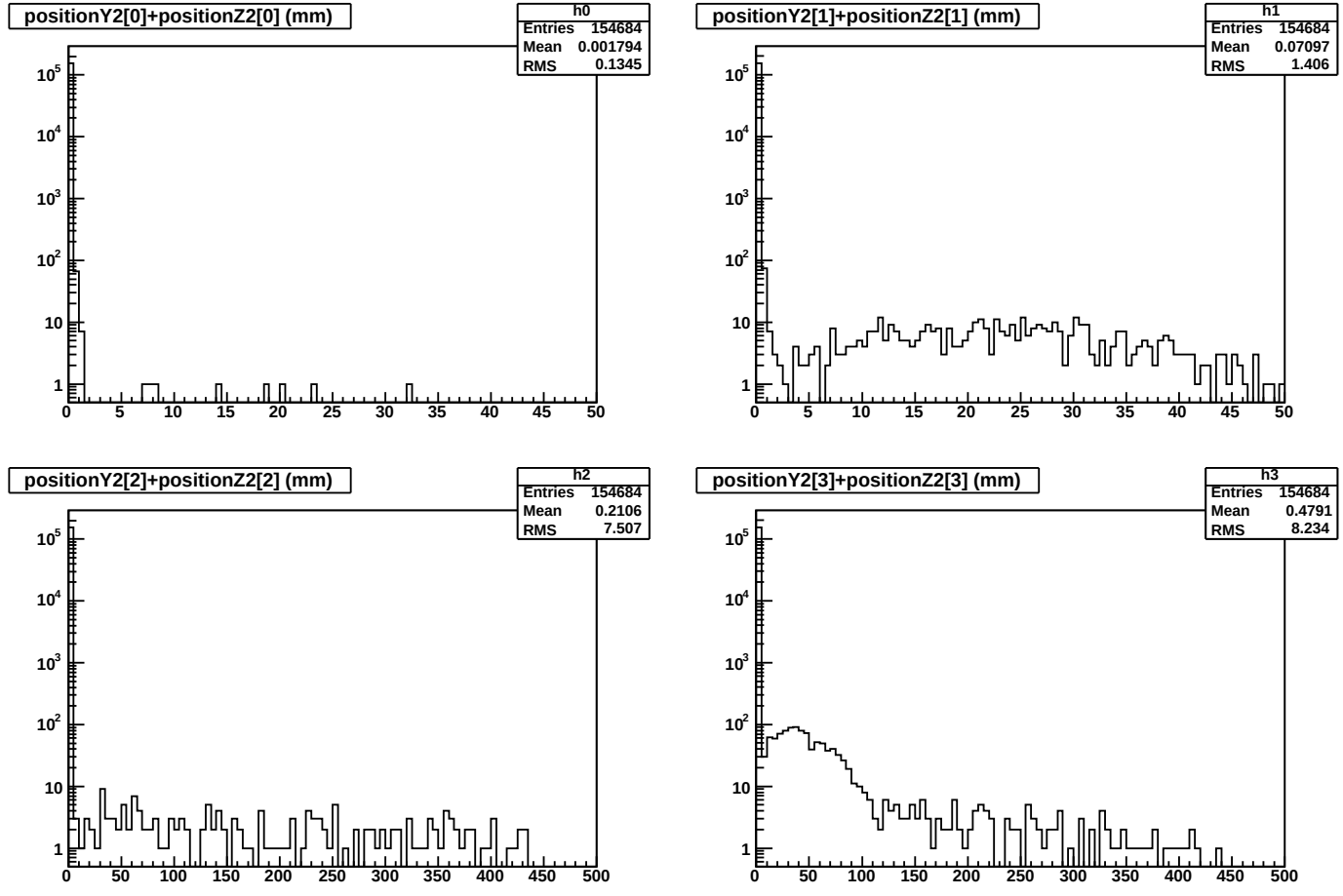
- Quality cuts
- $E_{rec}$ from MPtuple_PS_tag.cpp
- Trajectory fit

# Simulation

- BeamtestRelease v1r0801p0
- beamtest06 (April 6th)
- 1 GeV electron beam :
  divergence 0.12 deg (hor.) and 0.14 deg (vert)
  1% energy dispersion
- modified geometry : bigger Si chambers

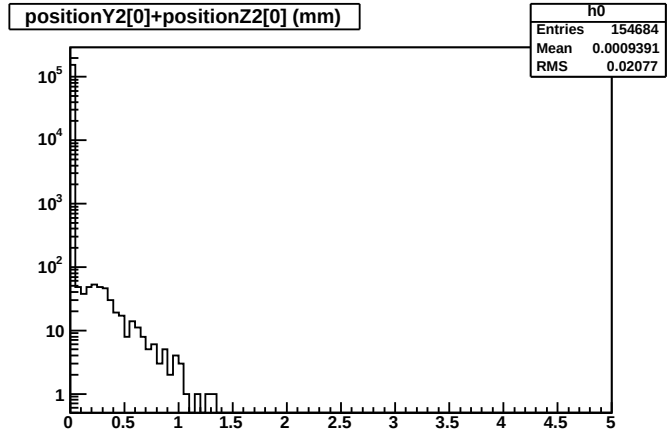
# Quality cuts (1)

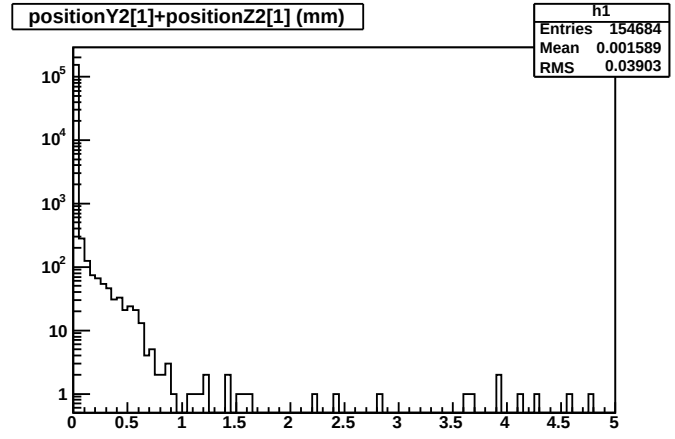
- there is some energy in all the Si chambers
- looking at the RMS along Y and Z

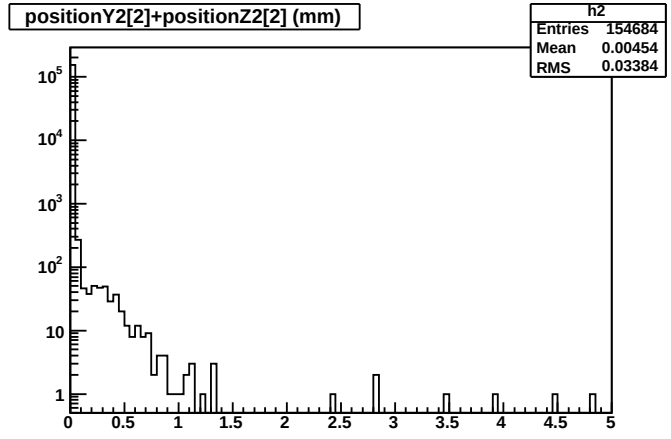


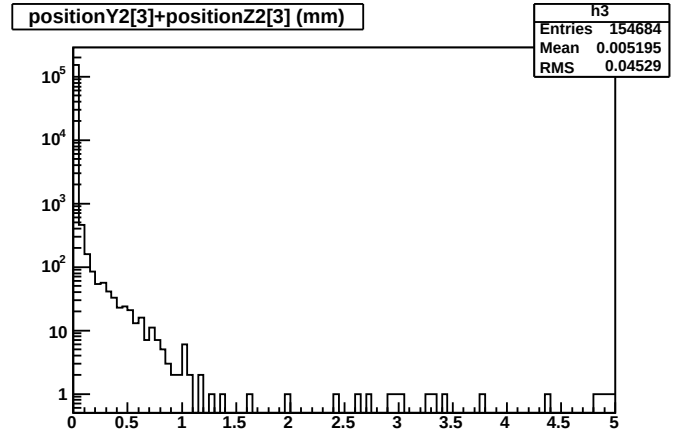
# Quality cuts (2)

- zoom between 0 and 5 mm



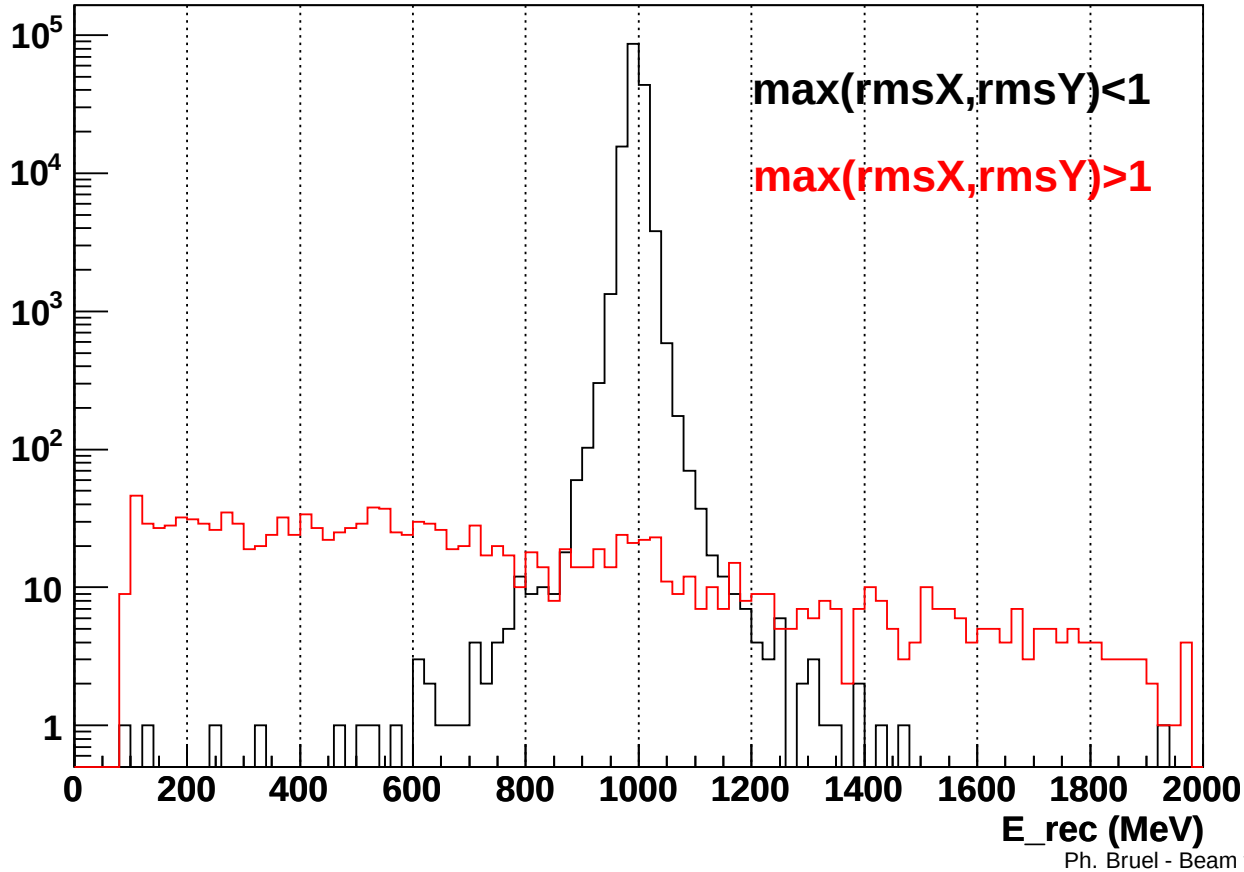



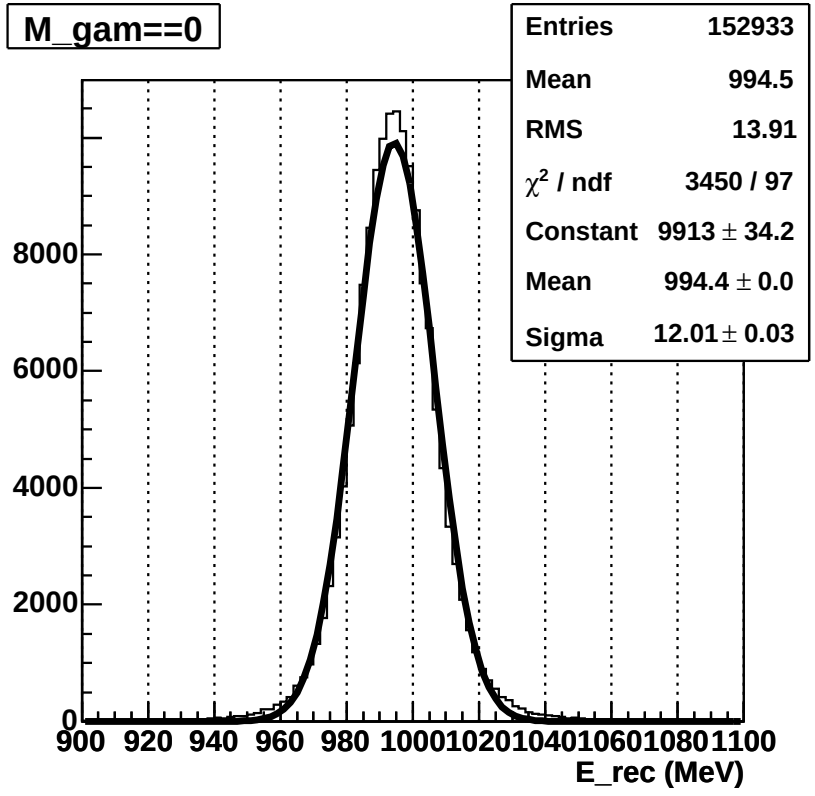
# Quality cuts (3)

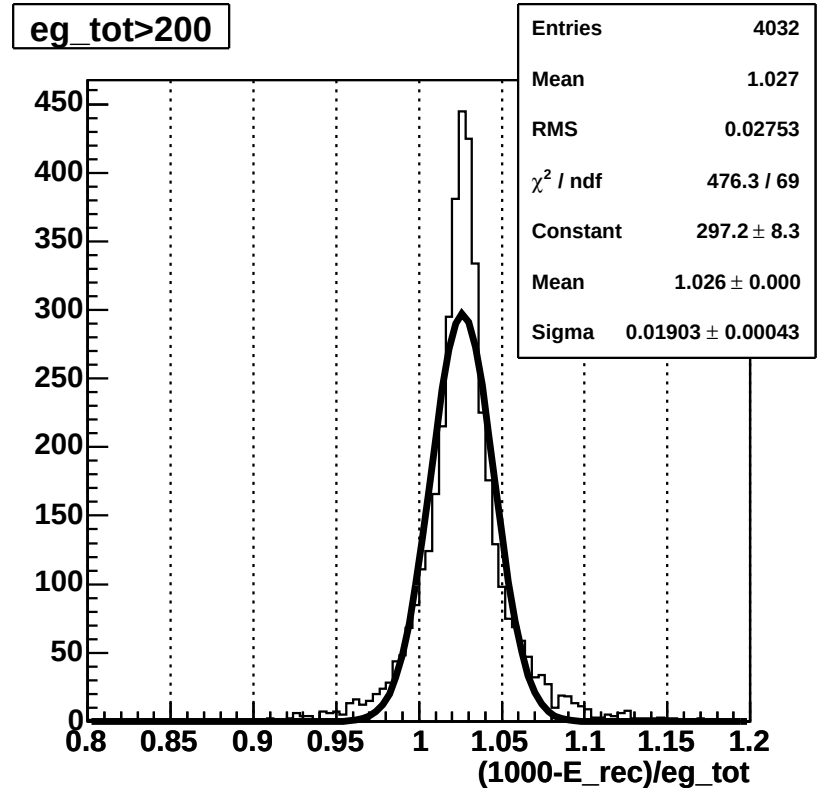
- requiring that $\max_{i=0,4}(rms_X^i + rms_Y^i) < 1\ \mathbf{mm}$ to get rid of delta ray $e^-$ (and dump backsplash ?)



# $E_{rec}$ results

- $E_{rec}(\mathbf{MeV}) = 300 \times 1\ \mathbf{T} \times 0.5\ \mathbf{m}/(2\tan(\theta/2))$
- $-0.5\%$ bias for $E_{rec}$
- $+2.5\%$ for $E_{gam} = 1000 - E_{rec}$



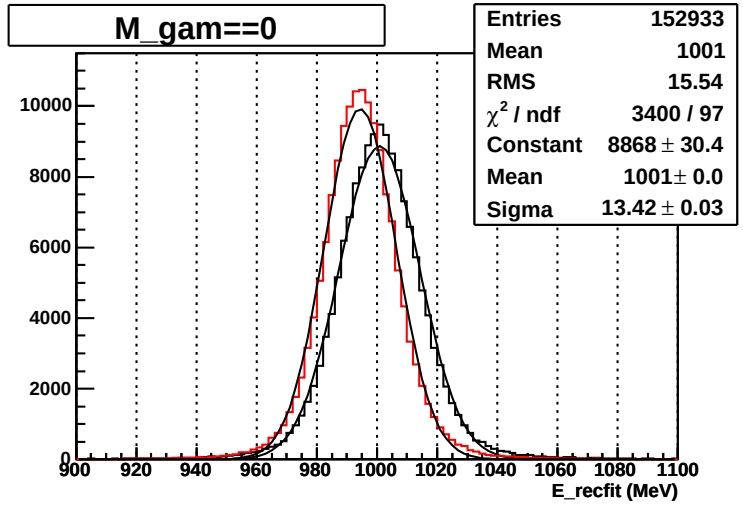



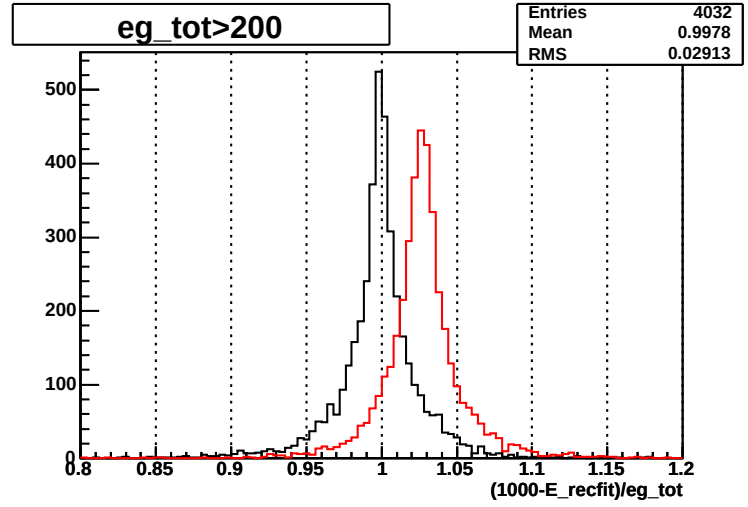
# simple $\chi^2$ minimization

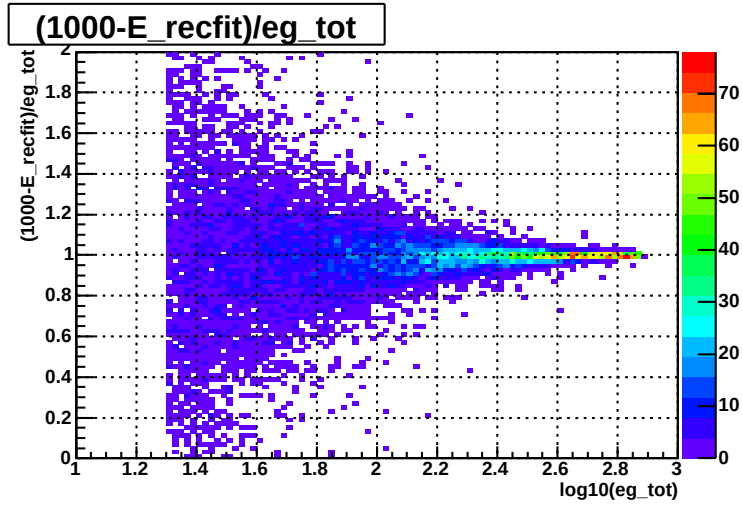
- retrieve the positions in the 2 first Si chambers
- determine the position when entering the magnet
- compute the trajectory inside the magnet
- determine the positions in the 2 last Si chambers : $P2_{fit}(E)$ and $P3_{fit}(E)$)
- minimize
  $\chi^2 = dist^2(P2, P2_{fit}(E)) + dist^2(P3, P3_{fit}(E))$

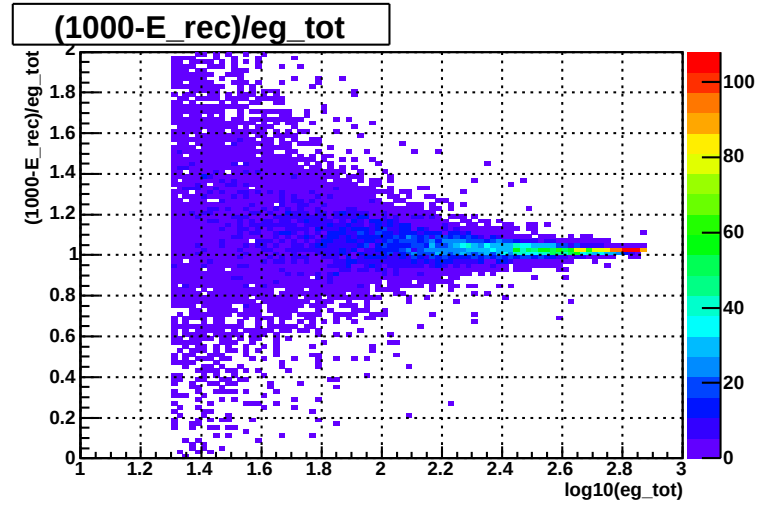
# $E_{recfit}$ results

- $E_{recfit}$ (in black) : no bias anymore



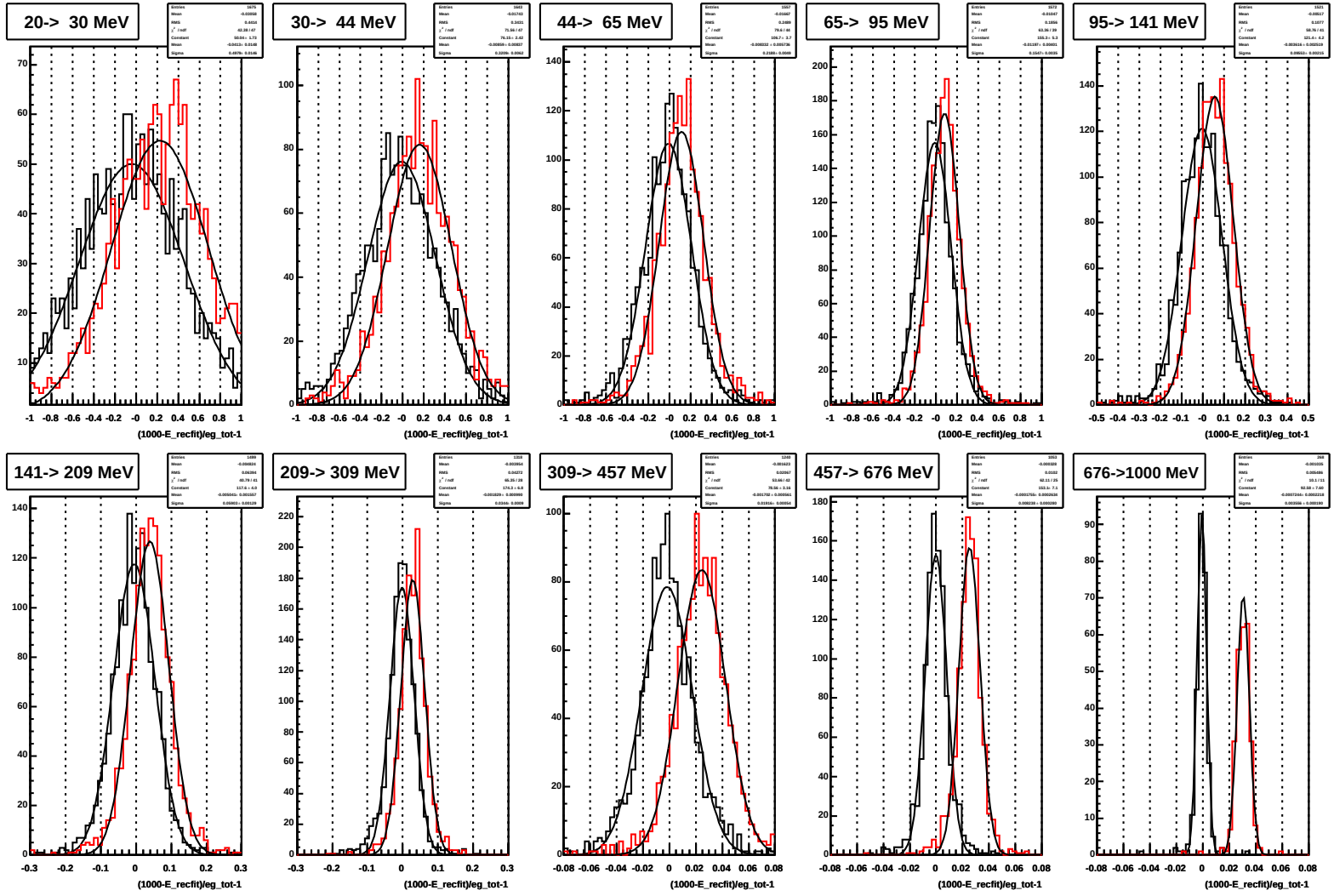



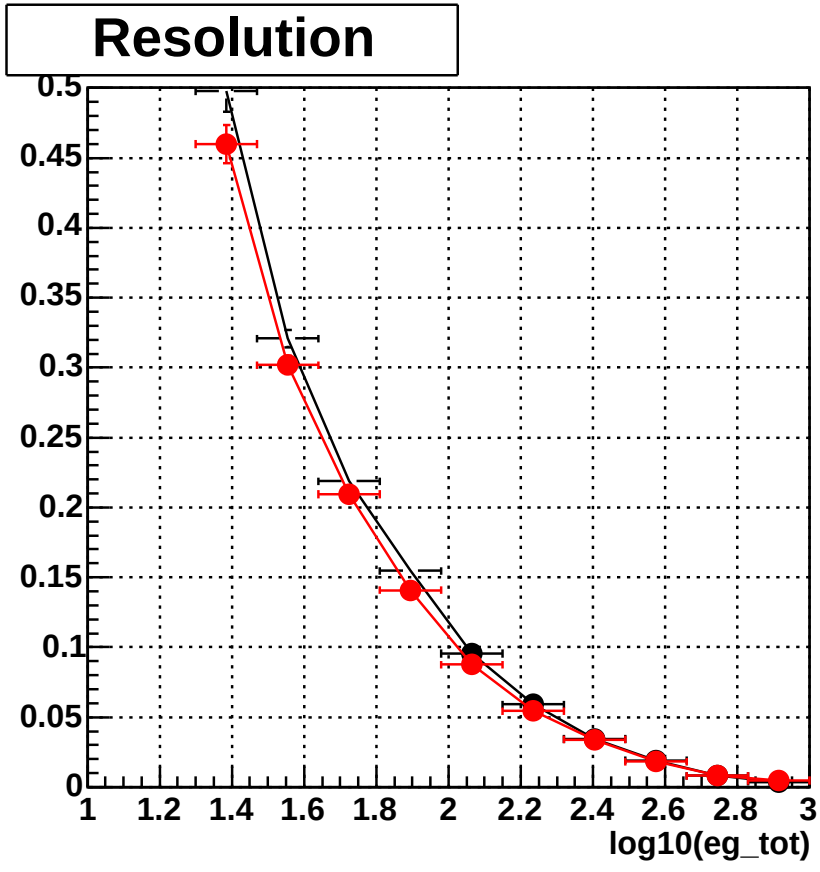
# Tagged gamma energy reconstruction

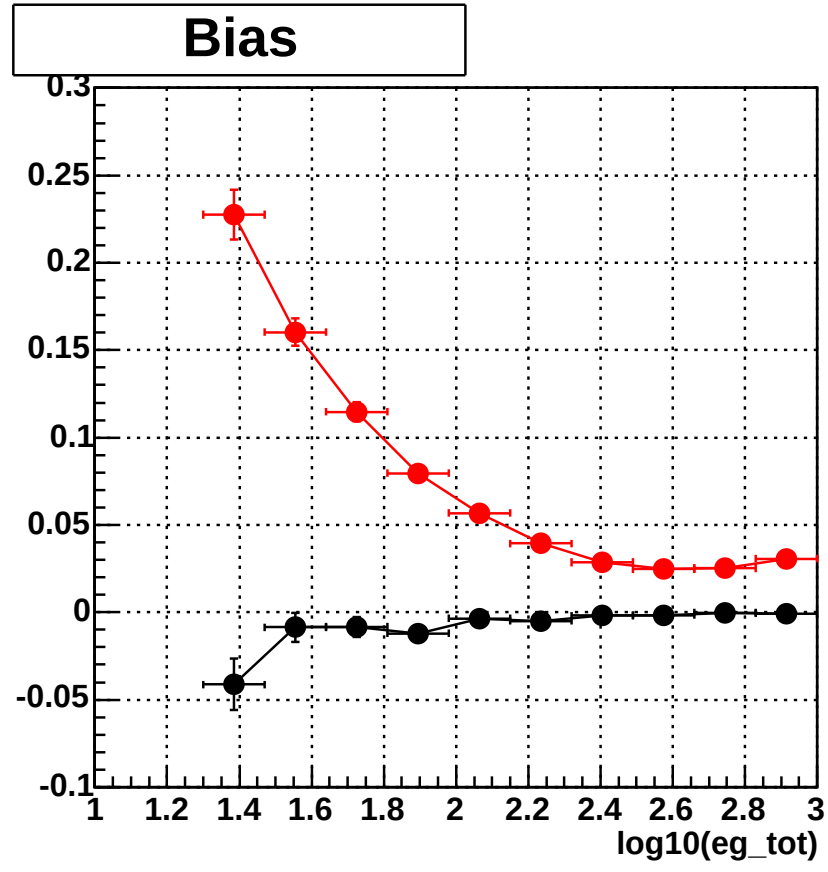
- from $E_{recfit}$ (black) and $E_{rec}$ (red)



# Tagged gamma energy resolution

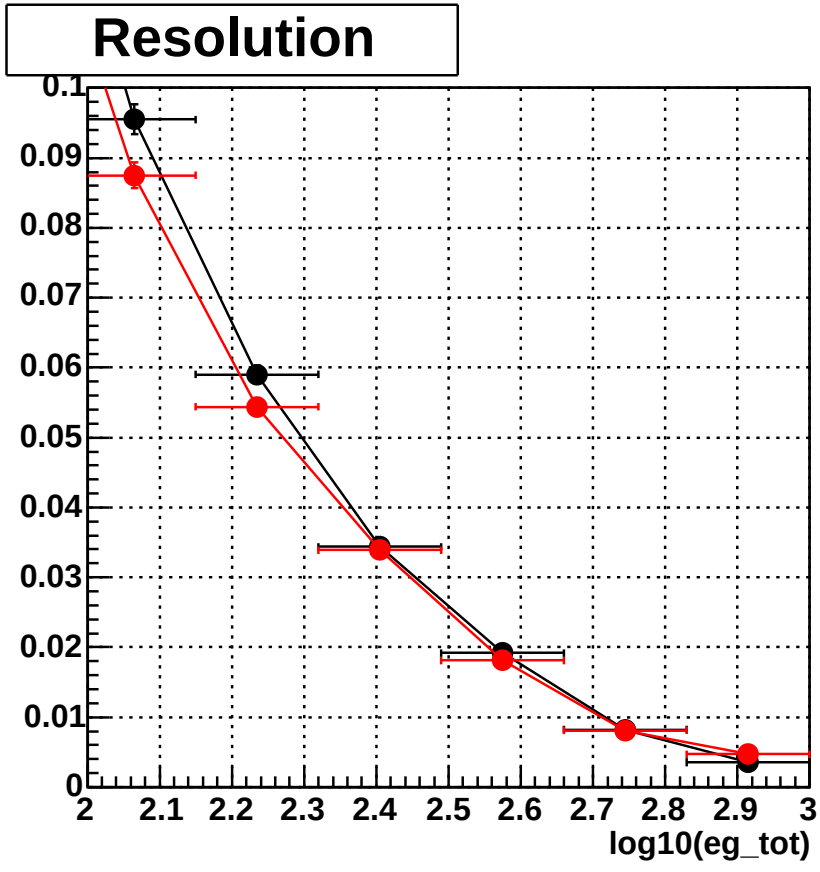
- from $E_{recfit}$ (black) and $E_{rec}$ (red)

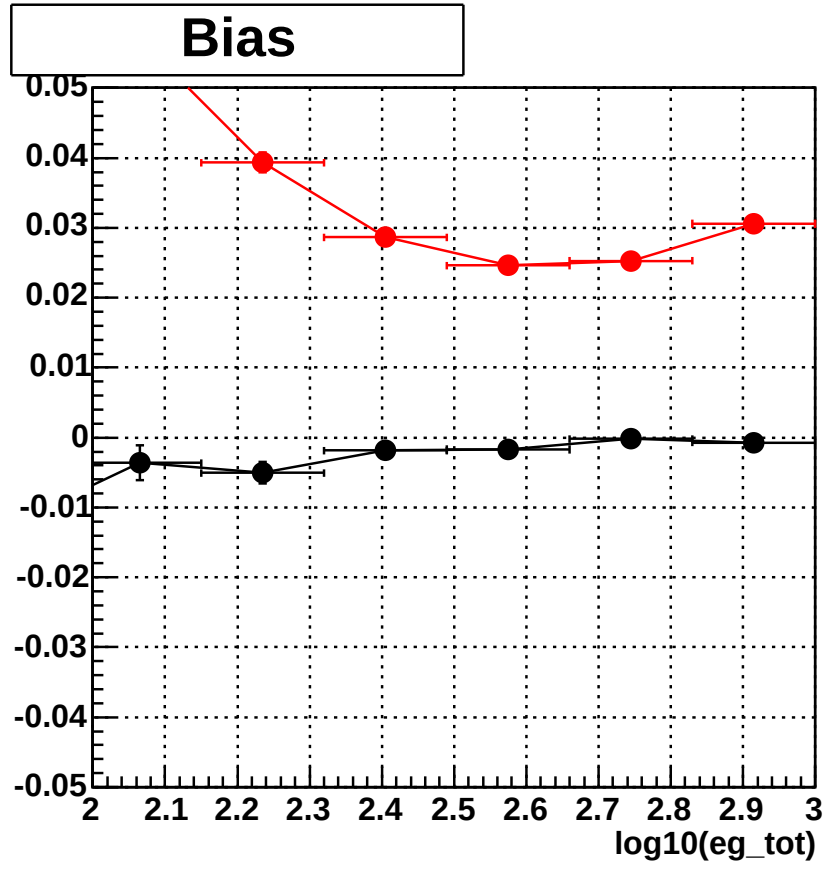


# Tagged gamma energy resolution

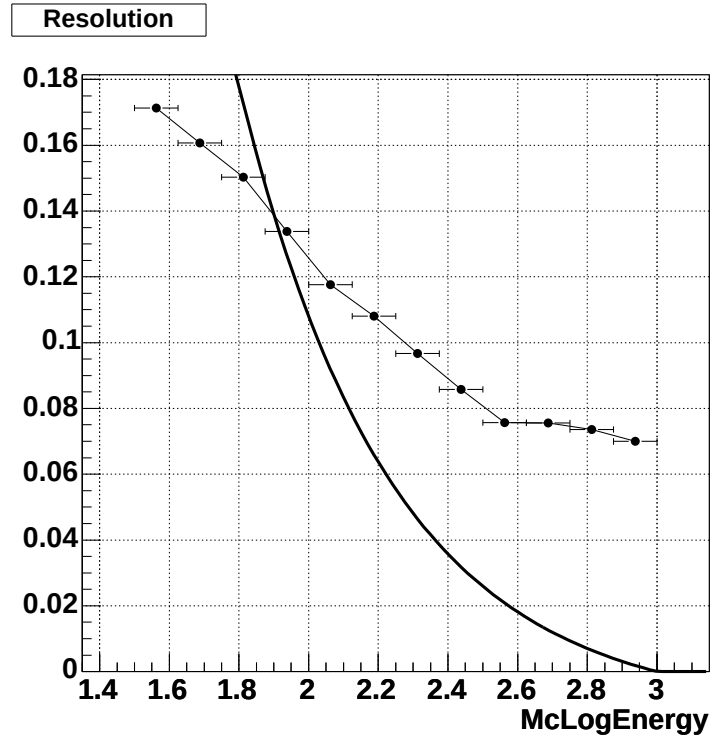
- zoom above 100 MeV



# New energy limitation at PS

- on-axis CU energy resolution (points) and tagged gamma energy resolution (function)
- with a 1 GeV electron beam : it is possible to check the CU energy resolution down to 150 MeV



# Preliminary today's news

- I have added the Si chamber containers (0.012 mm Al) : no change
- I have just discovered that the simulation was made in vacuum... :
  within air, the resolution for unradiating electrons is 1.5% instead of 1.2%
- next ? :
  try to improve the fit taking into account multiple scattering
- question :
  is it realistic ? (accuracy of the position of the Si chambers in the experimental hall, etc...)