machine bkg study in DCH needs a fast simulation?

(some preliminary considerations)

Impact of machine bkg on the DCH

- The dominant source of bkg in the super B DCH is expected to be radiative Bhabhas (see CDR):
  - off-energy electrons and positrons shower in the beamline elements and the tails of those showers may penetrate the passive shielding and reach the DCH. Most of these particles are photons with energies of O(MeV).
  - Most of photons do not interact, but a small fraction produces Compton electrons that spiral along the B field. ---> Increase of the occupancy
    - Using two different shielding schemes a range 1.5 – 7 % of occupancy was found (CDR)

Optimization of DCH

- The occupancy level can be lowered:
  - by reducing the dimension of the cells
    - Babar cell width: 2cm. The dimension may be reduced to decrease the occupancy
    - Smaller cell --> Larger number of cells -->More multiple scattering
    - Smaller cell --> per cell spatial resol. increases due to near-wire effects
    - Smaller cell --> addition of extra layers --> partially compensate the two negative effects above
  - by optimizing the gas mixture
    - look for gas with shorter collection time to reduce the collection window and therefore the overlap with spurious hits

Role of fast simulation

- We need to know which is an acceptable value of the occupancy, based on its effects (track reconstruction, deadtime,...)
- The precise effect on track reconstruction would probably require a detailed reconstruction simulation to keep into account the relevant effects
- ==> it looks like for the DCH it's reasonable to study the impact of the bkg on the track reconstruction with an ad hoc study and then apply the results to the fast simulation, rather than using a fast simulation to do the study.
  However some more investigation is required (we'd like to fix the ideas by the workshop)