Fwd ECAL Simulation

SuperB Generla Meeting

Perugia
18/06/2009

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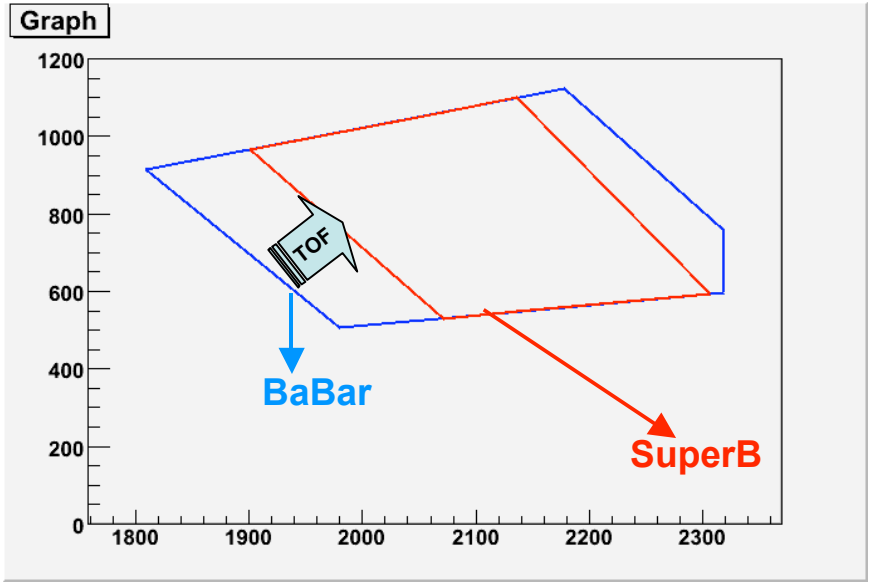
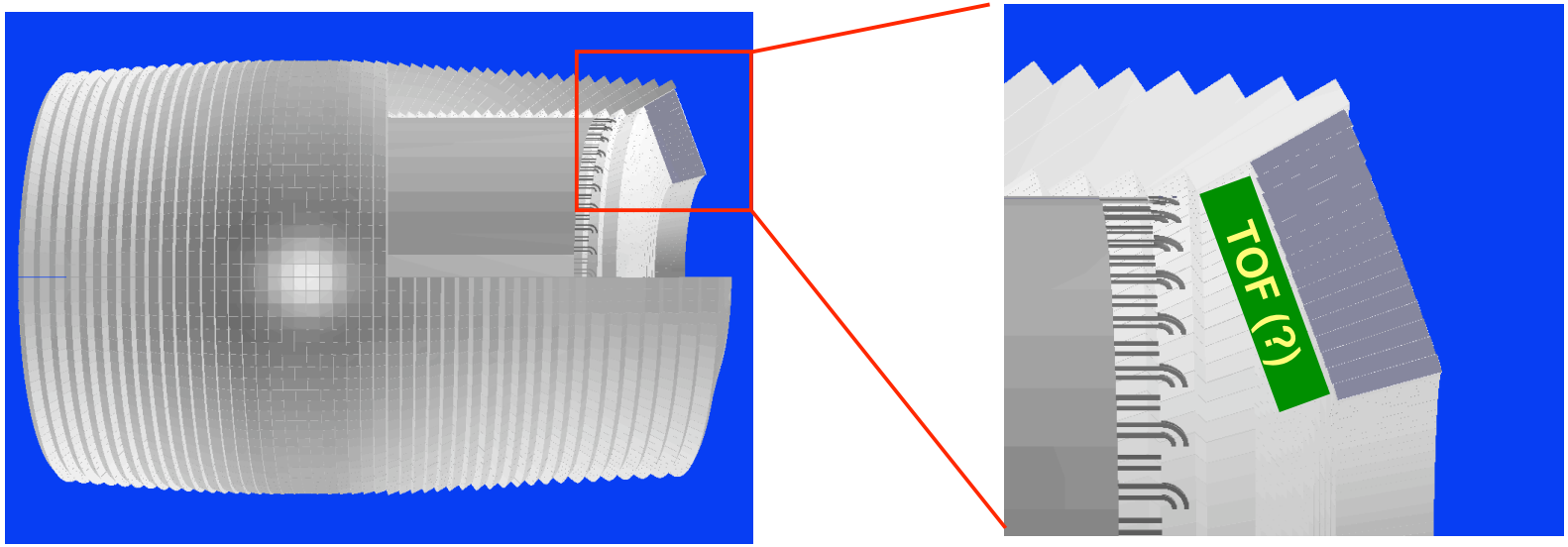
Fwd ECAL Geometry Envelop

- Fill the same BaBar angular region but
  - leave space for TOF: ΔZ = (100 mm)*cos(22.7)
  - Xtals material : LSO (LYSO)
    - Xtal depth = 200 mm (~17.5 X_0)

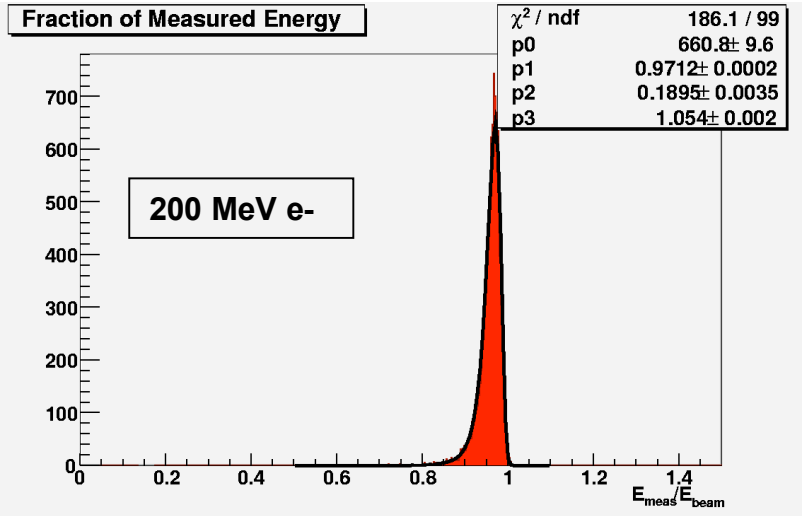




Energy Reconstruction

Algorithm:

1. Get Xtal deposited energy
2. Perform Poisson smearing with 8k pe/MeV
3. Assign 1% calibration error to crystals
   - Reconstruct with 8k±1% pe/MeV
4. Apply minimum energy cut for each xtal
   - 1 MeV to be tuned
5. Sum Xtal energy



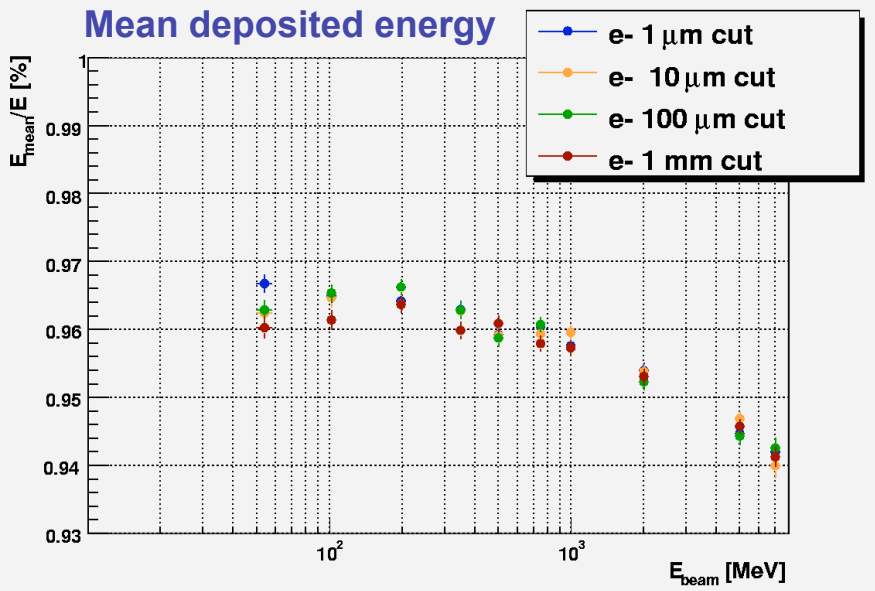
Comments:

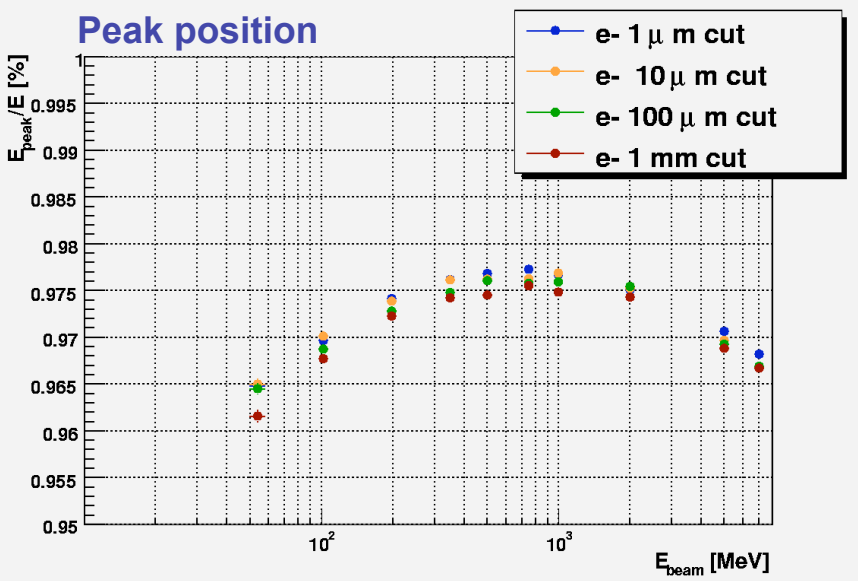
- All distributions have asymmetric low energy tails
  - Backsplash for low E particles
  - Forward leakege for high E particles
- Energy distributions fit with asymmetric Gauss function: $\sigma = \sigma(E)$

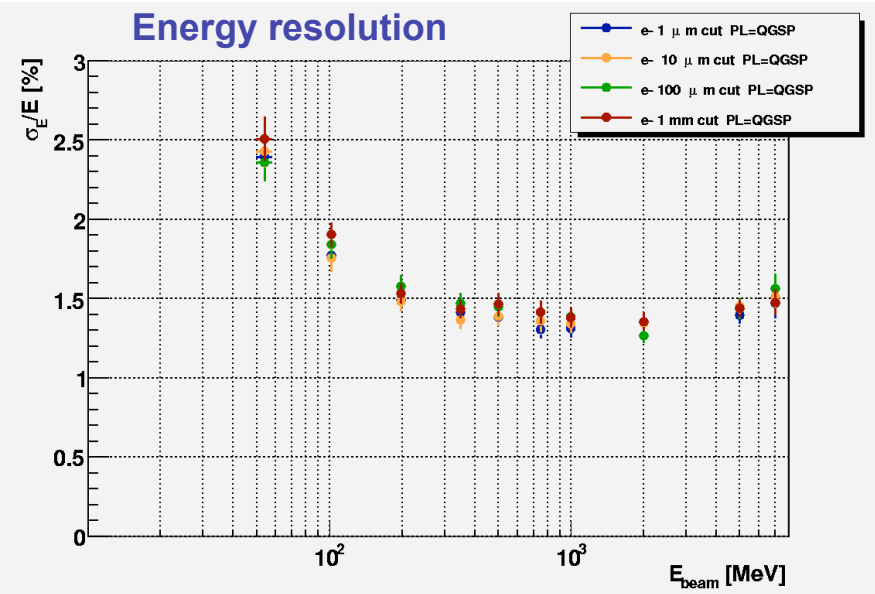
$$F(x) = P_0 e^{-\frac{(x-P_1)^2}{2[P_2(P_3-x)]^2}}$$

- P1 : most probable value (mpv)
- P2(P3-x) : running σ

Production thershold tuning







- It seems the best thresold cut
Is of the order of 100 μm

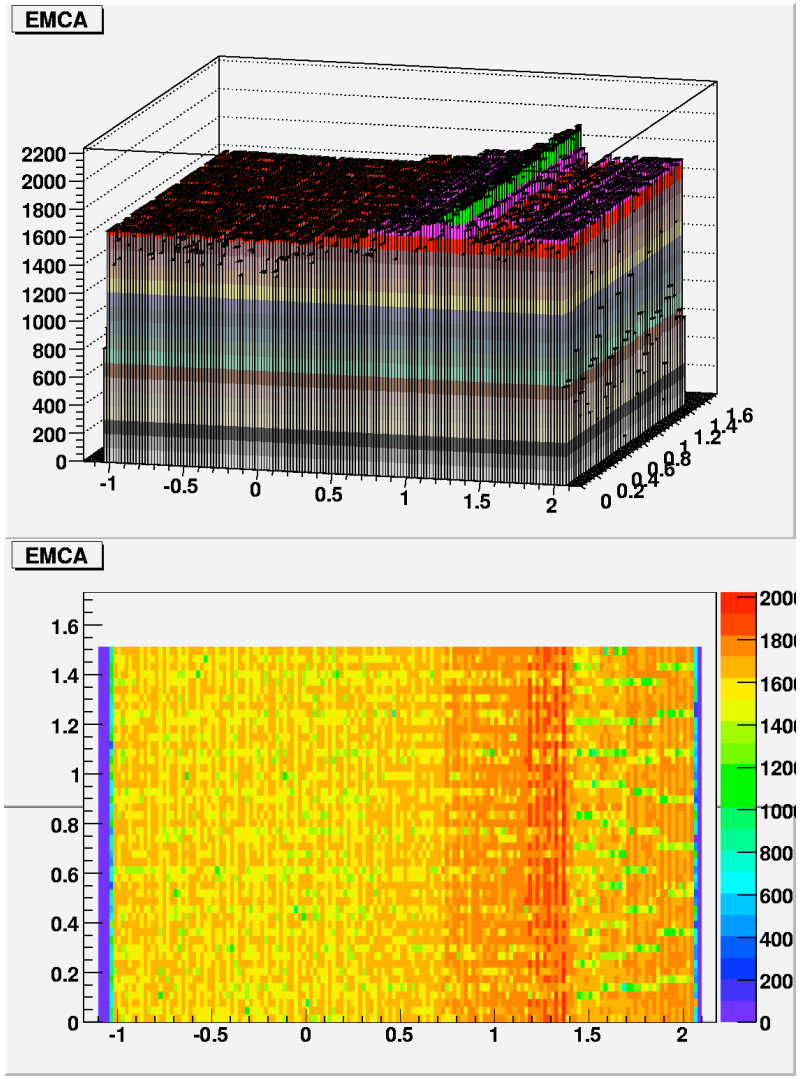
- 1 mm cut does not seem to affect the resolution

Change in volume name

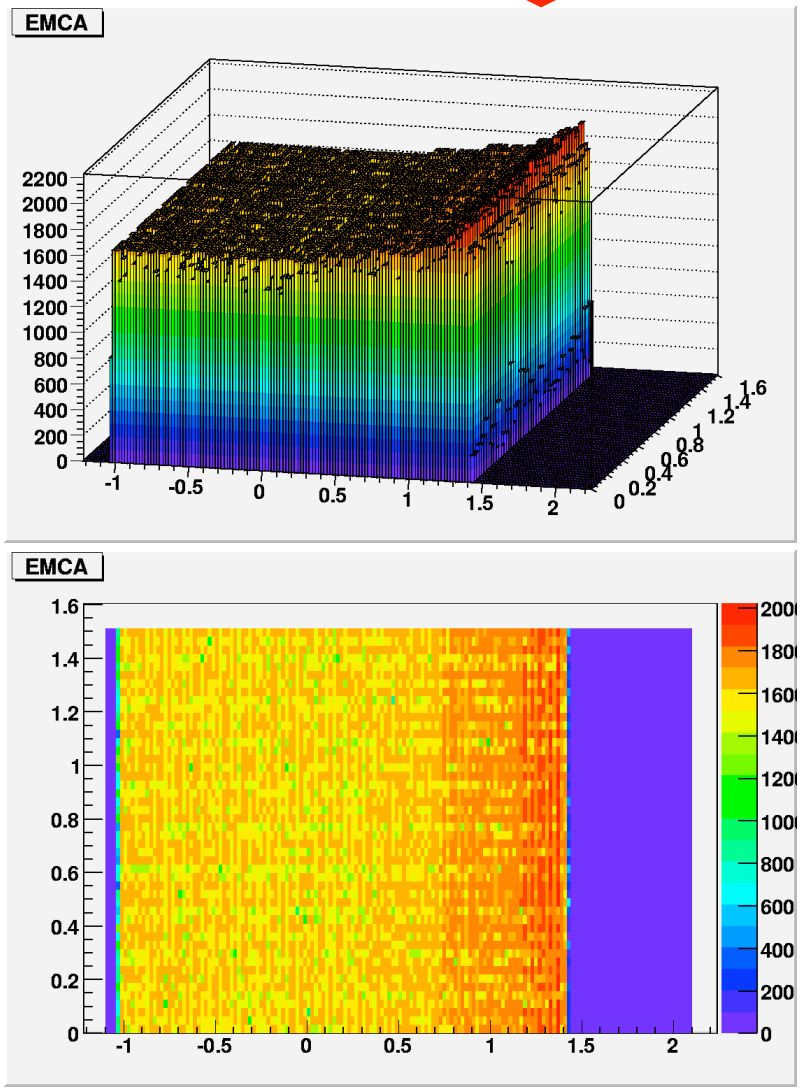
- Crystals position Index is identified by volume name
- Crystal names contained only theata index both for barrel and endcap
- The same volume was positioned in different phi positions to reach 2π coverage
  - CopyNumber or ReplicaNumber seems not to work with GDML defined geometries
  - Phi index was unknown at
- Solution:
  - Define as many volumes as Phi positions and add phi index in the volume name

Detector surveys (with geantinos)

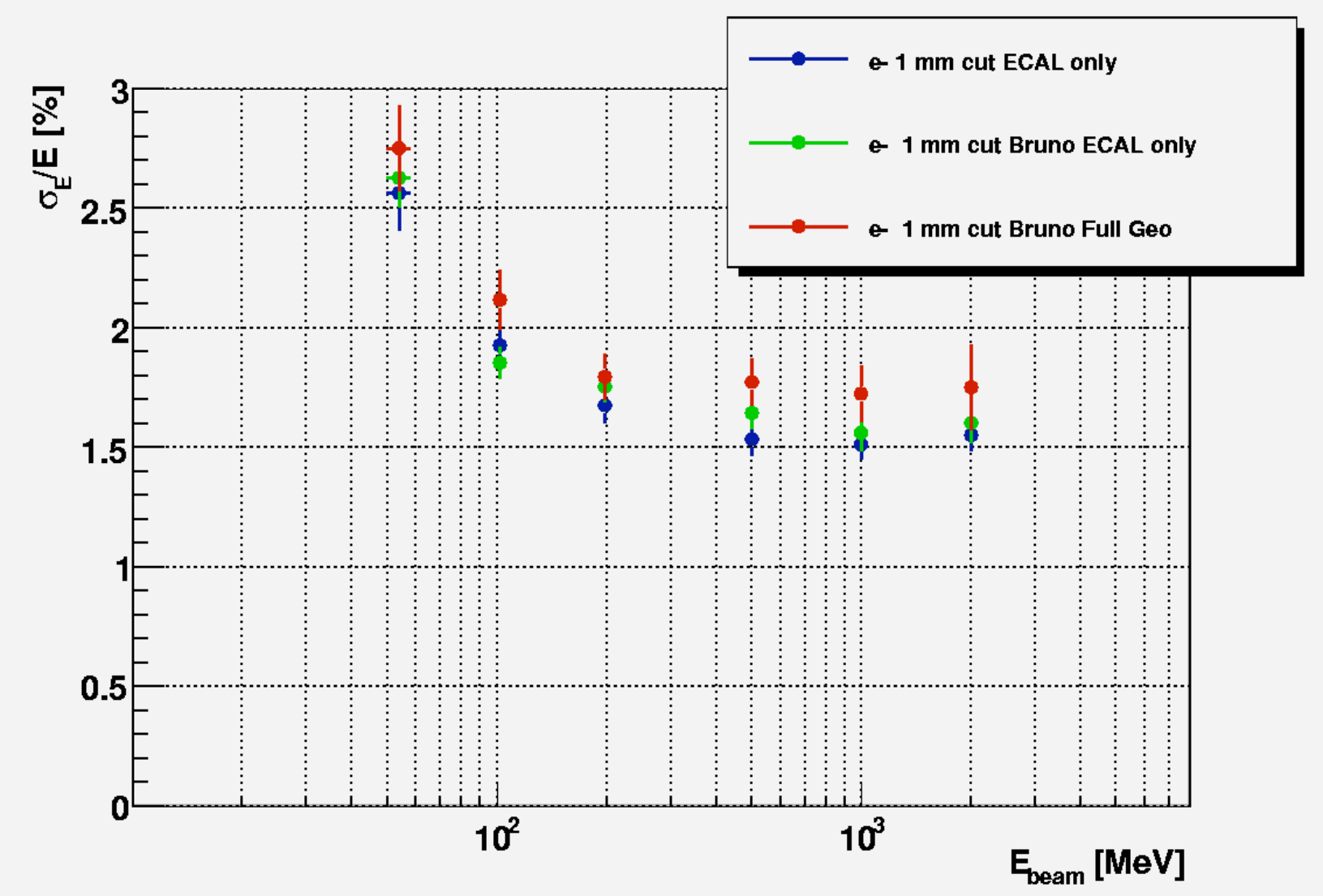
Barrel + Endcap



Barrel only

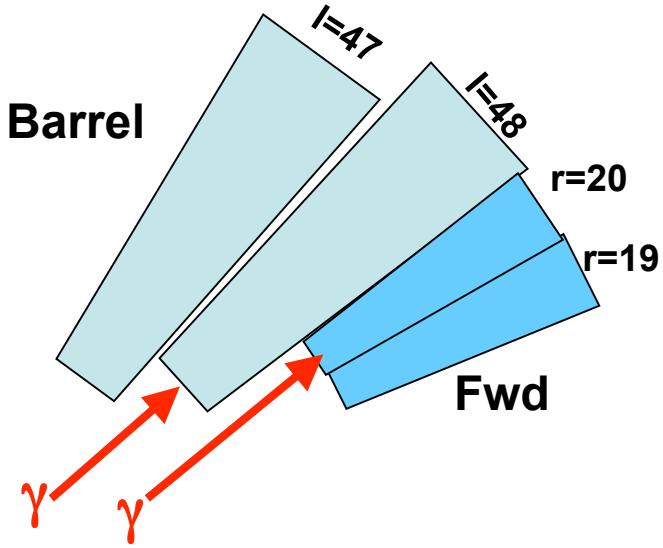


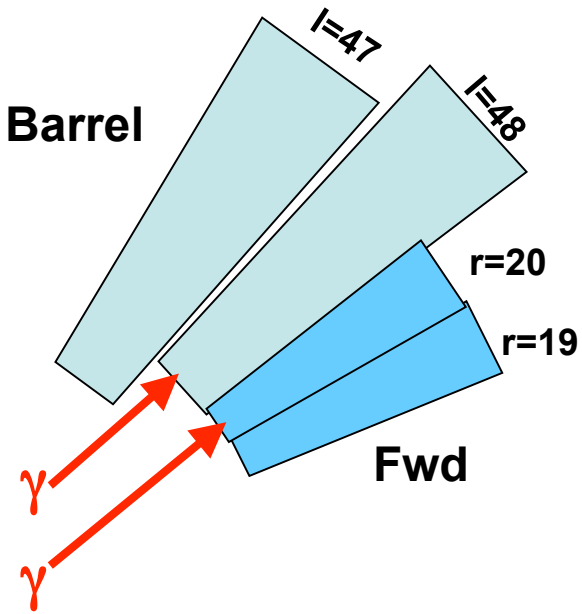
Bruno vs standalone G4



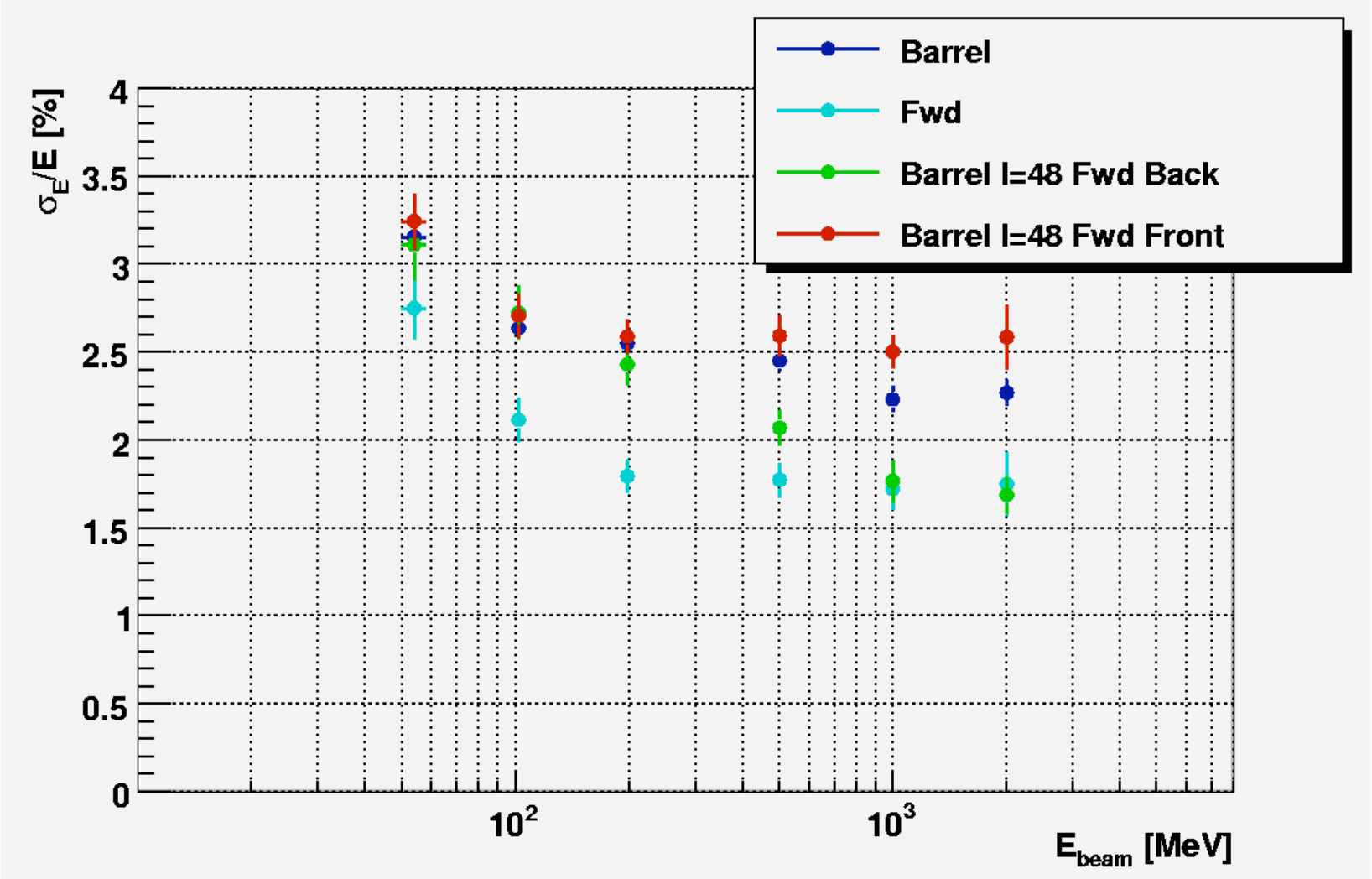
Investigate Barrel-Fwd Transition Region

- Quick scan in theta angle to investigate the effect of Barrel-Fwd transition region and Fwd postion with respect to the barrel
  - Backward alignemnt (room for Fwd PID)
  - Front alignement

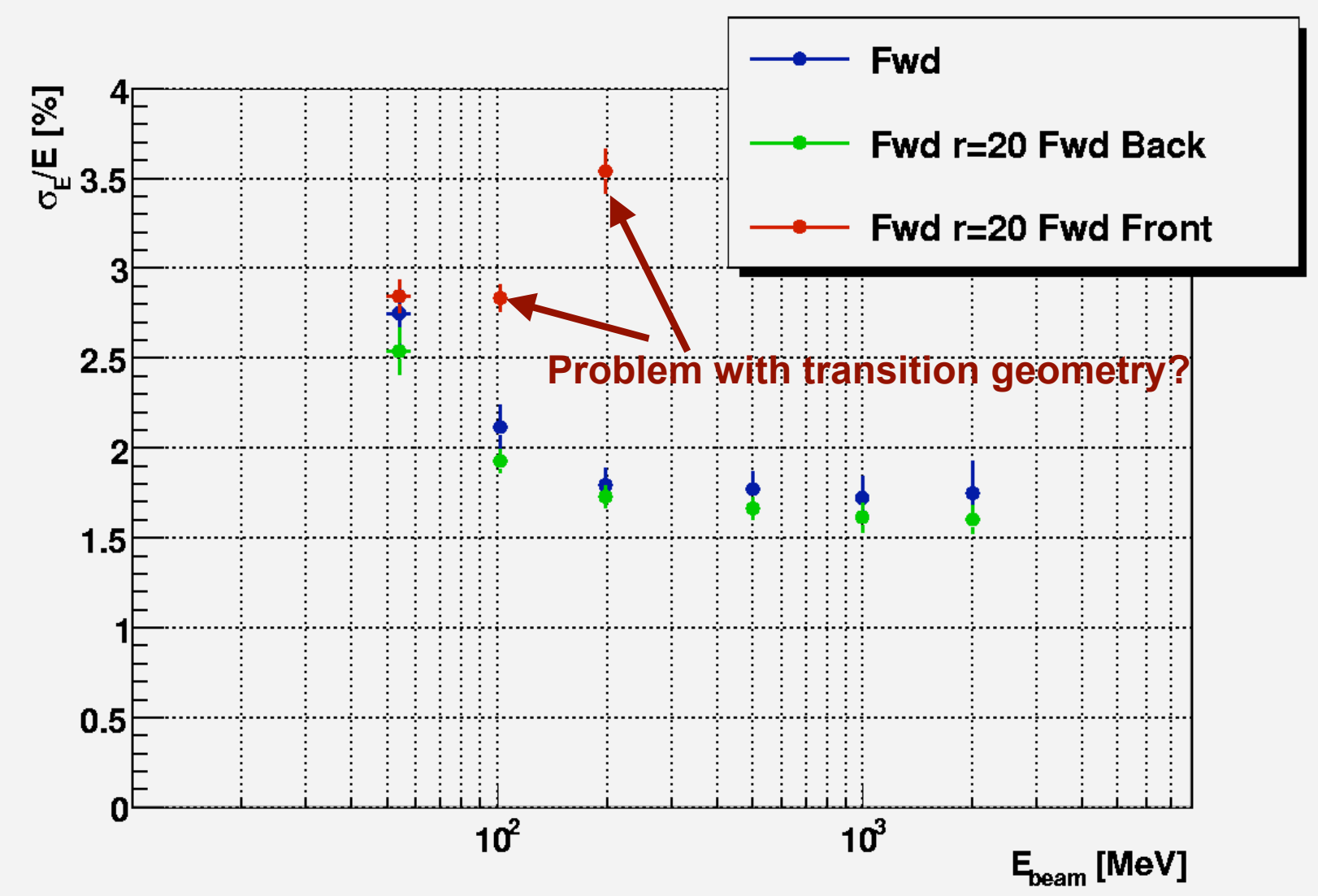




γ on last barrel crystal (I=48)



γ on first Fwd crystal (r=20)



Conclusions

- The threshold cut scan seems to prefer a bit lower cut (100μ)
- The average results seems to agree with the standalone G4 simulation
- Further checks needed before performing complex studies