

# Pair Background and the Forward Region



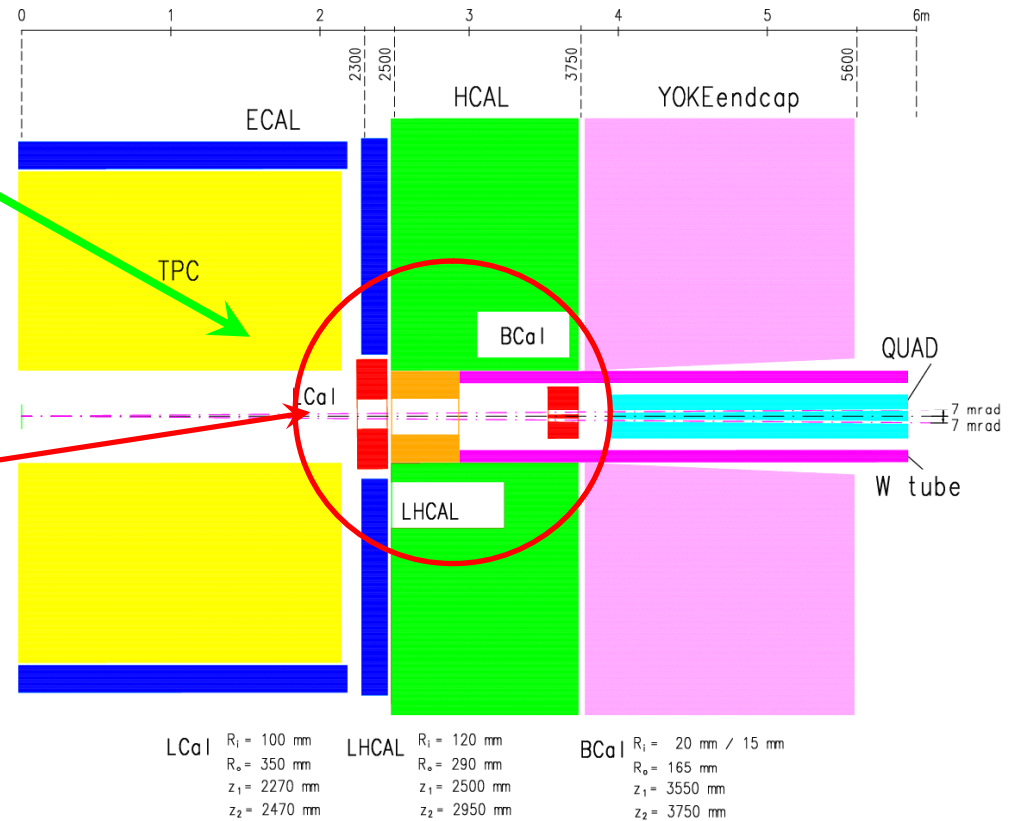
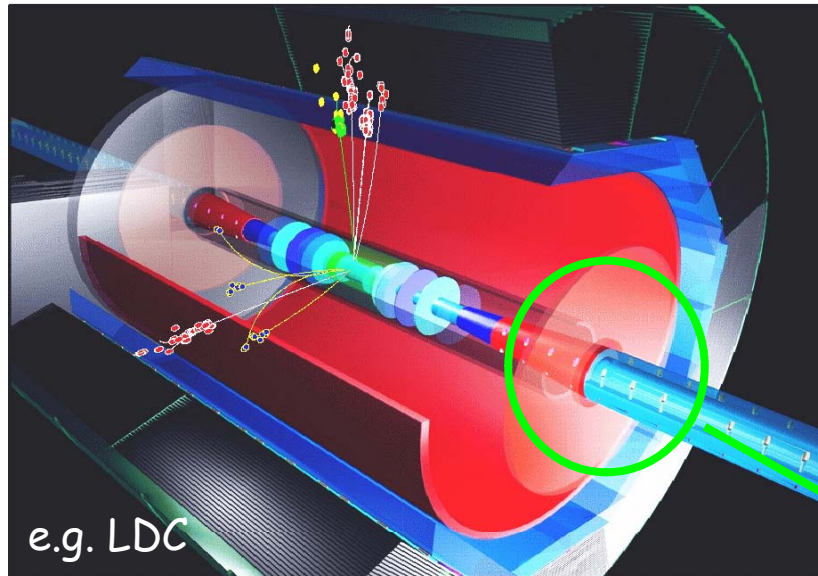
C.Grah



(presenting simulation results of Adrian Vogel)

FCAL Workshop, Paris, 6.10.2007

- Simulated Geometry of the Very Forward Region and Magnetic Field
- Backgrounds induced in dependence of LumiCal  $R_{\text{Inner}}$
- Summary



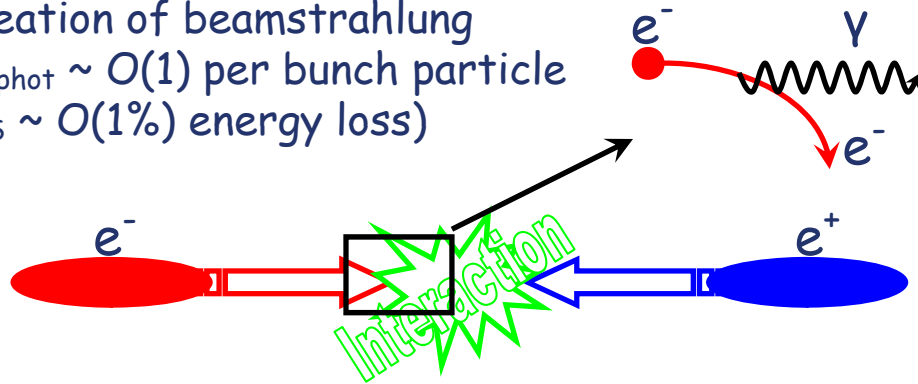
**BeamCal** should be hit by all electron-positron pairs stemming from beamstrahlung as long as they don't leave through the beampipe.



# Maybe we would like to have something like...



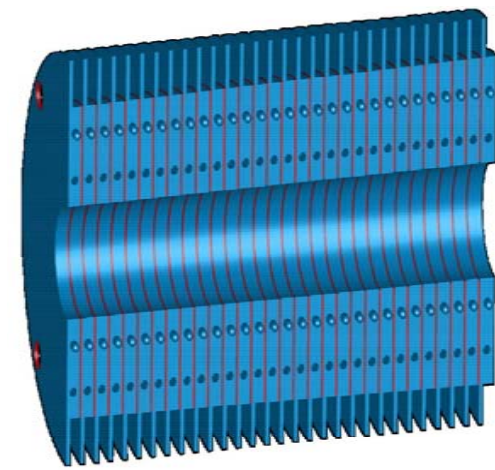
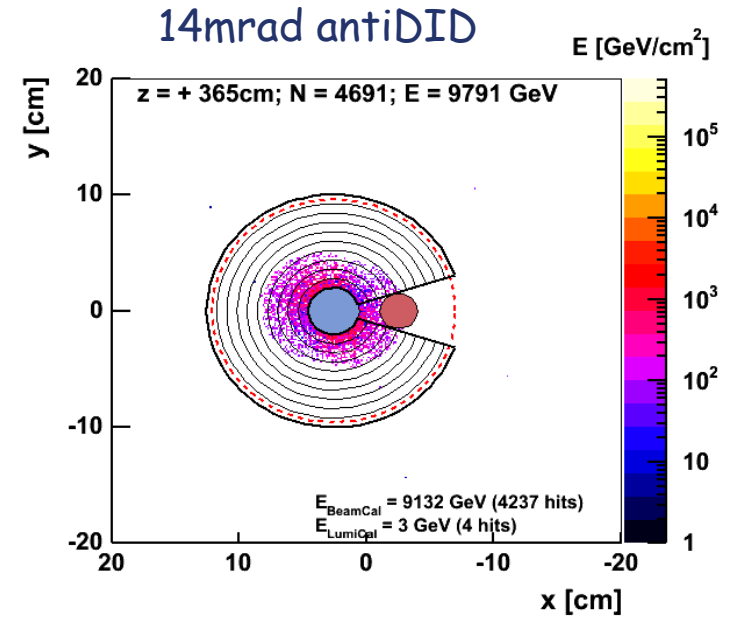
Creation of beamstrahlung  
( $N_{\text{phot}} \sim O(1)$  per bunch particle  
 $\delta_{\text{BS}} \sim O(1\%)$  energy loss)



**BeamCal:**  
5.5 mrad (2cm) <  $\theta$  < 27.4 mrad (10cm)

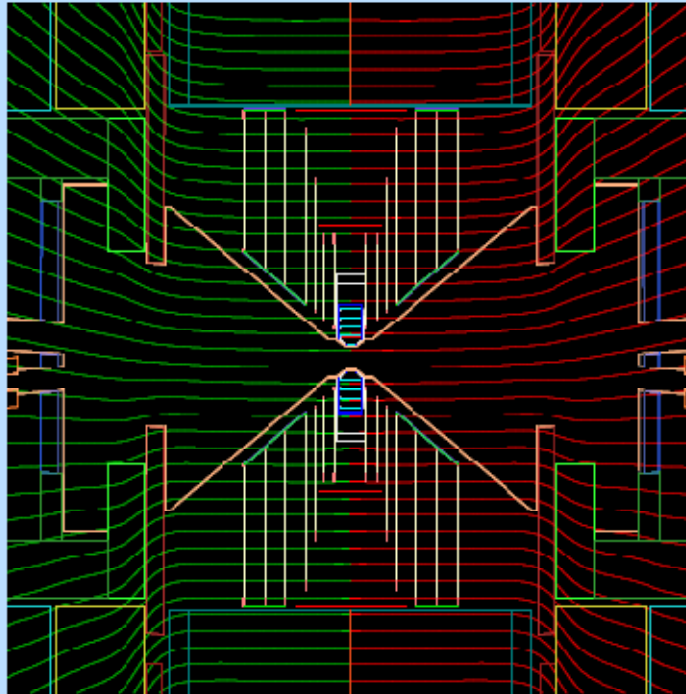
**LumiCal:**  
26.4 mrad (6cm) <  $\theta$  < 91.6mrad (20.8cm)

(That's just the geometry! ~2cm less for bhabha statistics)

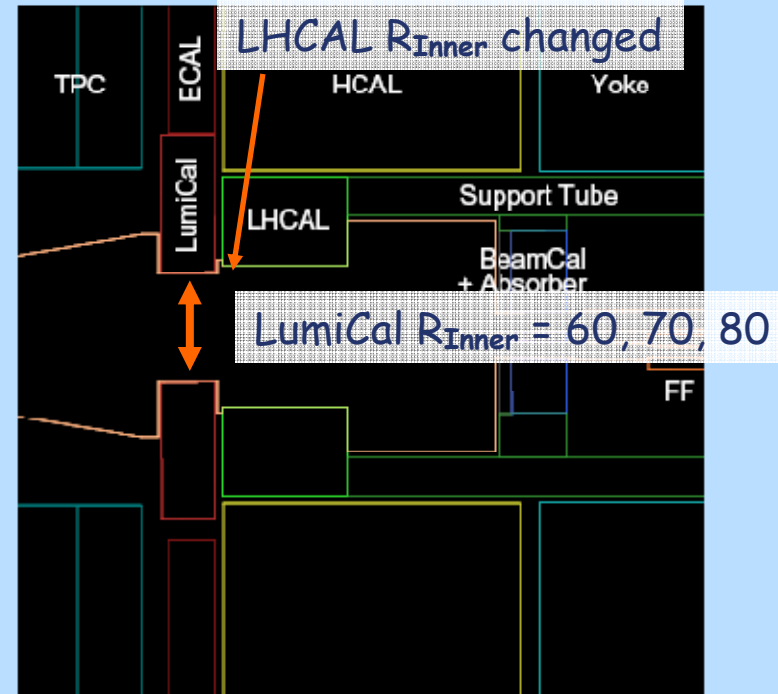


How far can we decrease the inner radius of LumiCal?

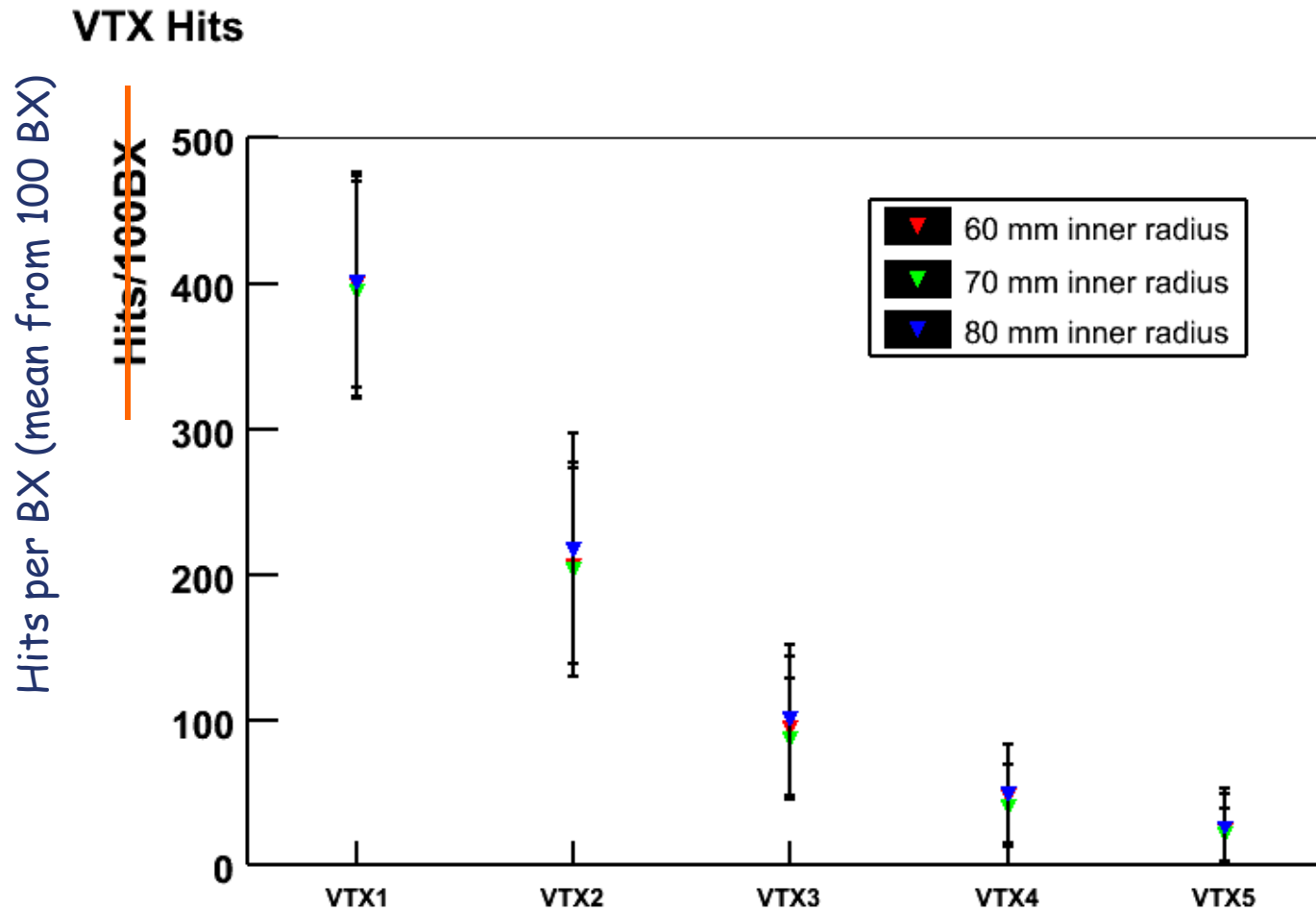
## LDC Detector Geometry



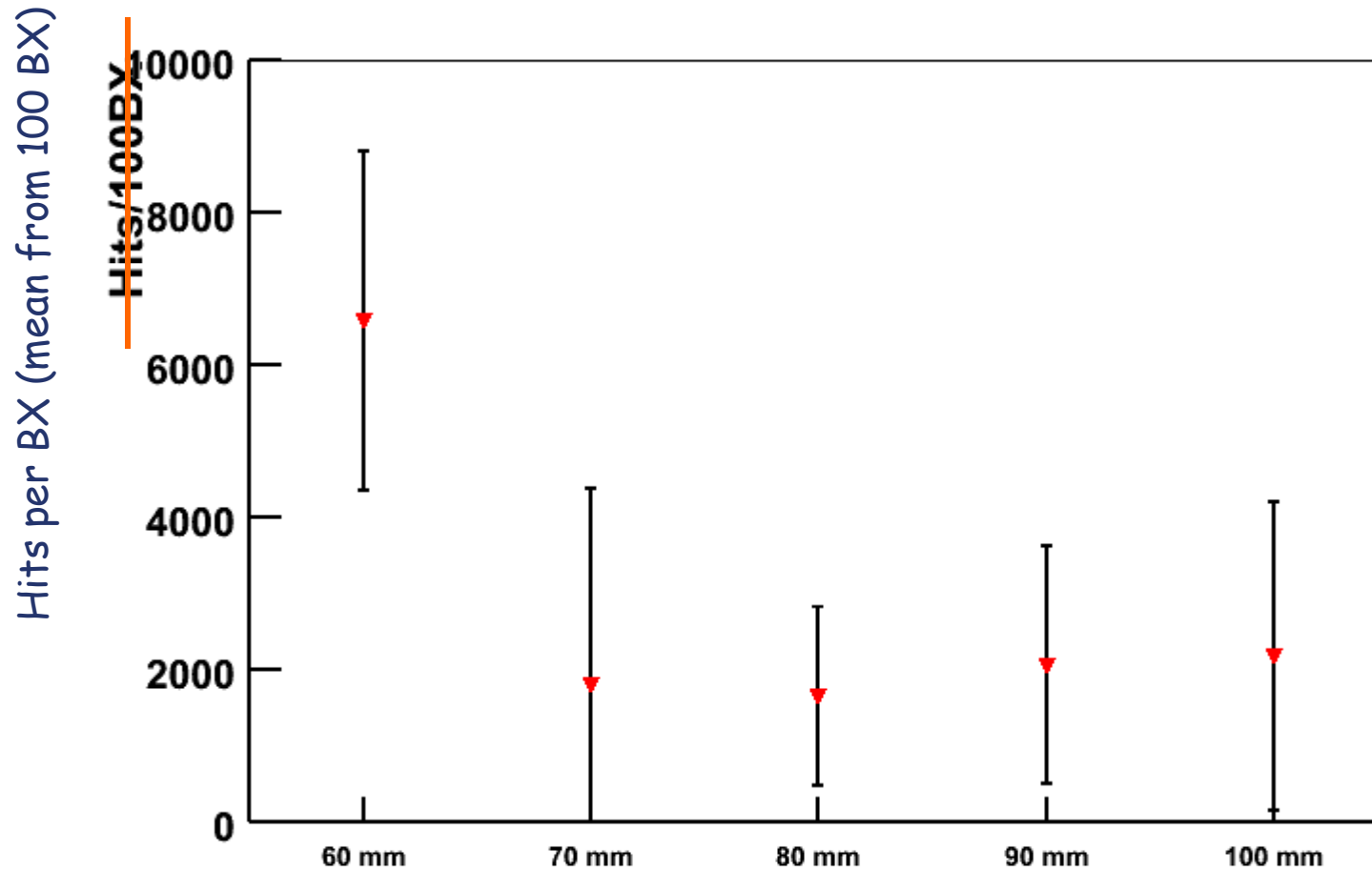
14 mrad crossing angle  
with anti-DID field (1:10)



Forward region design  
(compressed view 1:2)



## TPC Hits

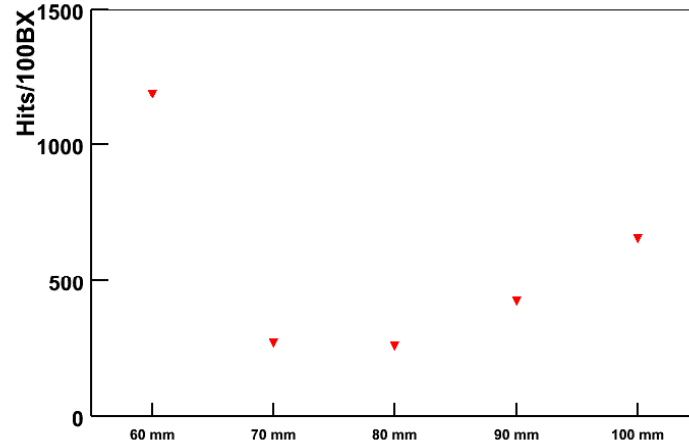




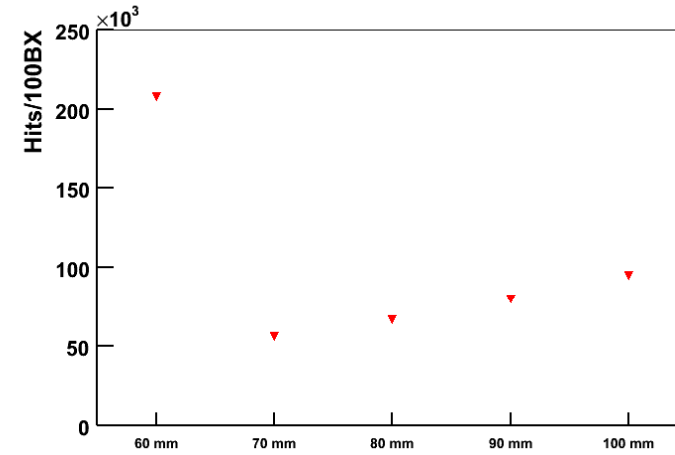
# Particles reaching the TPC



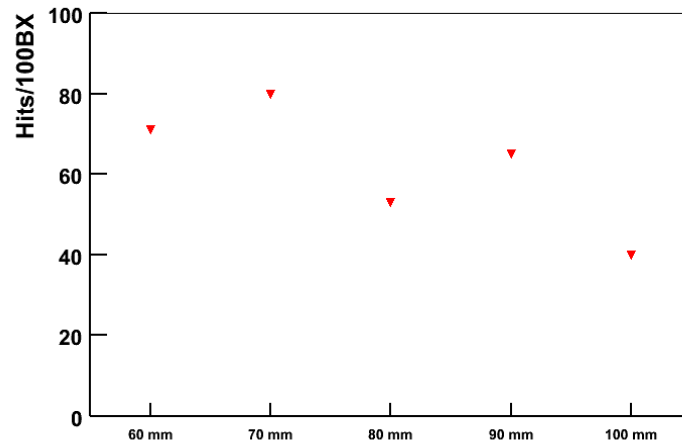
Electrons



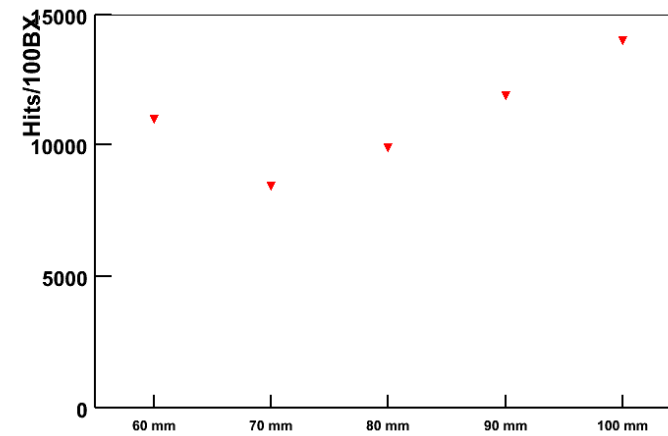
Gammas



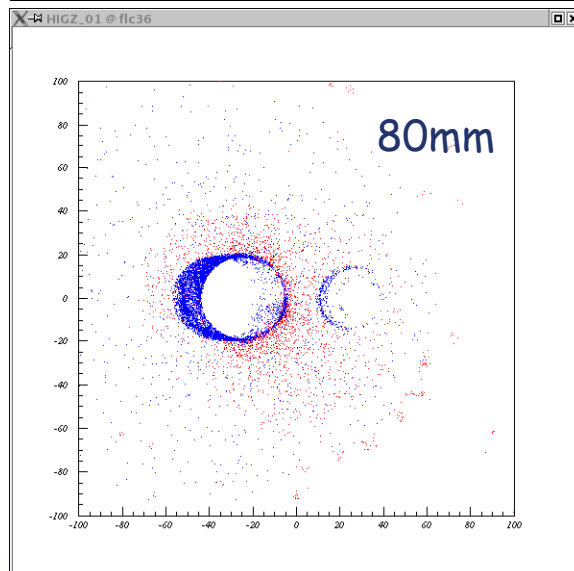
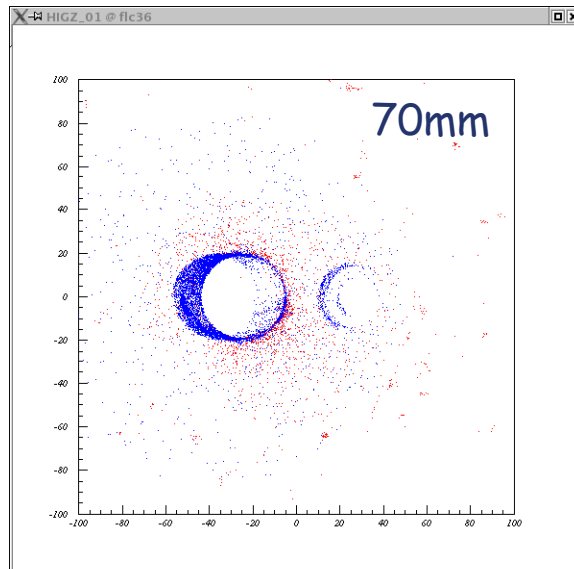
Positrons



Neutrons

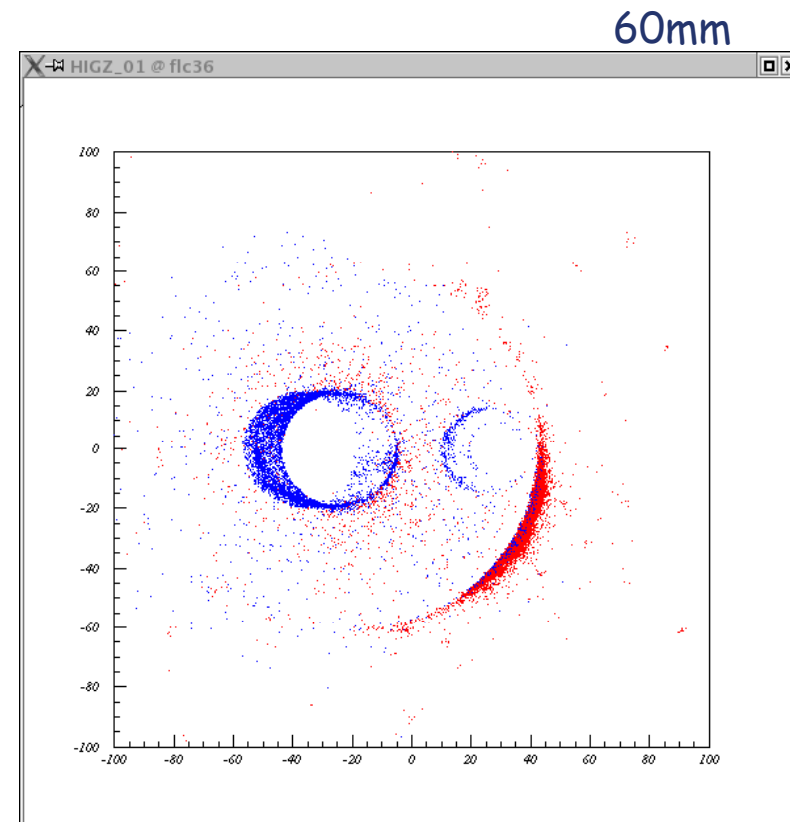


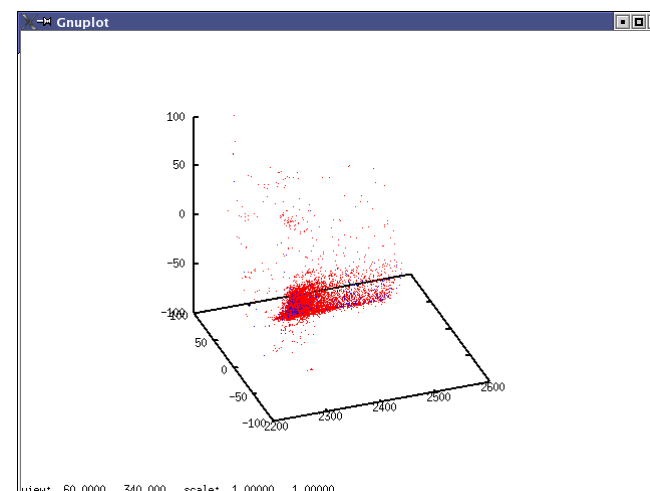
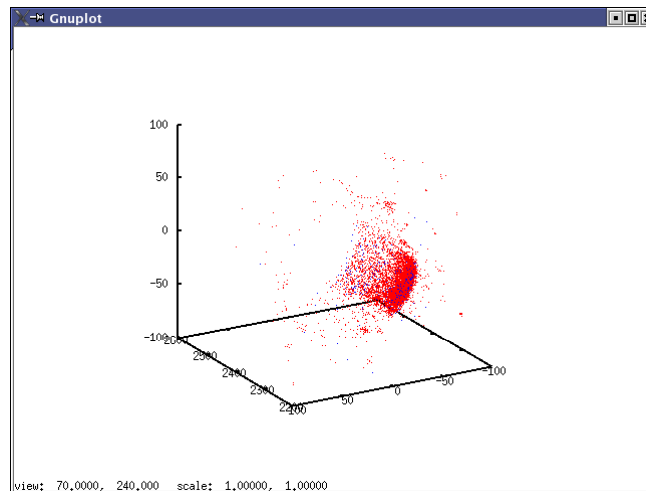
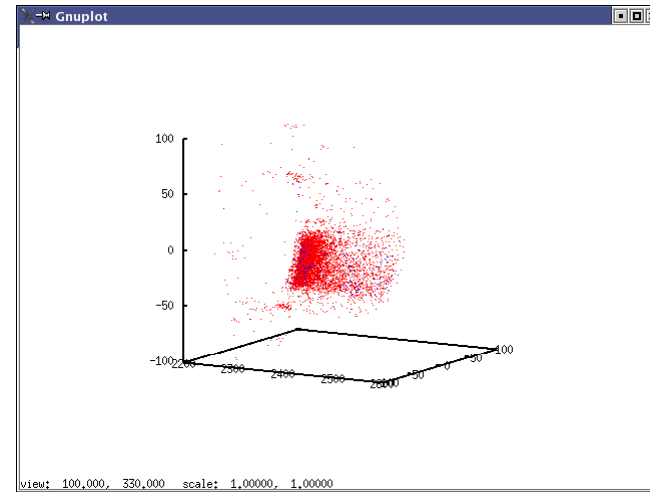
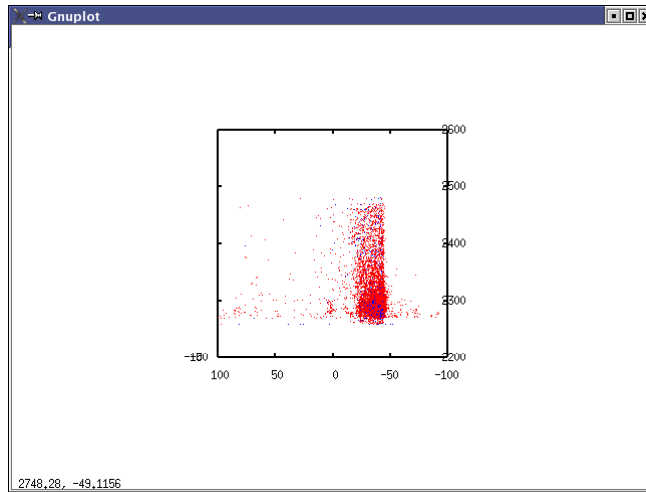


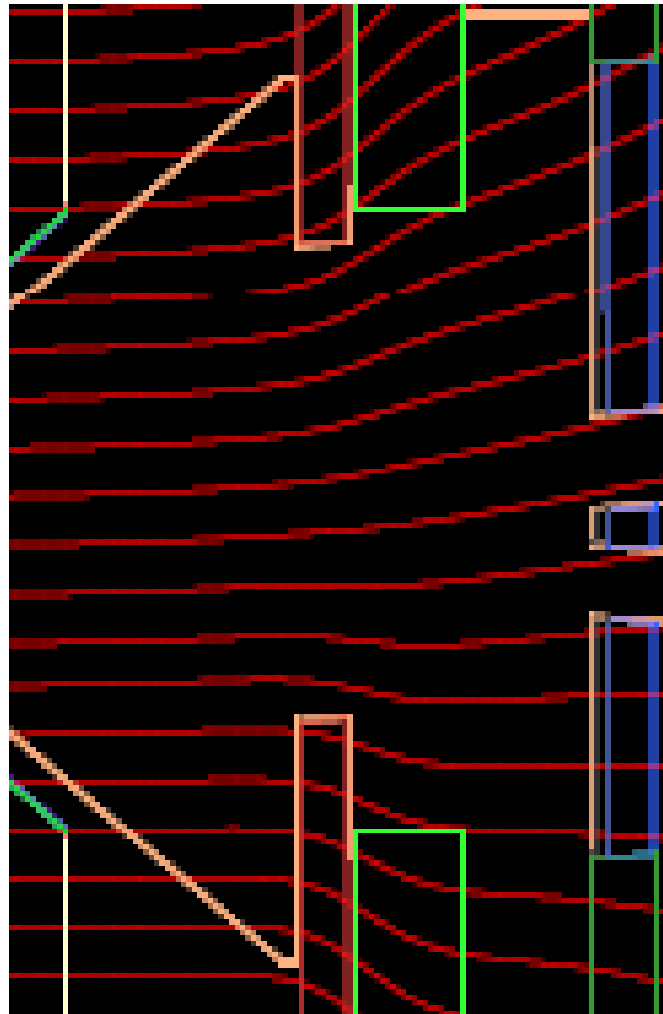


Overlaid particles from 10 BX

blue: charged particles  
red: photons







- 100mm inner LumiCal radius does not provide the necessary statistics.  
Questions: What is the necessary statistics?  $10^8$ ?  
In which time? For all energies or just at the  $Z^0$ ?
- 60mm (equal to roughly 80mm of sensitive area) increases the background significantly in the TPC (photons).
- 70mm looks much better and there is an optimum in the choice.
- Tuning the magnetic field might enable us to avoid the pairs hitting LumiCal.
- All this is an AntiDID Configuration, for DID it's much worse.