



IFR Geant4 Background Simulation

G. Cibinetto - INFN & Universita' di Ferrara
on behalf of the IFR group

Super B Meeting
Elba May 31 - June 3, 2008

Outline

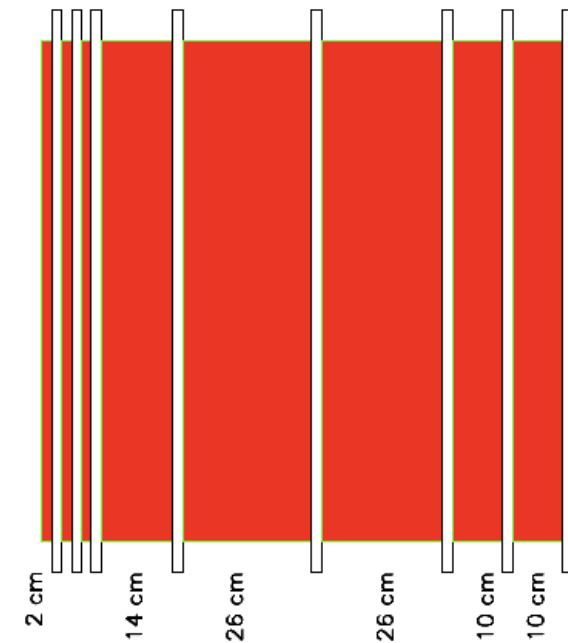
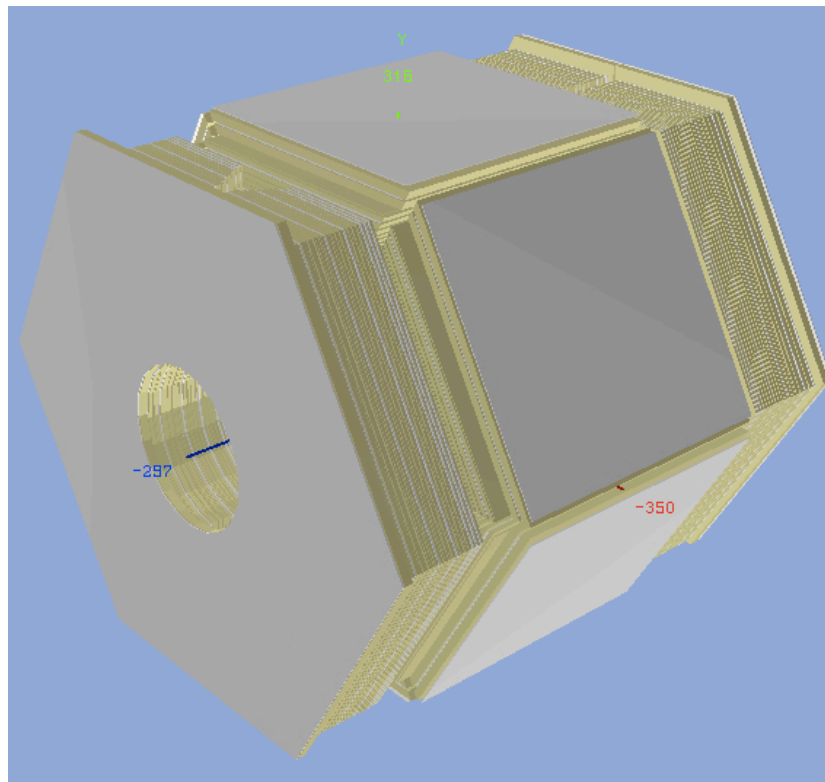


- First look at background events
- The BaBar experience
 - Beam halo
 - Hottest parts of the detector
 - Neutrons
- Conclusions and (my) question time

G4 simulation features



- The super B IFR is designed starting from the BaBar IFR, using the same iron structure and adding **8 active scintillator layers**.

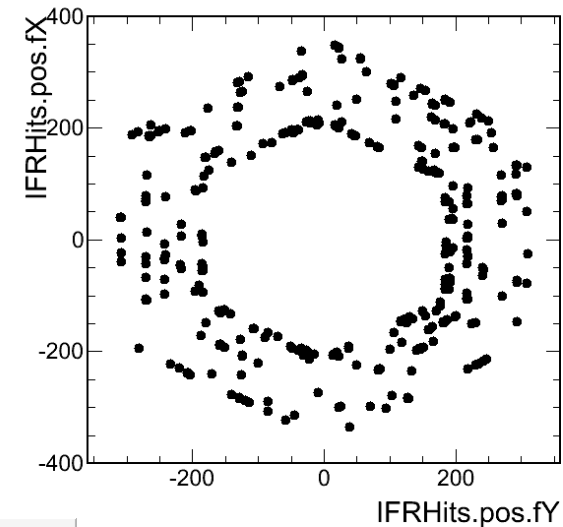


- **No segmentation in the active layers** (just one big scintillator slab)

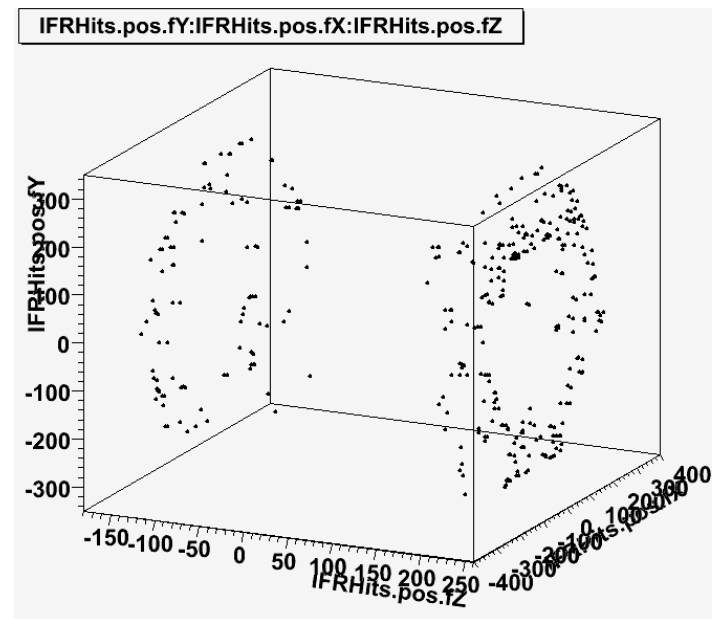
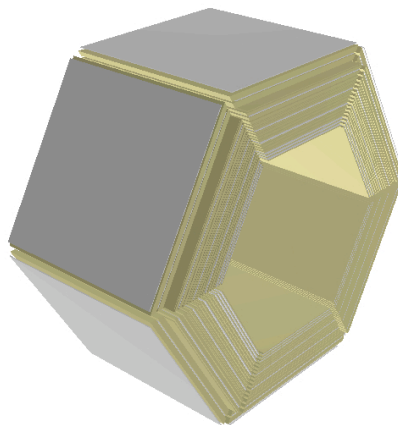
First look at background events



- First checks have been done analyzing the first radiative Bhabha rootuples produced by Eugenio.
- Some endcap volumes are overlapping with other stuff: only the barrel in the simulation.



- Few events.



Without the endcaps, only the very forward and backward part of the barrel have been hit

More checks

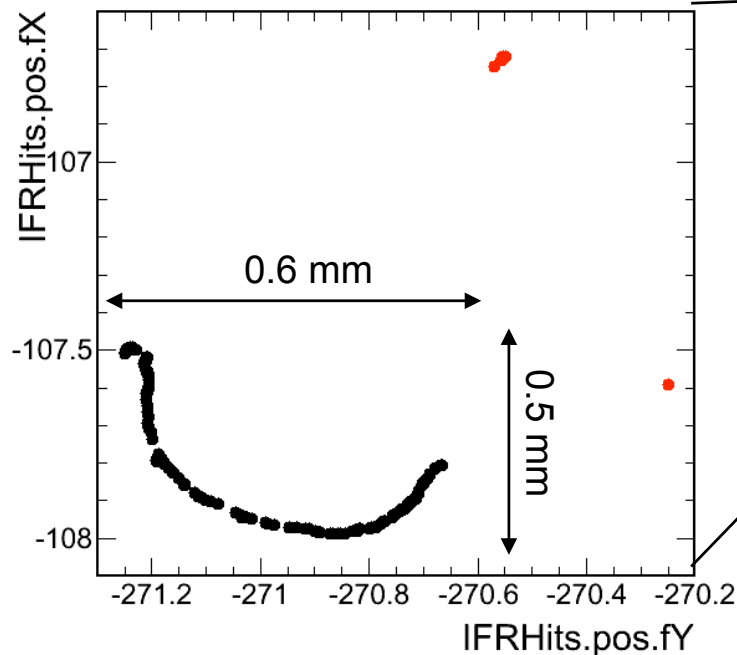


Some events have a huge number of ghits localized in a very small space.

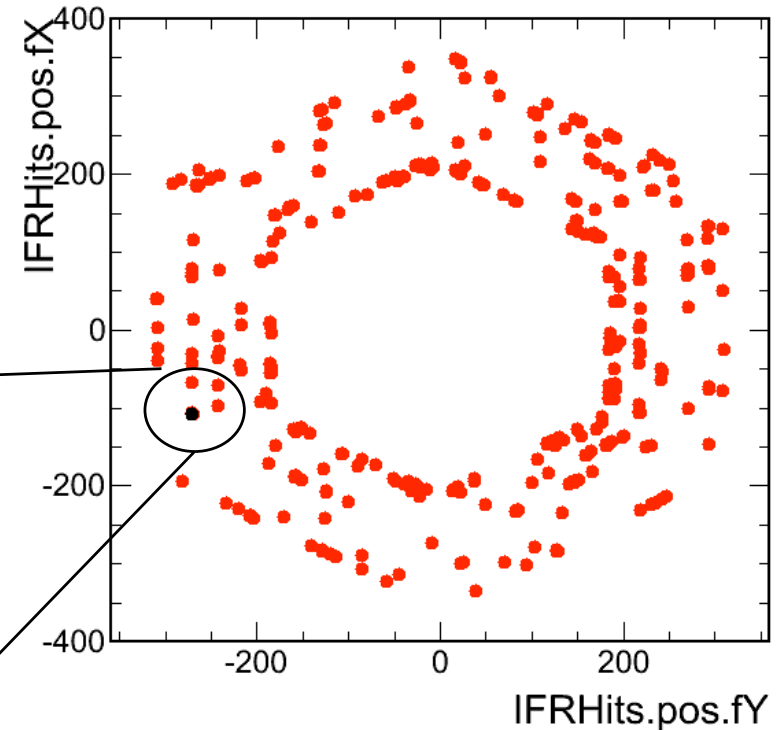
This can be avoided having hits information by layer.

Rootuples size will largely be reduced

`IFRHits.pos.fX:IFRHits.pos.fY (abs(IFRHits.pos.fY+270)<10&&abs(IFRHits.pos.fX+108)<10)`

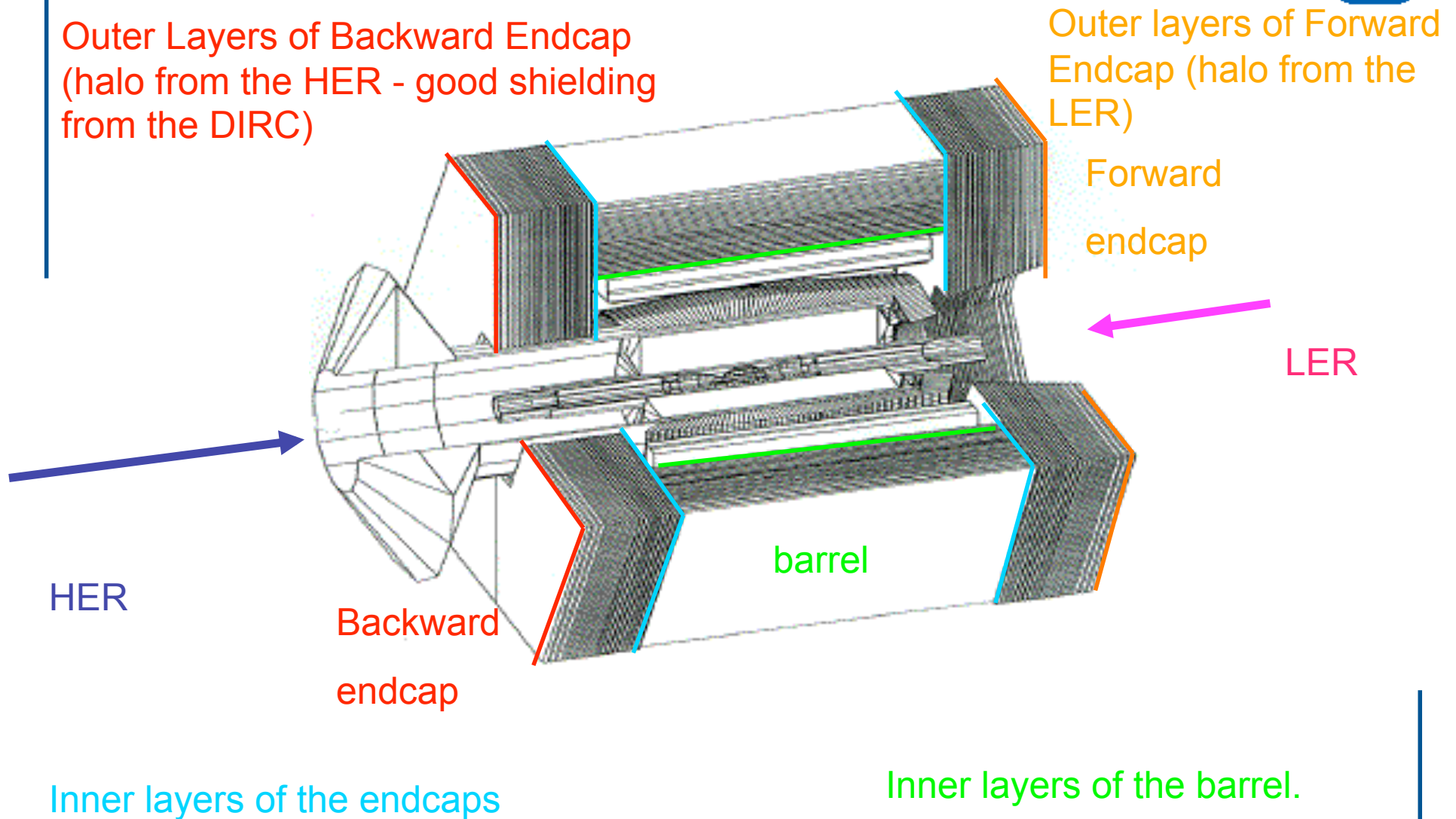


`IFRHits.pos.fX:IFRHits.pos.fY`

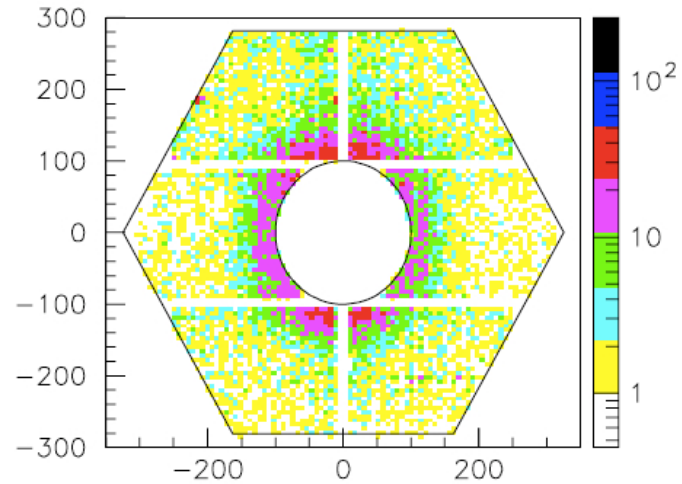


More than 150 ghits will be reduced to just one.

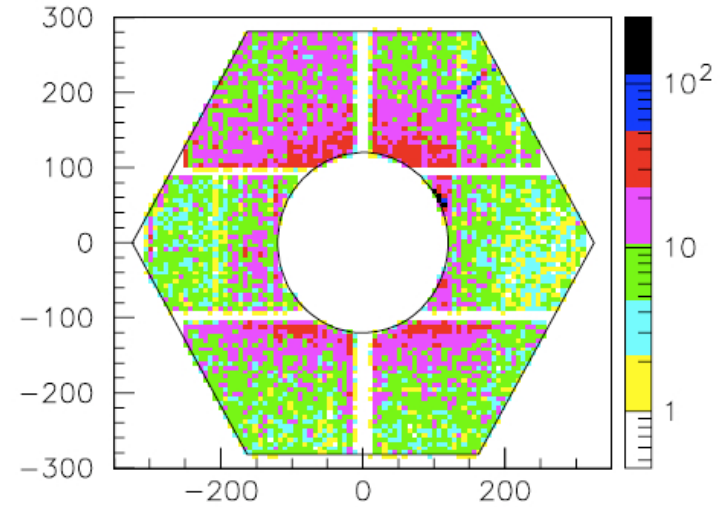
The BaBar experience



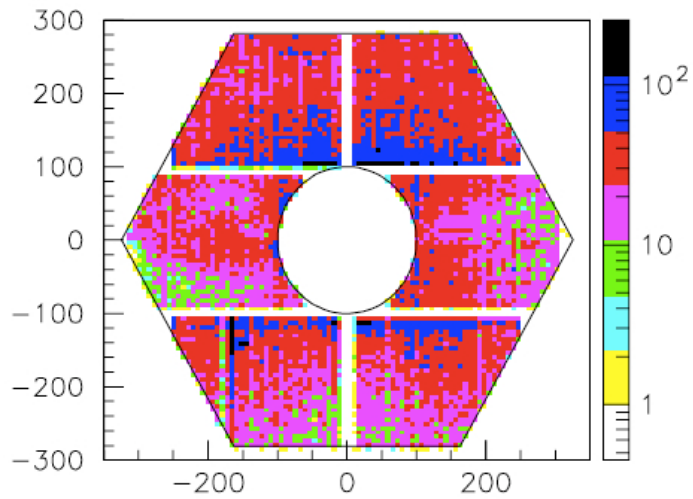
Beam halo



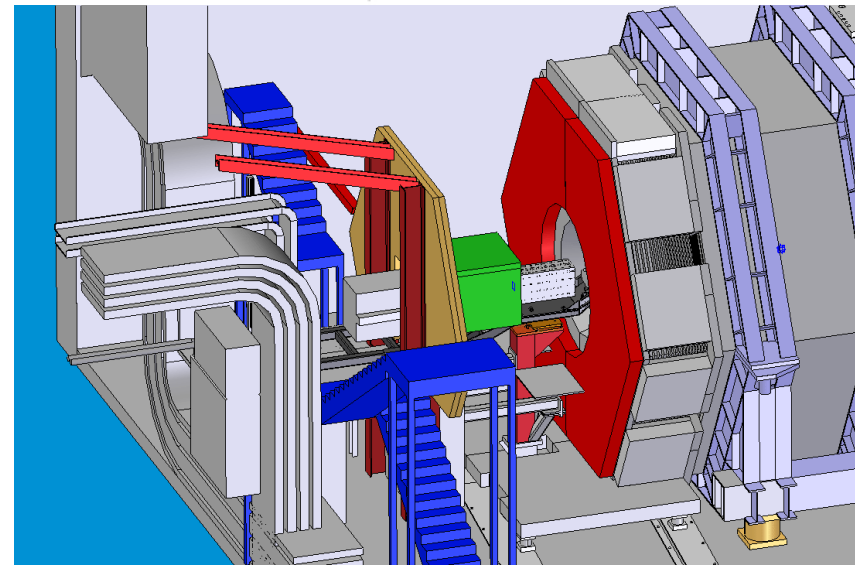
layer 11



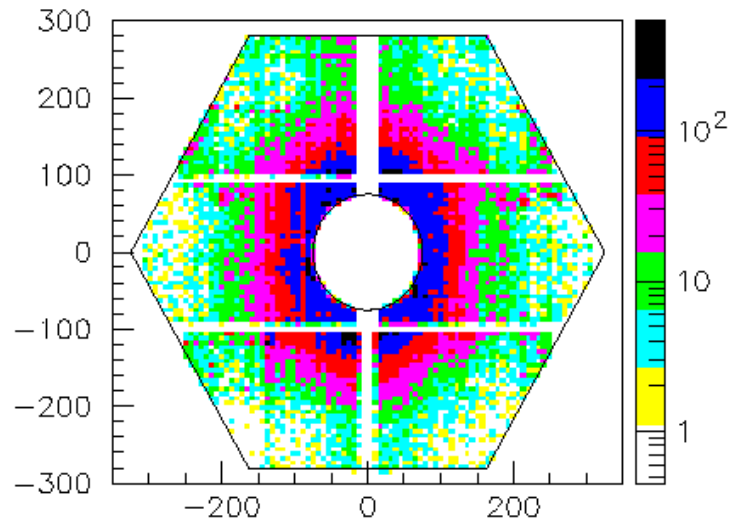
layer 13



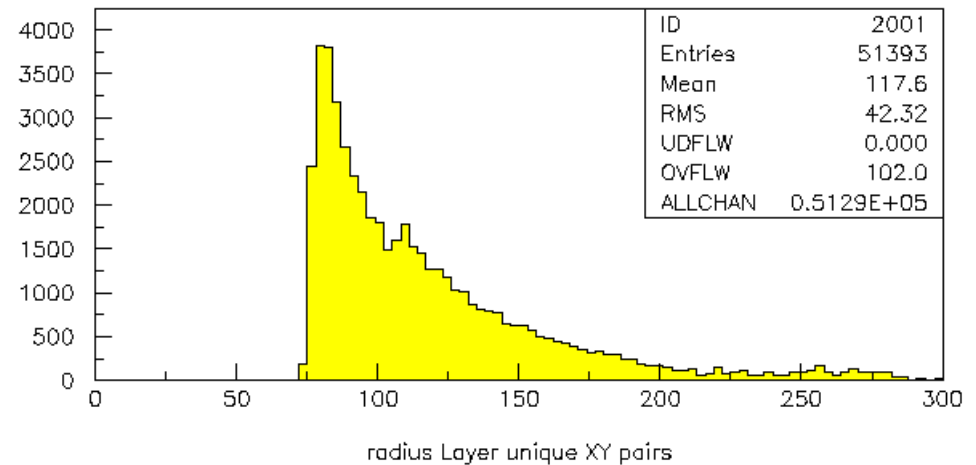
layer 15



Innermost layers

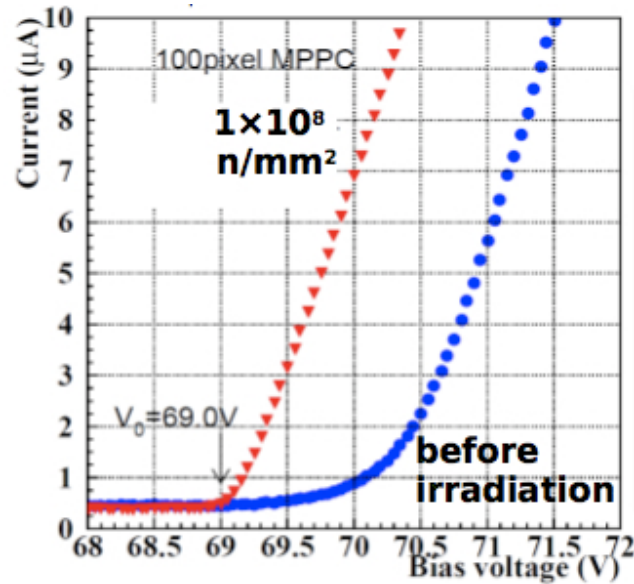


layer 2

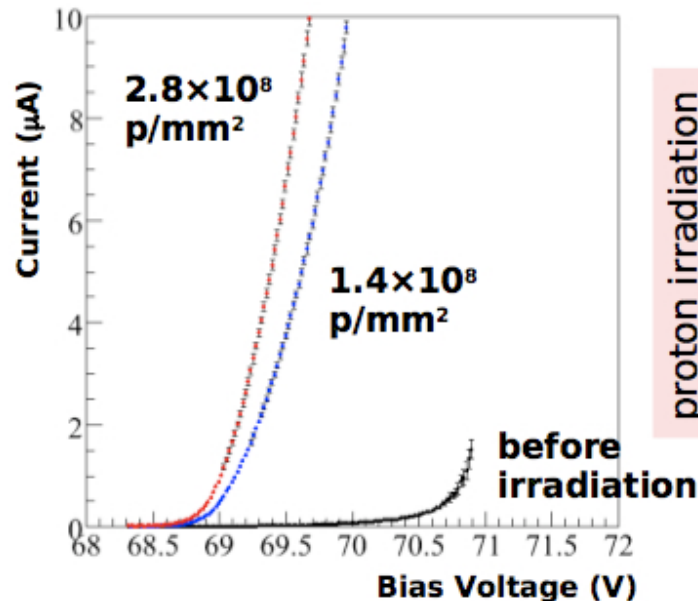


- We may want to put photodetectors and electronics in the hottest part of the endcap.
- Need to understand the radiation dose in this regions

SiPM radiation damage



Neutron irradiation



proton irradiation

In BaBar we had a lumi dependent neutron background due to radiative Bhabhas striking the beam line components.

More evident on the forward side.

Need to know the neutron rate on the detector

Conclusions



- A first look at the background rootuples was not very exciting (few events and IFR not yet well described)
- Main issues for the IFR:
 - Beam halo (mostly LER)
 - Innermost layers around the beam pipe
 - Neutrons
- Can we simulate these contribution to the background?
What would be the time scale?