IFR Geant4 Simulation

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Super B Meeting
## Elba May 31 - June 2, 2008

Outline

- General overview

- The IFR volumes

- Geant simulation: feature and issues

- Geant simulation: checks and validation

- Simulation output

- Future plans

General overview

- A full IFR description is needed for background simulation, detector optimization and to extract the parameters for the fast simulation.

- The IFR simulation group formed just before the SLAC workshop:
  - Mirco Andreotti (Ferrara)
  - Gianluigi Cibinetto (Ferrara)
  - Mauro Munerato (Ferrara)
  - Marcello Rotondo (Padova)

- In February the IFR was big cylinder outside the other subdetectors
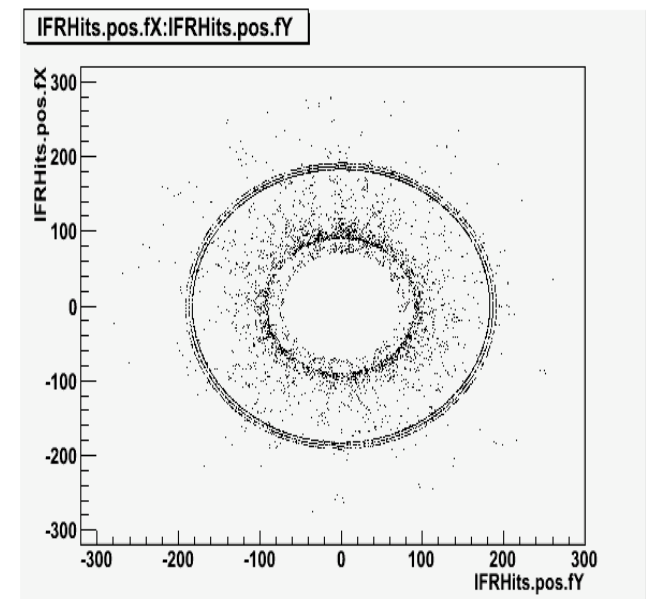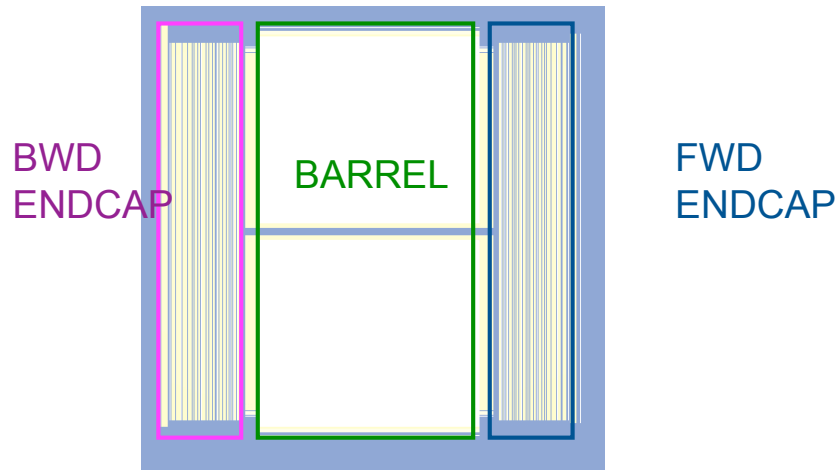
One step ahead

- Now we have a preliminary version if the IFR description with the proper geometry based on the Babar IFR.
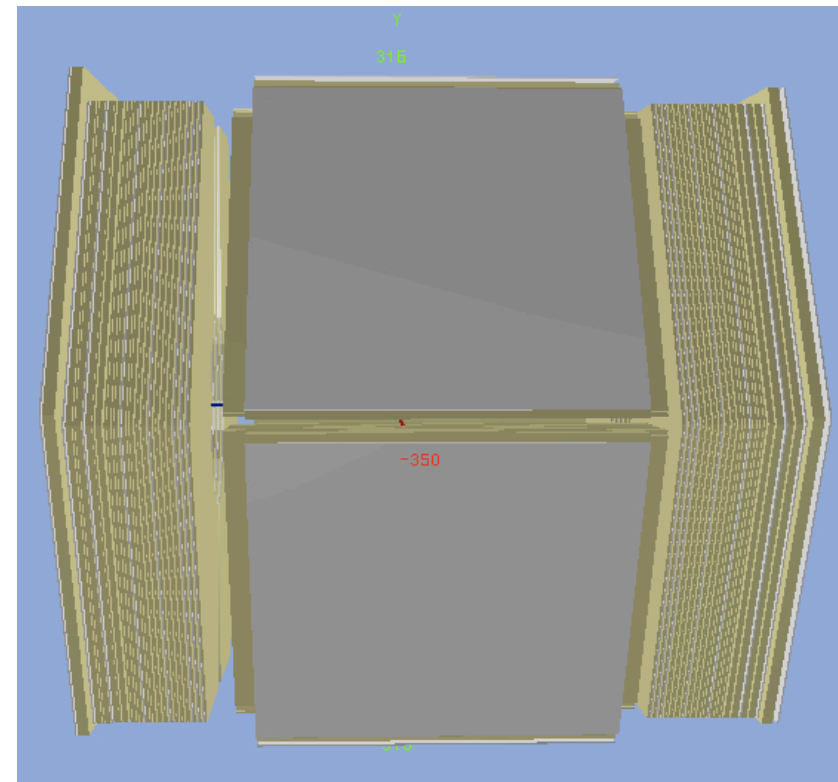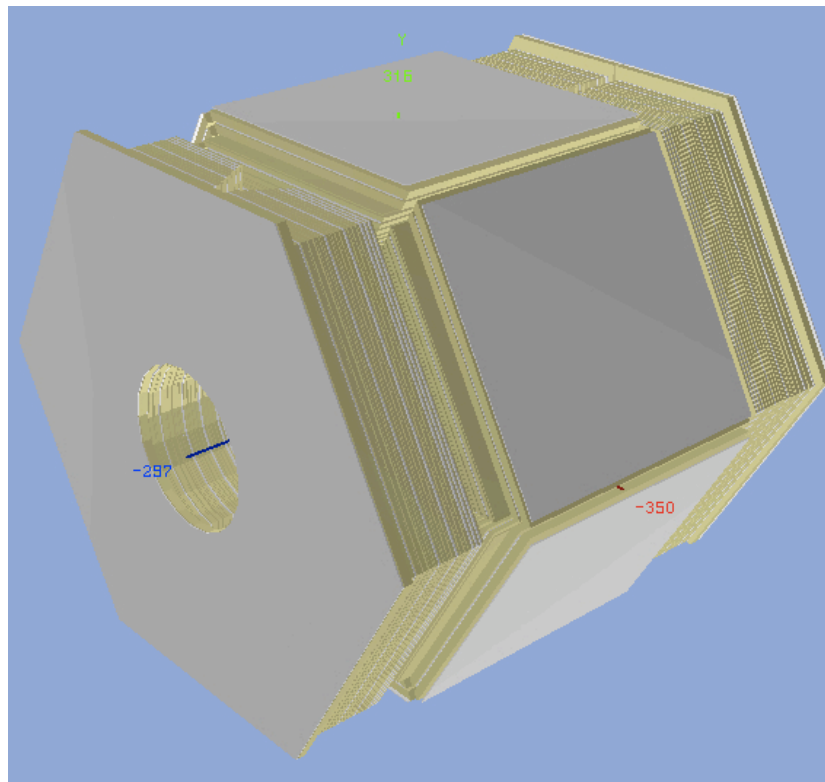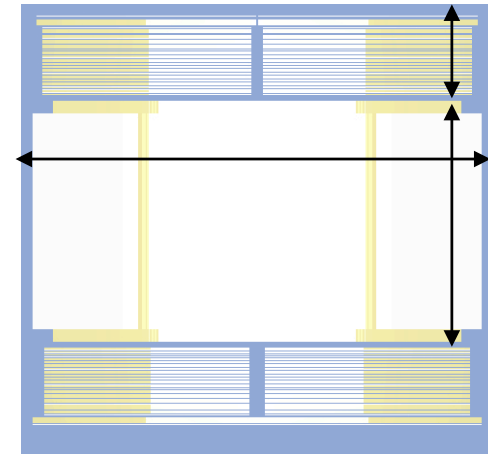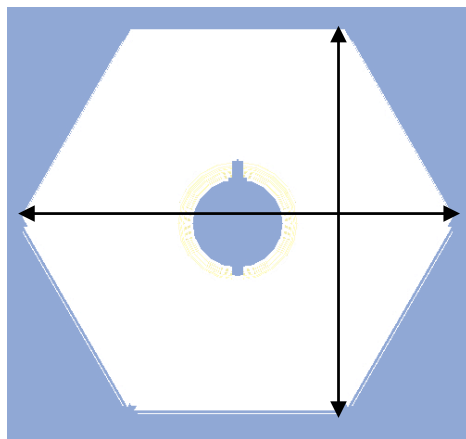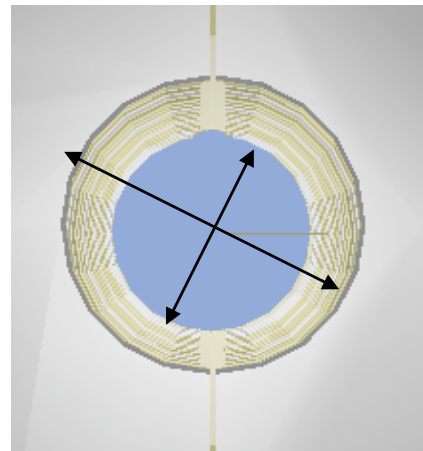
IFR volumes

Side view: Y,Z plane

Top view: Z,X plane

BWD
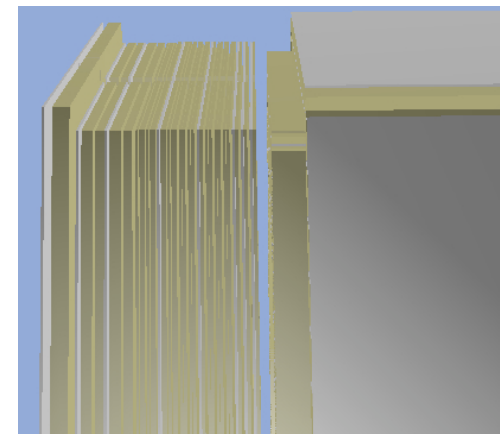ENDCAP

BARREL

FWD
ENDCAP

Front view: X,Y plane

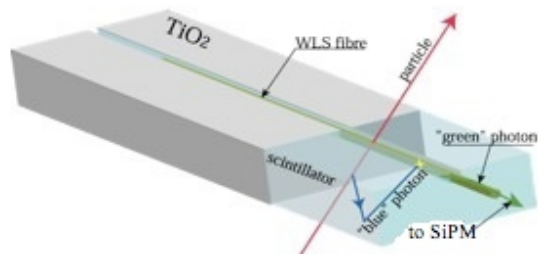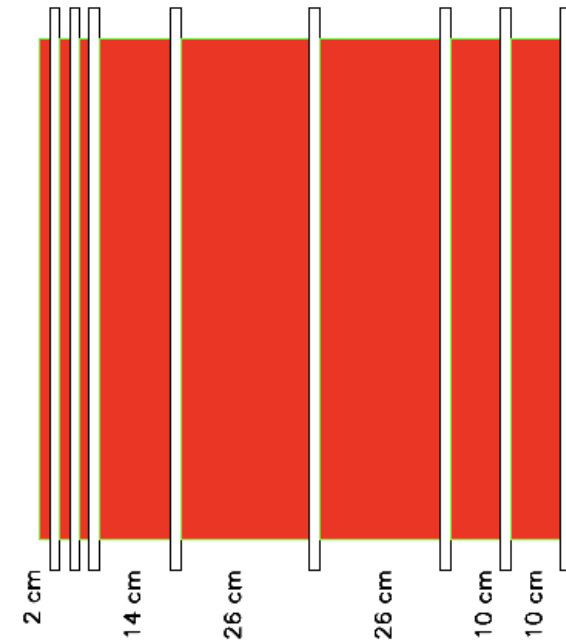**The fwd endcap hole in the X,Y plane**

Need to add iron structure

G4 simulation: issues and features

- The description file is generated by a script to allow the production of different configuration: number of active layers/ absorber.

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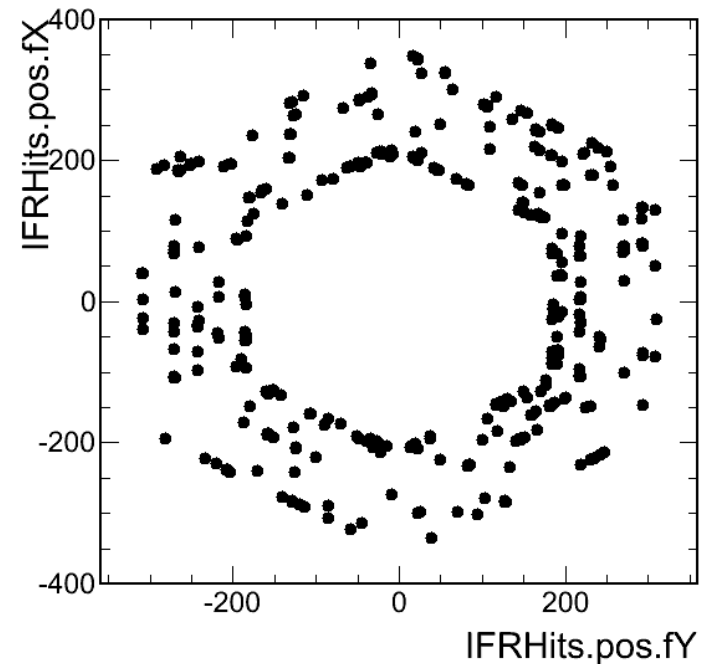

- No segmentation in the active layers (just one big scintillator slab) to allow offline reconstruction with different configurations.

Simulation checks and validation

- First checks have been done by eyes and analyzing the first rootuples produced by Eugenio.

- Some endcap volumes are misplaced or overlapping with other stuff: this will be fixed soon.

- A full validation on the IFR description will be done using $\mu\mu$ or $\mu\mu\gamma$ events.
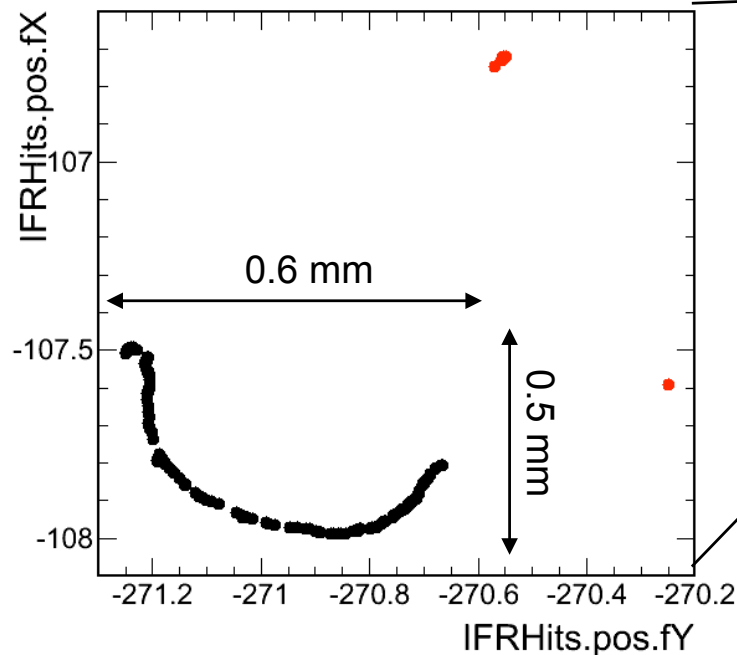
First checks

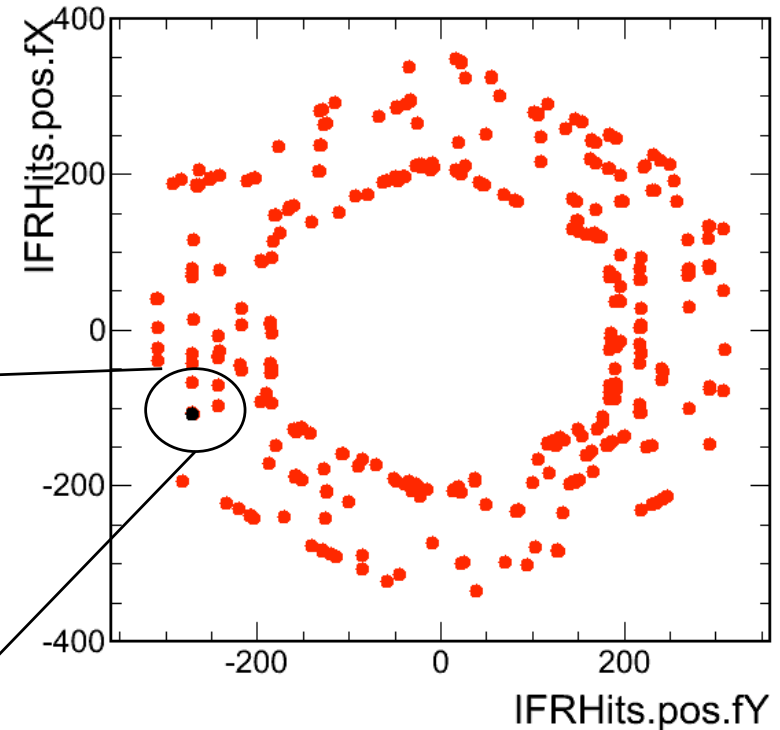Some events have a huge number of ghits localized in a very small space.

This can be avoided having hits information by layer.

Rootuples size will largely be reduced

IFRHits.pos.fX:IFRHits.pos.fY

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

0.6 mm

0.5 mm

More than 150 ghits will be reduced to just one.

Simulation output

- Best solution:

    – Have different variables for Barrel, Forward and Backward

    – For each track, have hits in each layer instead of ghits for position X,Y,Z.
      - Hit energy: sum of ghit energies
      - Hit position: average of ghit positions

    – Within each layer use local coordinate (X,Y)

Future plans

- Refine the IFR description code

- Consistency checks

- Generate different IFR configurations

- Start using background events for the detector optimization.