

First look at simulated background rootuples (DCH)

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for the LNF group

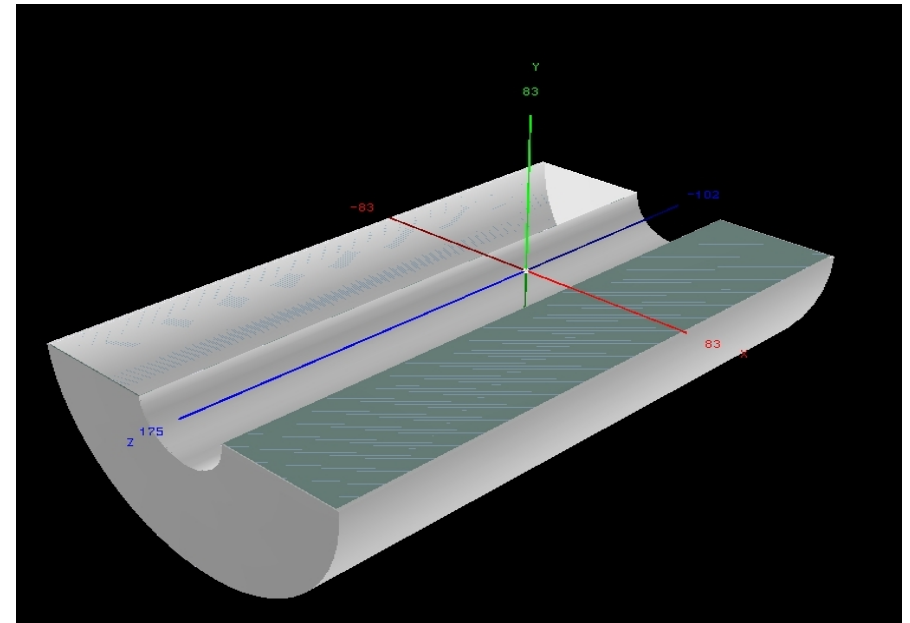
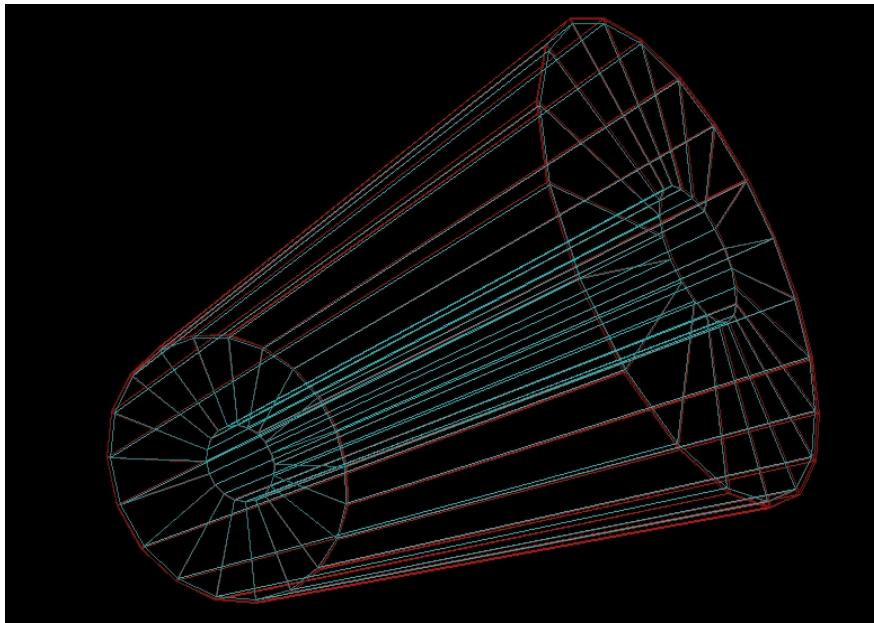
SuperB workshop
La Biodola, Elba
1 June 2008

Goal

- The goal of these slides is NOT to quantify the machine background in the SuperB drift chamber.
- Rootfiles with small samples of simulated background have been available this week for the first time and are preliminary.
- We've done a quick study to provide a first, fast feedback to the background simulation group.

DCH model

- Cylindrical barrel with flat endcaps.
- Inner/outer walls and endcaps made of Carbon fiber
- Same dimensions of BaBar DCH
- Filled with homogeneous gas+wires medium (BaBar-like)

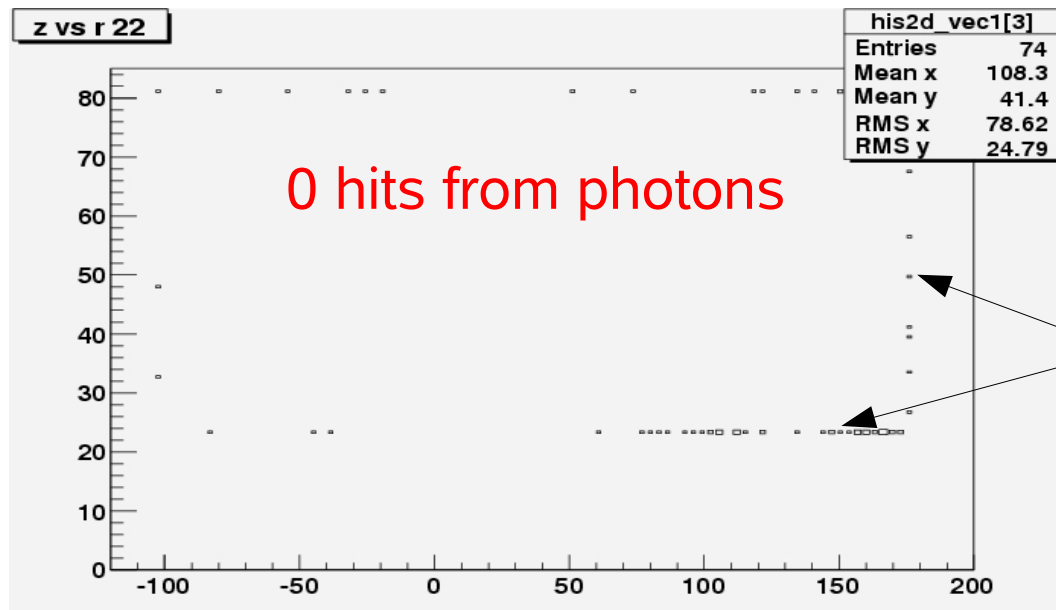


Simulated backgrounds

- 3 samples are available:
 - Radiative Bhabha's
 - Touschek background (low energy ring)
 - Pair production
- The 3 samples were simulated with the proposed shielding in place.

Radiative Bhabha's (I)

- $e^+e^- \rightarrow e^+e^-\gamma$
- 10 bunch crossings with $E_\gamma > 10\%$ E_{beam} . Crossing freq=209MHz. $\Rightarrow \Delta t \sim 50\text{ns}$.
- e^\pm : 3 hits. γ : 0 hits



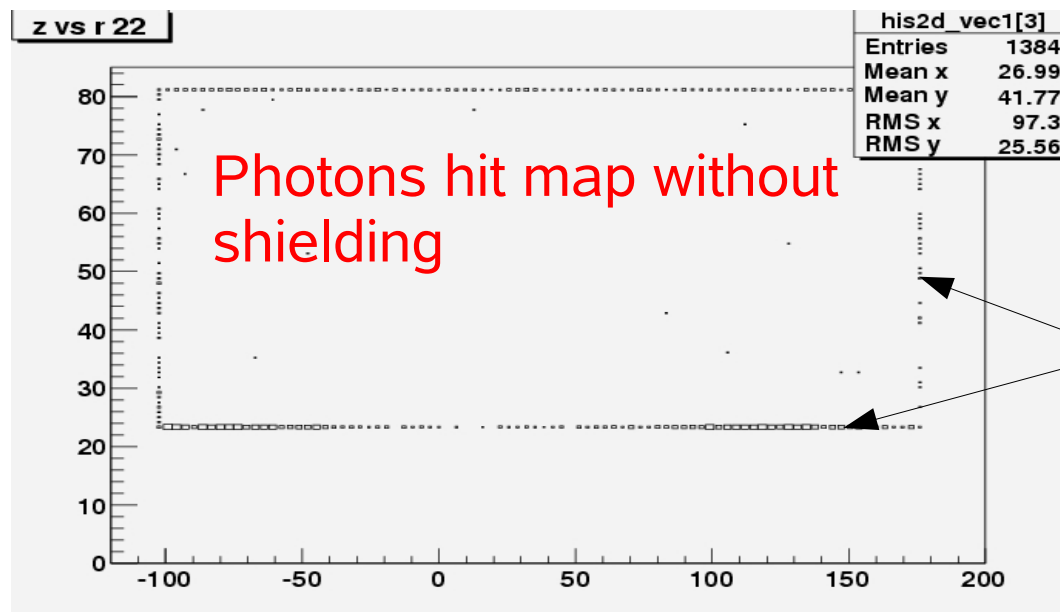
r,z view of hit map
(rmin=23.6cm
rmax=80.9cm)

These hits have 0 deposited energy. They only mark the passage of photons.

Note: we can evaluate more precisely the average number of interacting photons from the number of entering photons and the cross section (as was done for the CDR)

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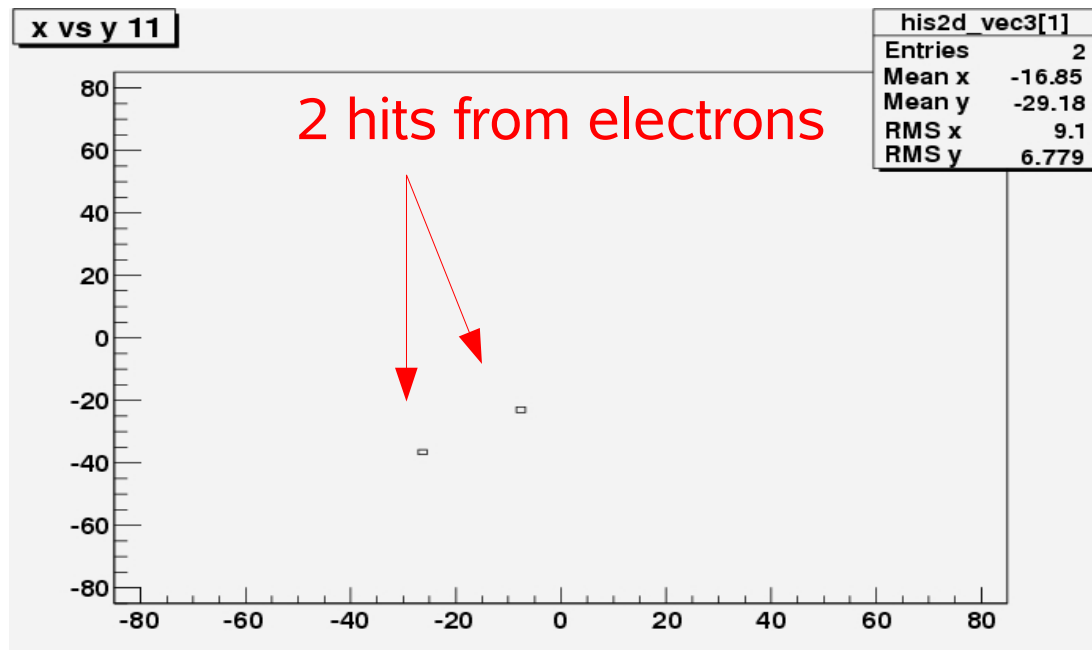
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radiative Bhabha's (II)

- e^\pm : 3 hits. γ : 0 hits
- Assuming for example a time window of $2.2\mu\text{s}$, we extrapolate ~ 140 hits.

Need more simulated data



Touschek background

- The root file contains the hit map, each hit being weighted by a number giving the Hz/bunch of that hit (for 1 bunch). There are 1251 bunches.
- 0 hits found
- This background is negligible according to the simulated sample we have analyzed.

Pair production

- $e^+e^- \rightarrow e^+e^-e^+e^-$
- $\sigma=7.3\text{mb}$. Expected rate @ $10^{36}\text{cm}^{-2}\text{s}^{-1}$: 7.3GHz
- Simulated sample: 700 events ($\Rightarrow \Delta t \sim 96\text{ns}$)
- 0 hits found
- This background is negligible according to the simulated sample we have analyzed

Requests to background simul. group

- In a typical BaBar trigger @ $10^{34}\text{cm}^{-2}\text{s}^{-1}$ we see on average ~ 600 DCH hits, of which $\sim 1/2$ is background.
- As discussed previously from the available rootuples we would extrapolate ~ 140 hits with 100 times the luminosity...
- Can we trust these numbers? There might be a problem either with our interpretation of the background rootuples or with their generation.
- We need to further investigate and more simulated data. If possible:
 - at least a factor 100 more statistics
 - it may be useful to add the info to reconstruct the secondary tracks (only the link to the primary track is available now).