BG in BeamCal SIMULATIONS – changing DISTANCE to IP

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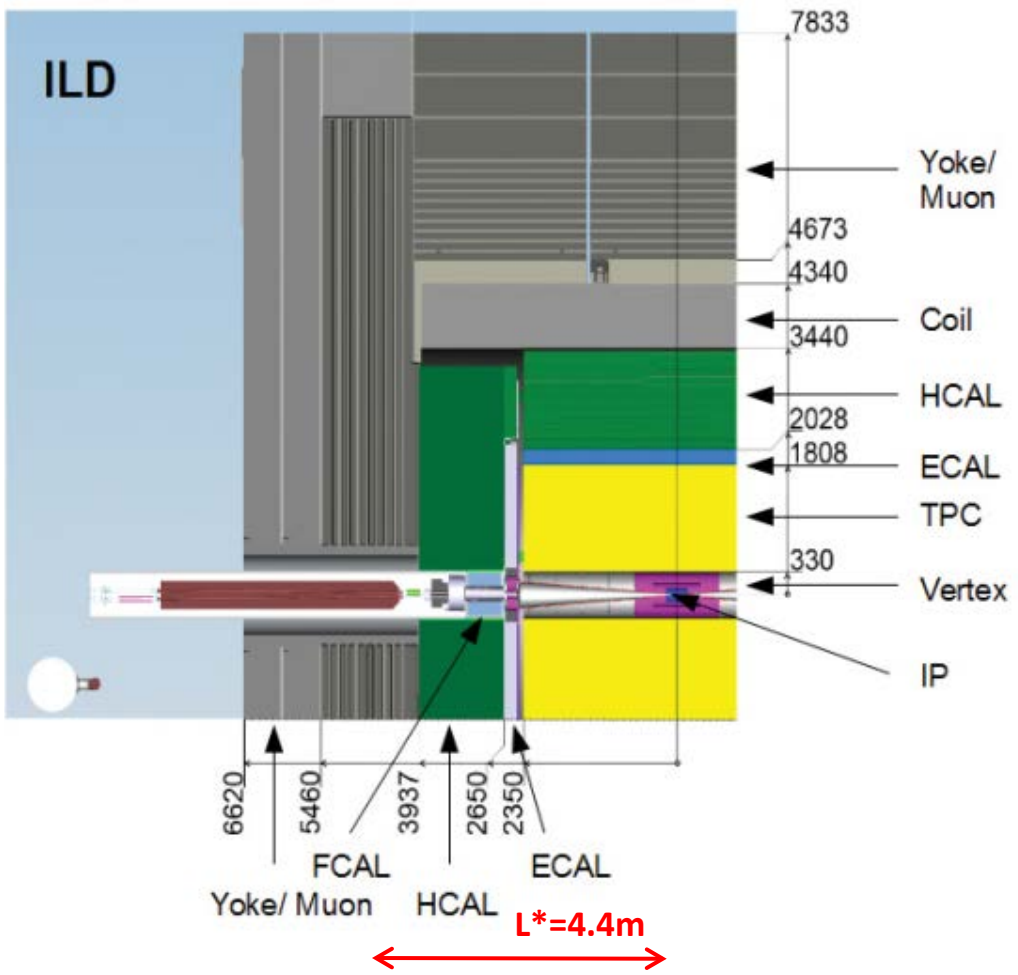
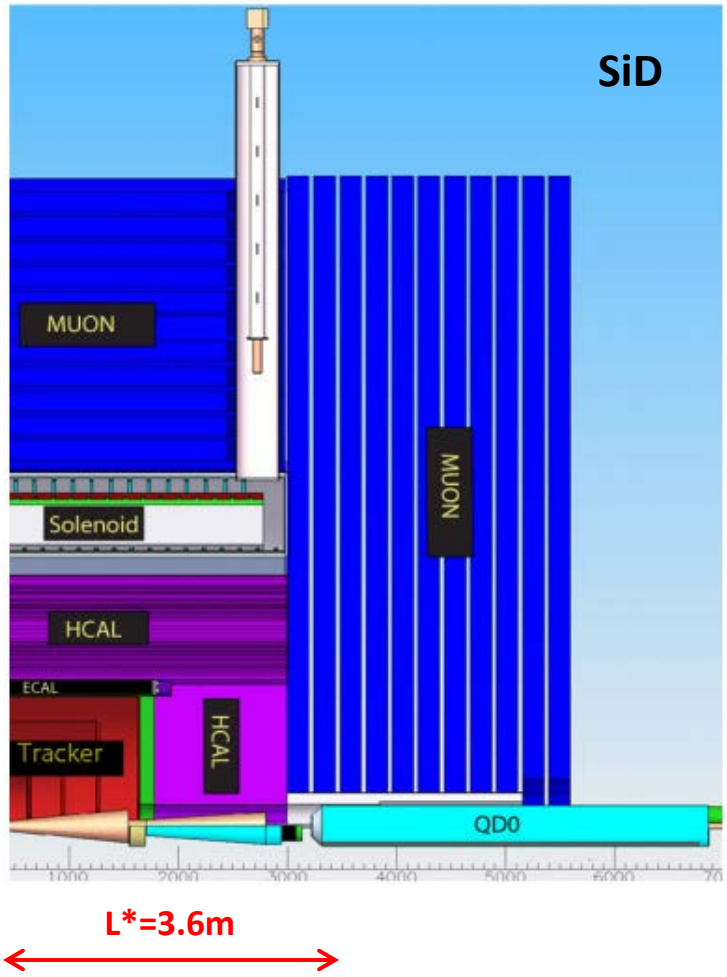
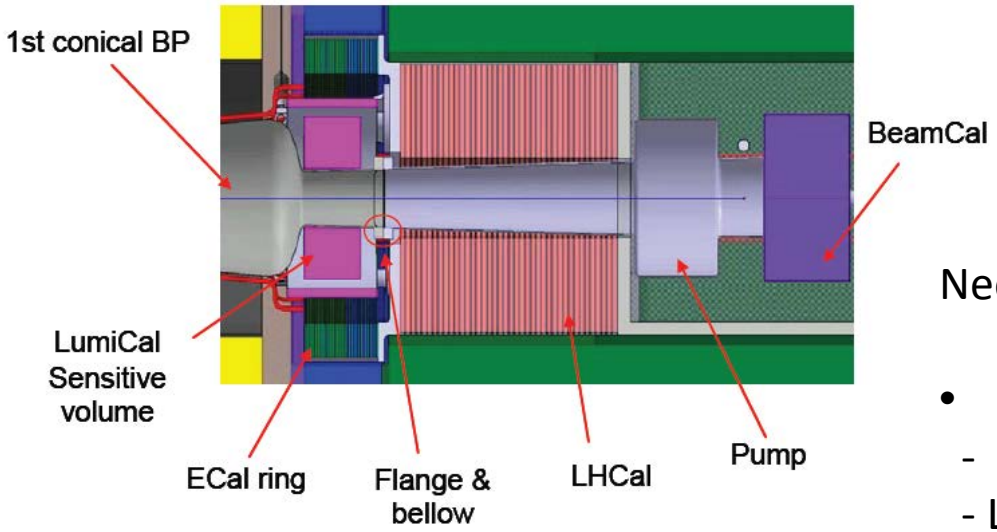
ILD and SiD dimensions





It was decided to make L*, distance between the final quadrupole field edge and the IP, 4m for both detectors.

Forward region at ILD. Possible changes towards L*=4m



Need to find ~40cm in current design

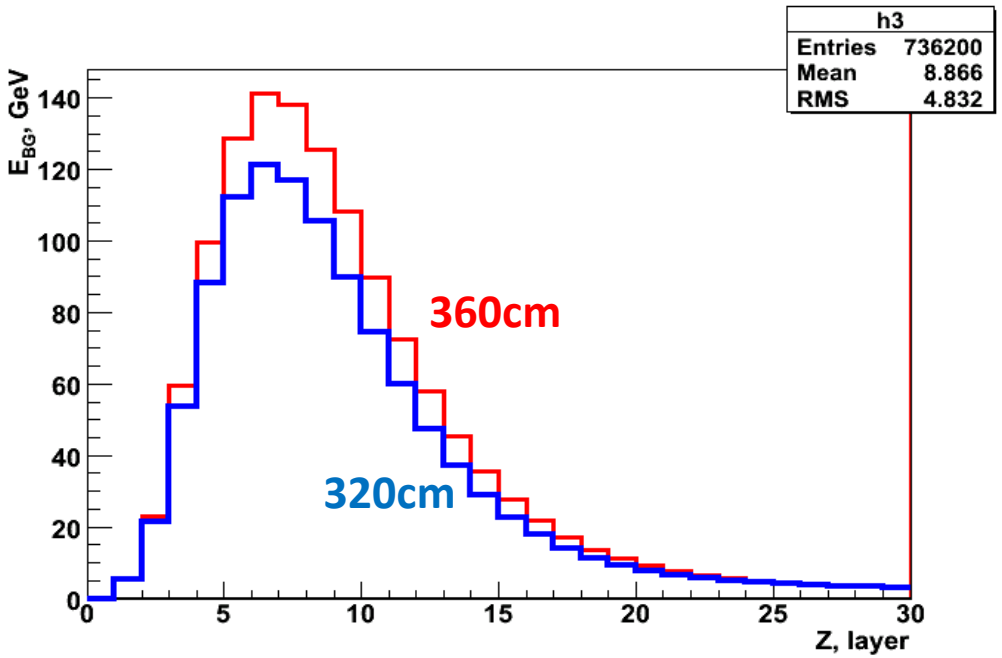
- Biggest devices:
  - Pump in front of BeamCal (30cm)
  - LHCAL (~50cm)

- Look into optimizations of all structures

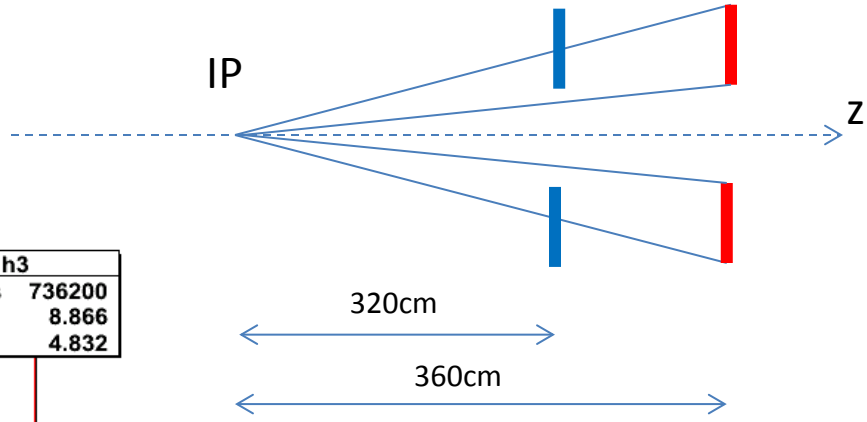
L*=440 cm: Distance (IP->BeamC al) = 360 cm

L*=400 cm: Distance (IP->BeamC al) = 320 cm

BG energy distribution in BeamCal along Z axis

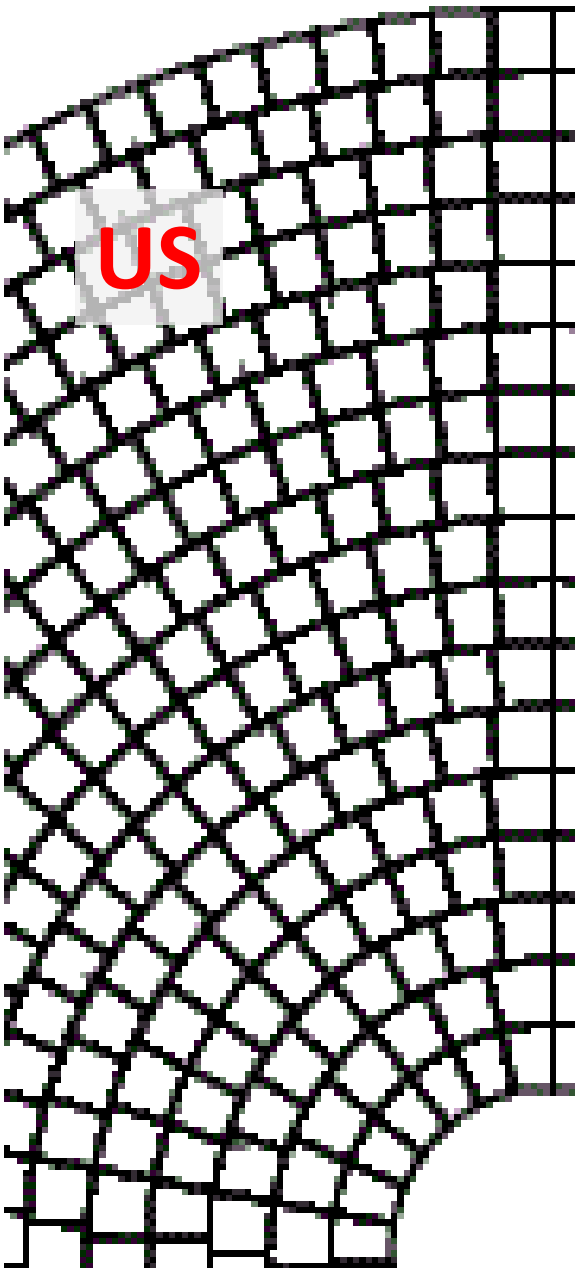


US 320 vs 360 cm



Moving BeamCal closer to IP we cover bigger polar angels, therefore smaller energies of beamstrahlung pairs

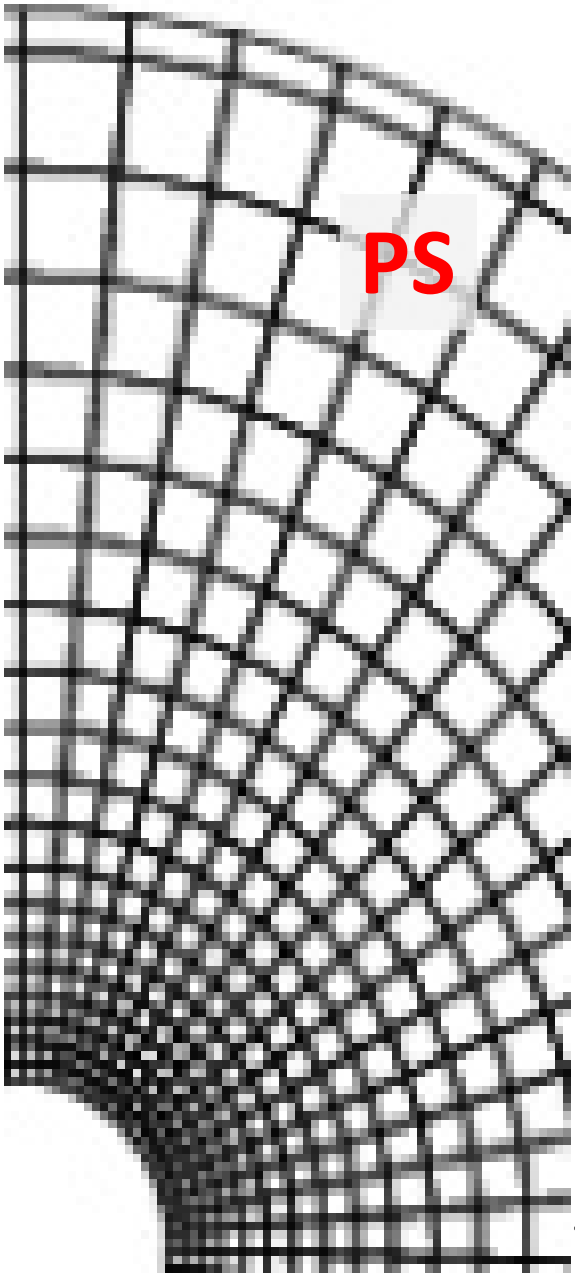
Rings of Uniform and Proportional Segmentations(US and PS)



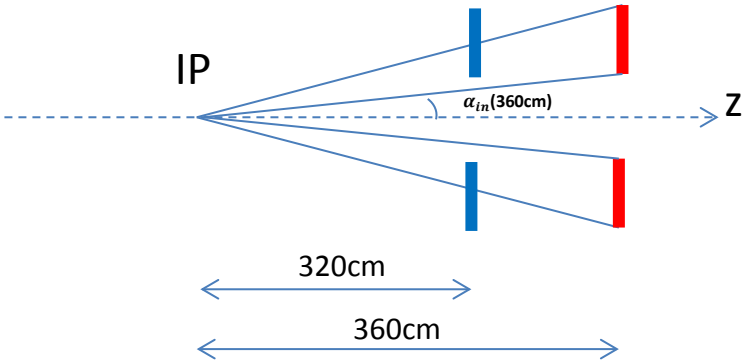
Thickness of 1st ring:

7.6mm

2.2mm



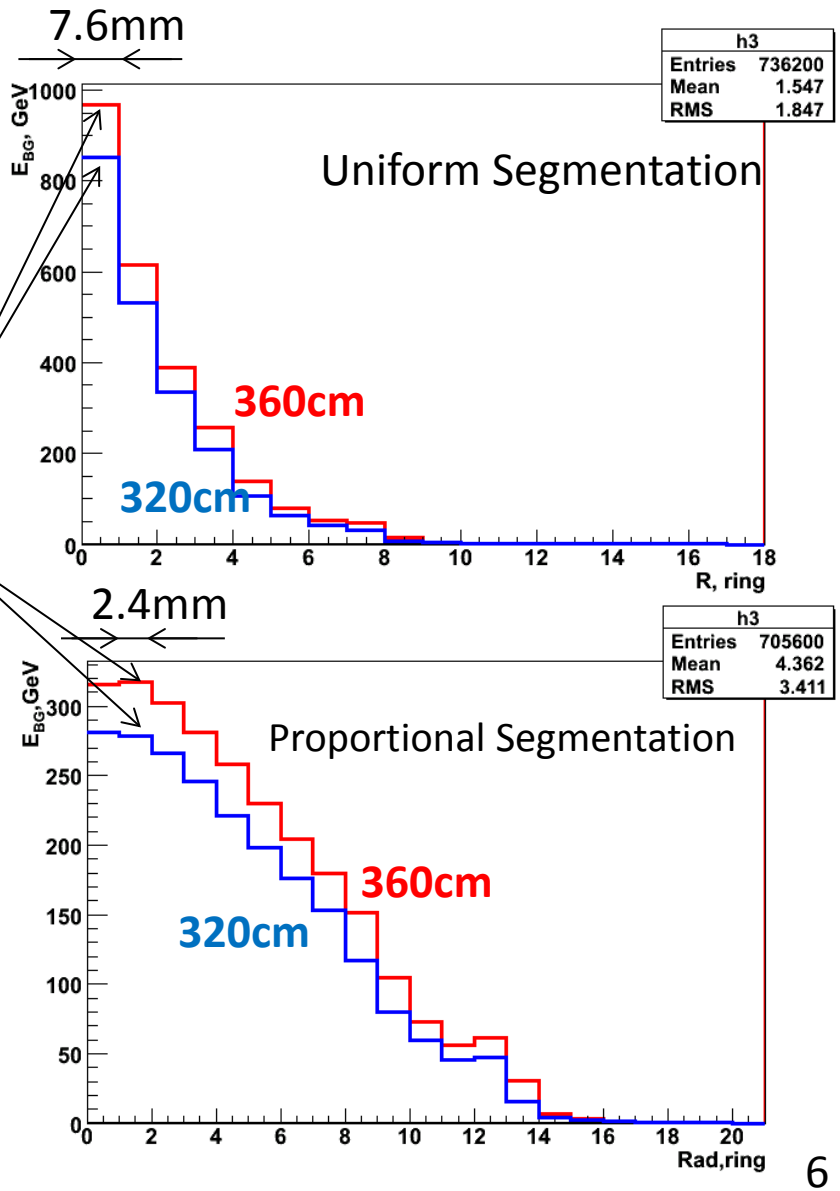
BG energy vs Radius of BeamCal on 320 and 360cm from IP Rad – in rings



$$\frac{\alpha_{in}(360\text{cm})}{\alpha_{in}(320\text{cm})} = \frac{6.2\ mrad}{5.5\ mrad} \sim 1.13$$

$\Rightarrow$ To cover same α_{in} as on 360cm, Rin should be 1.78cm instead 2cm

Ratio ~ 1.14



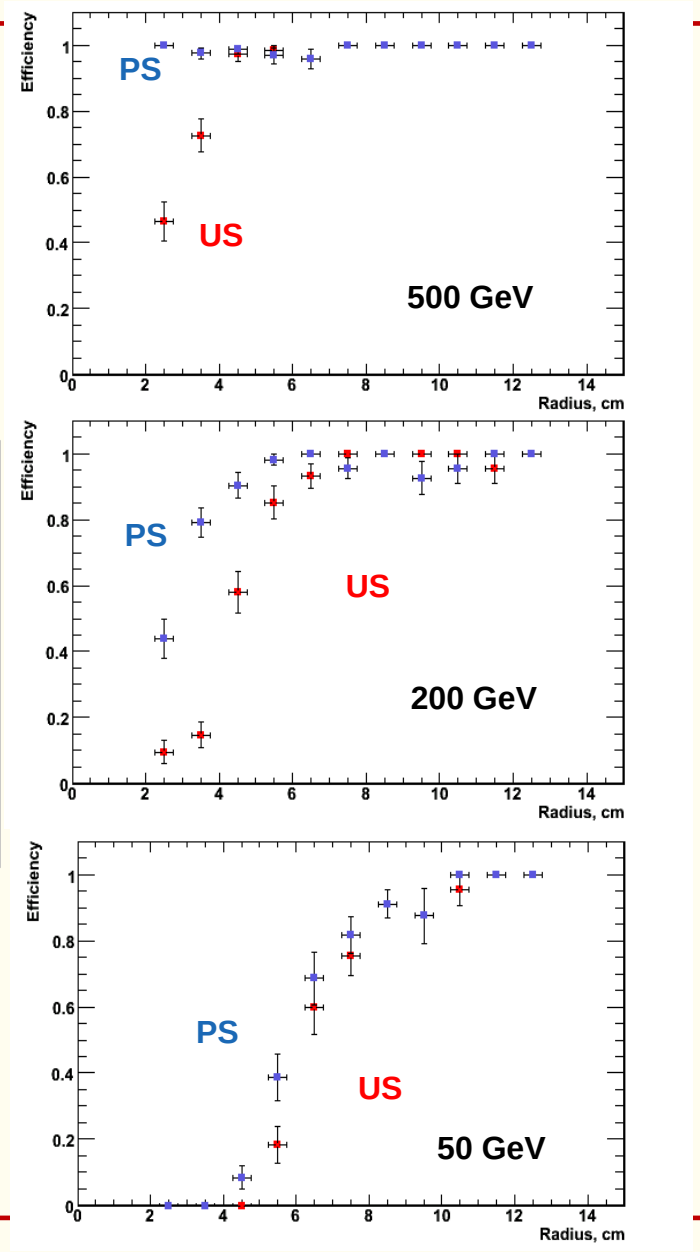
Efficiency of shower reconstruction as a function of radius

Shower is considered as correctly reconstructed if:

- distance

$$| (X,Y)_{true} - (X,Y)_{reco} | \leq R_{moliere}$$

- 500 GeV electrons detected with 100% efficiency by PS even at high background area, while US detects efficient, but concede at this area
- 200 GeV electrons can be efficiently detected at radii larger then ~4 cm, while PS performs better
- 50 GeV electrons can be efficiently detected only at R ≥ 7cm



Number of events 500

*** At distance IP-BeamCal 355cm**