

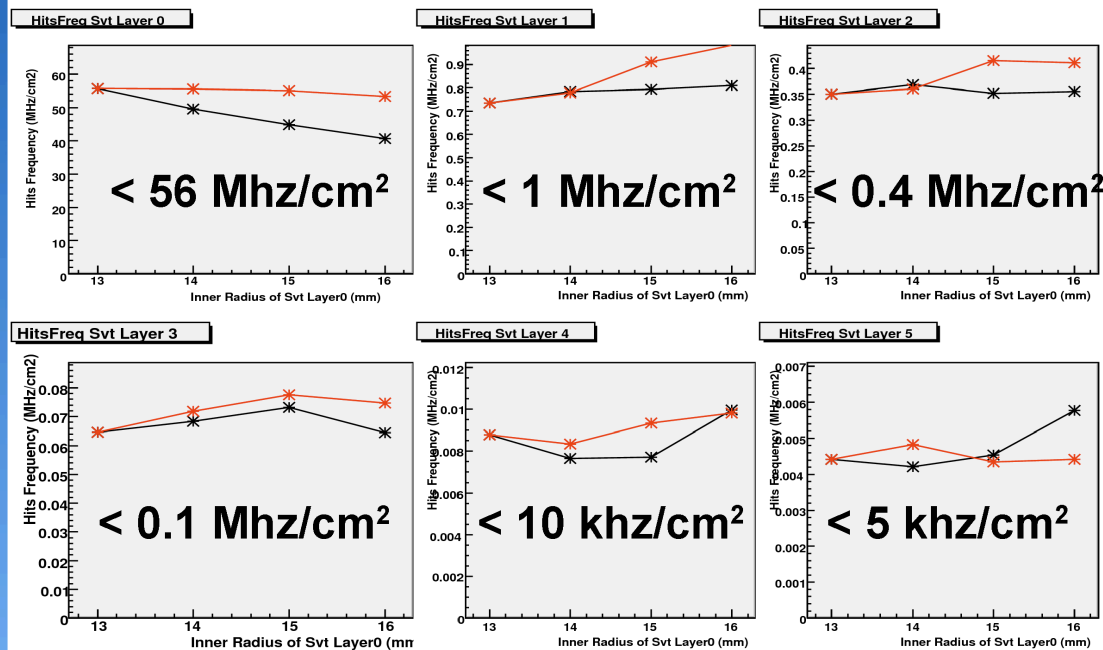
Random Hit Background in Tracking

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Motivation

- There are sources of background hits in the tracking detectors that may not be accounted for with the current background events.
 - Radiative Bhabhas, e^+e^- pairs, electronics noise, others?
- Trying to treat some of these sources as tracks that get propagated through FastSim and generate hits may be too costly time-wise
- Instead, we can just look at average hit rates in the detector elements and try to incorporate these effects in hit merging and pattern recognition effects

Hits Frequency, pairs bkg

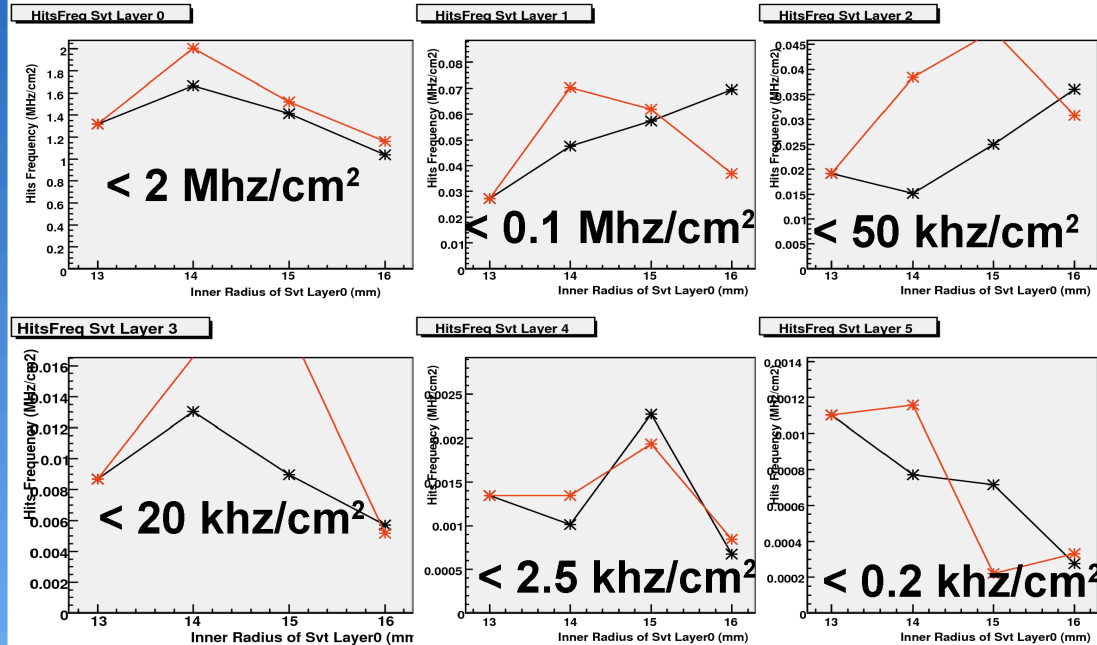


- Fluctuations due to lack of statistics, error bars needed

Hit Frequencies in SVT, Pair Production

Black and red lines correspond to different beam pipe configurations

Hits Frequency, bbbrem bkg

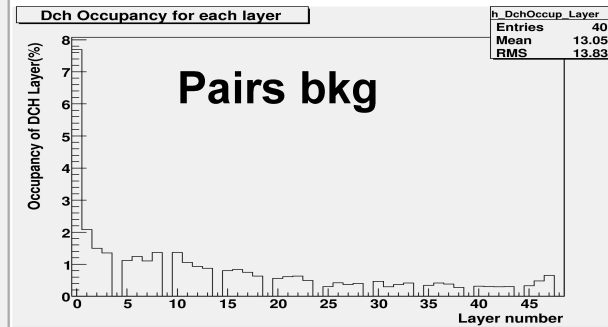
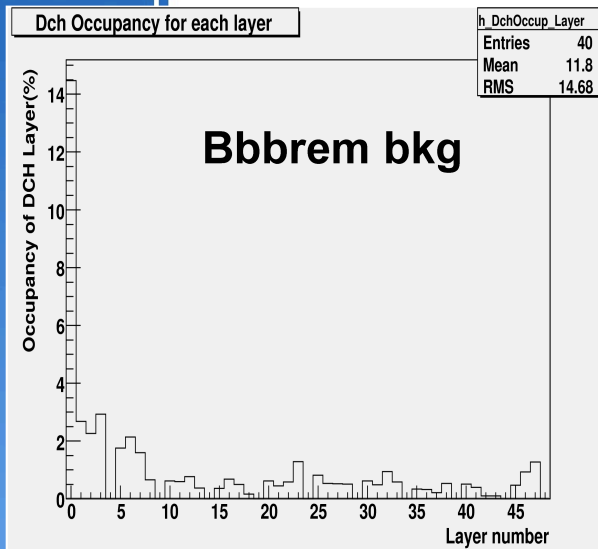


- Fluctuations due to lack of statistics, error bars needed

Hit Rates in SVT, Radiative Bhabhas

Black and red lines correspond to different beam pipe configurations

DCH Occupancy per layer



- Occupancy by layer, same y scale
- 22% total on layer 0
- Reasonable occupancy on other layers, not so correlated with r

DCH Occupancy

Pairs and Radiative Bhabhas

Implementation Ideas

- Two possible paths:
 - 1) Generate SimHits based on average occupancy per detector element (not SimTracks, just unassigned SimHits) and let the existing hit merging and hit filtering code deal with it
 - 2) On a SimHit-by-SimHit basis calculate the probability that there is a background hit nearby that would influence this hit
- Option 2) is probably preferable. Option 1) would introduce a lot of extra hits that would never influence a track and would just increase the combinatoric time spent in hit merging.

What's Needed

- For a SimHit, we will need to be able to determine its “footprint” in cm^2 or something like that in order to mesh with the FullSim background estimates
- Will need some object that can report the background hit rate as a function of:
 - Detector type
 - Radius
 - Phi, z?
- This will necessarily be somewhat tied to the specific geometry in used in FullSim.
- We need to make sure that we are not double-counting background sources