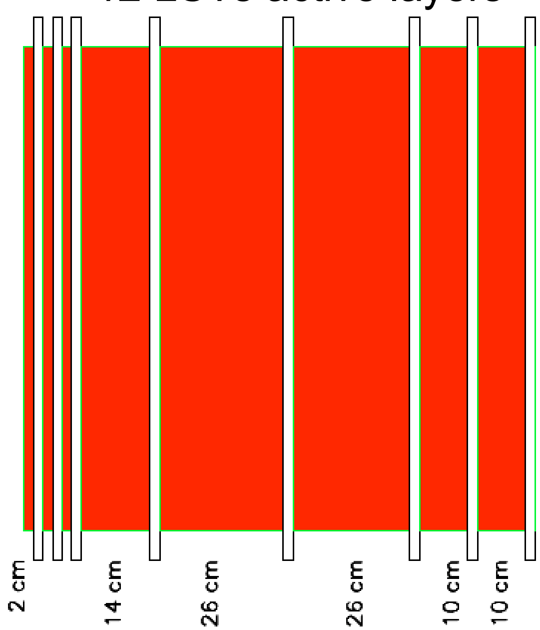
IFR plans and requirements

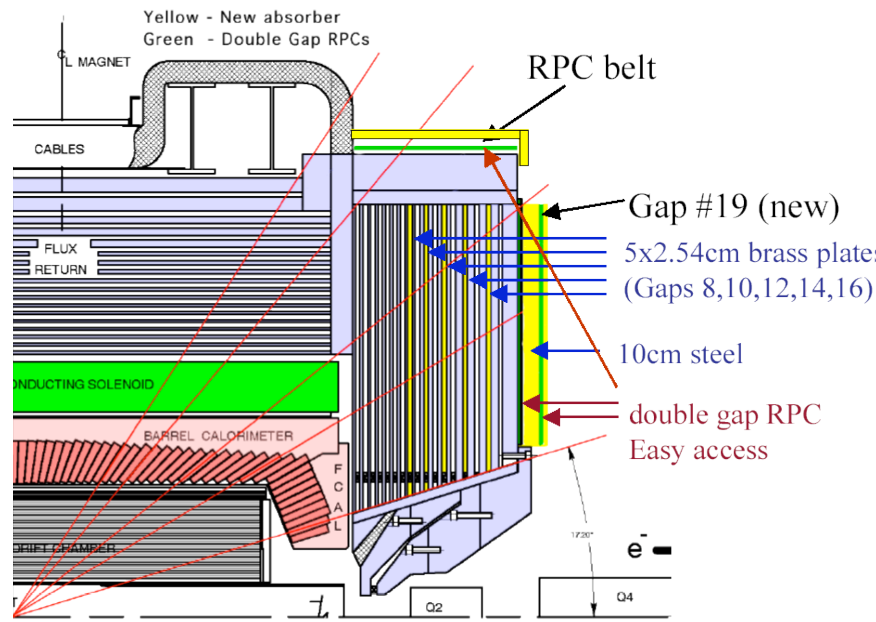
Mirco Andreotti, Marcello Rotondo and G. C.

SuperB Detector R&D Workshop

IFR: from B to super B

- The muon and K_L detector is build in the magnet flux return.
- In BaBar it's composed by one hexagonal barrel and 2 endcaps
- The iron is instrumented with LSTs in the barrel and with RPCs in the endcaps.
  - 16 RPCs active layers
  - 12 LSTs active layers





Baseline

•Add iron to BaBar stack to improve μ ID.

➔ 7-8 detection layers.

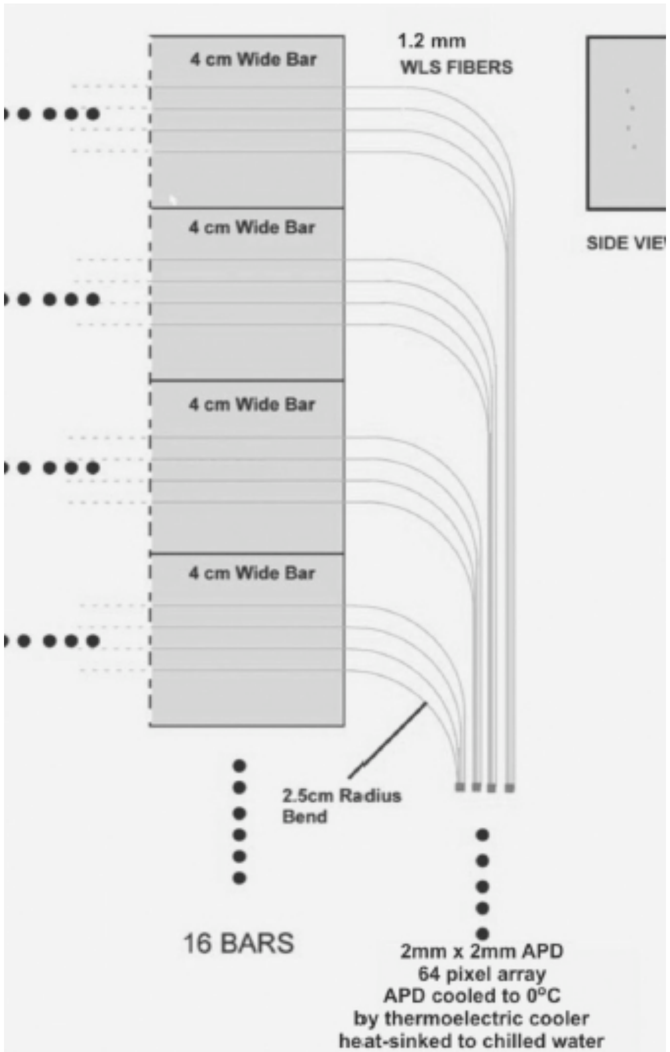
•Re-use BaBar steel (still to be fully assessed)

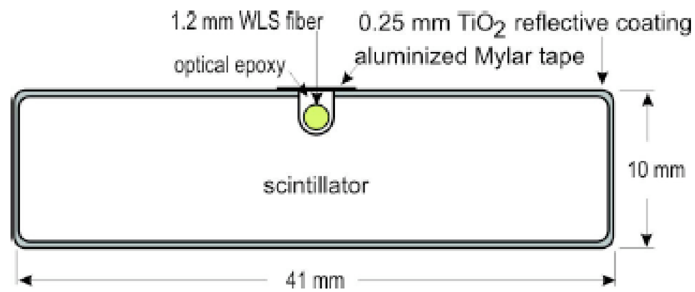
•Keep longitudinal segmentation in front of stack to retain K_L ID capability.

•Backgrounds are problematic for gas detectors.

➔Use Minos style scintillation bars.

What is needed





- One coordinate will be measured by the bar position.
- The other coordinate by measuring the time at both end of the bar.
- The number of active layers will also be different.
- Need input from simulation and background evaluation.
  - Time resolution and spatial segmentation
  - Number and location of active layers.
  - Where to add iron if needed
- Need full simulation of the detector, reconstruction code and muon selectors. Not available for super B.

What can we use

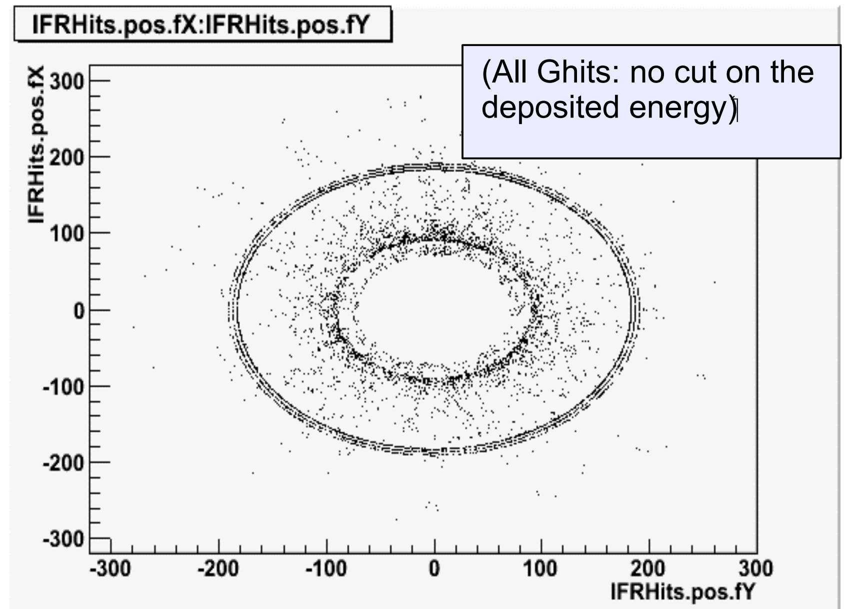
➢ Simulated background from machine

✓ available from the geant4 standalone simulation of the background group.

➔ root files with hit information

Extraction of the
Spatial distribution of the rates due to the background

This parametrization will be inserted like a noise in the BaBar MC reconstruction



Evaluation of background effects in terms of inefficiency in the
- swimming of tracks from DCH
- clusters reconsctruction
These info. can be used in a fast/full simulation

Background and simulation

- <u>Background simulation side</u>

  ✓ Improvements in IFR geometry description: now simple tubes;

  ✓Try different geometries: (position of the absorbers)
  - Moving to a detector description with GDML will give many advantages

- <u>Babar simulation of superIFR side</u>

  ✓ detector optimization

  ✓ parameterization of the hadronic shower to use in Fast Simulation

  ✓ different geometry

Preliminary conclusions

- For detector optimization and evaluation of background effects on superIFR we will take advantage of the existing BaBar full simulation.

- To implement a reliable Fast Simulation of superIFR it is necessary to know a detailed parameterization of the hadronic shower and to know the inefficiencies due to the background: this is important for the μ/π separation and crucial for the K_L identification.

- The inefficiency due to the bkg, parameterized as a function of the P,theta,phi, can be used in the Fast Simulation (Pravda stile).