General Overview

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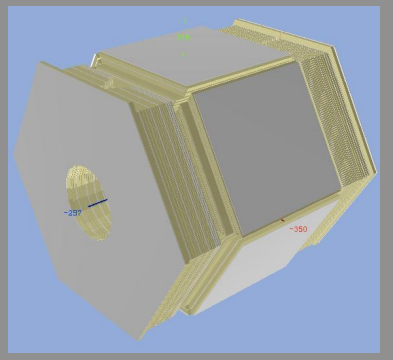
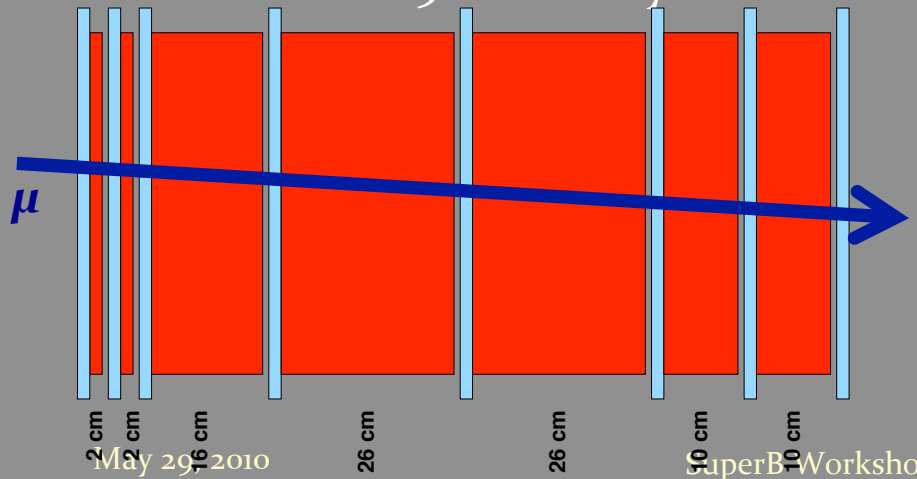
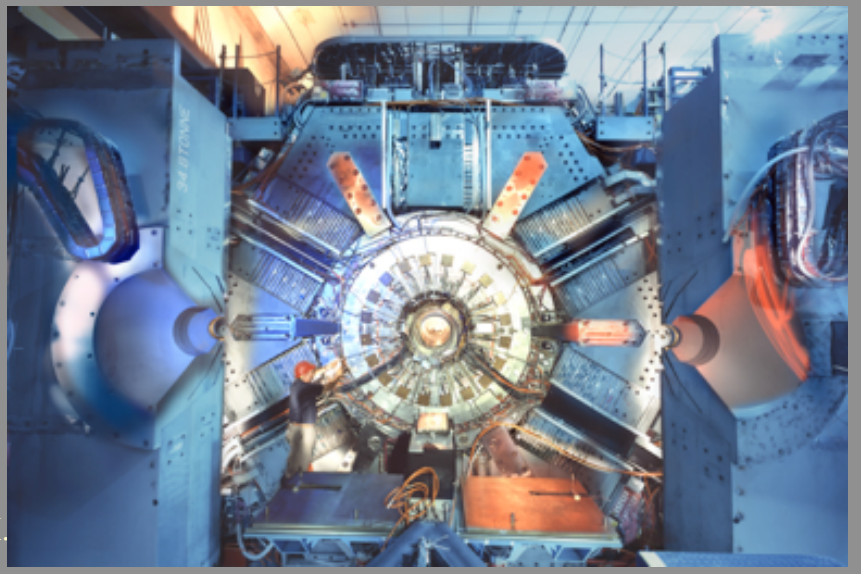
SuperB Workshop and K.O. meeting

Introduction

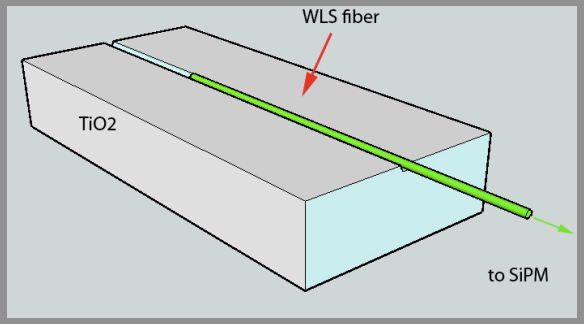


- Built in the magnet flux return, it will be composed by one hexagonal barrel and two endcaps
- Large active area
- Very high rates: hottest region up to few 100 Hz/cm^2
- Fine longitudinal segmentation in front of the stack for K_L ID capability (together with the electromagnetic calorimeter)
- Plan to reuse BaBar iron structure: some mechanical constraint (gap dimensions, amount of iron, accessibility, …)
- Use of 8-9 active layers

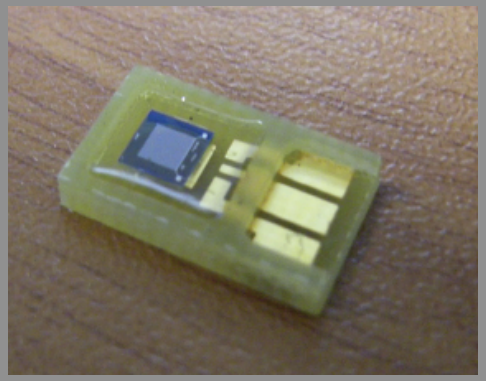




Detection technique



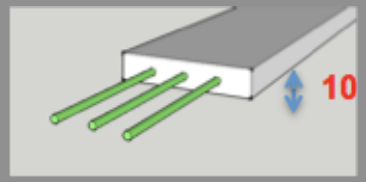
- Scintillator:
  - 2x4x400 cm^3 and 1x4x400 cm^3 scintillator bars
  - coated with TiO2
  - Light collection through WLS fibersFibers housed in embedded holes or grooves.
  - Made by FNAL NICADD facility.
- WLS fibers:
  - ϕ = 1.0 mm type Y11(300) (Kuraray)
  - ϕ =1.2mm type BCF92 (Saint Gobain)
  - Attenuation length $\lambda \approx 3.5$m
  - trapping efficiency $\varepsilon \approx 5.5\%$
- Photodetectors:
  - Silicon Photo Multiplier (FBK-IRST)
  - Gain $>10^5$
  - < 1ns risetime
  - Low bias voltage (≈35V)
  - Dark current rate @ room temperature, ≈MHz @ 1.5 phe, few 100kHz @ 2.5 phe, few 10KHz @ 3.5 p.e.



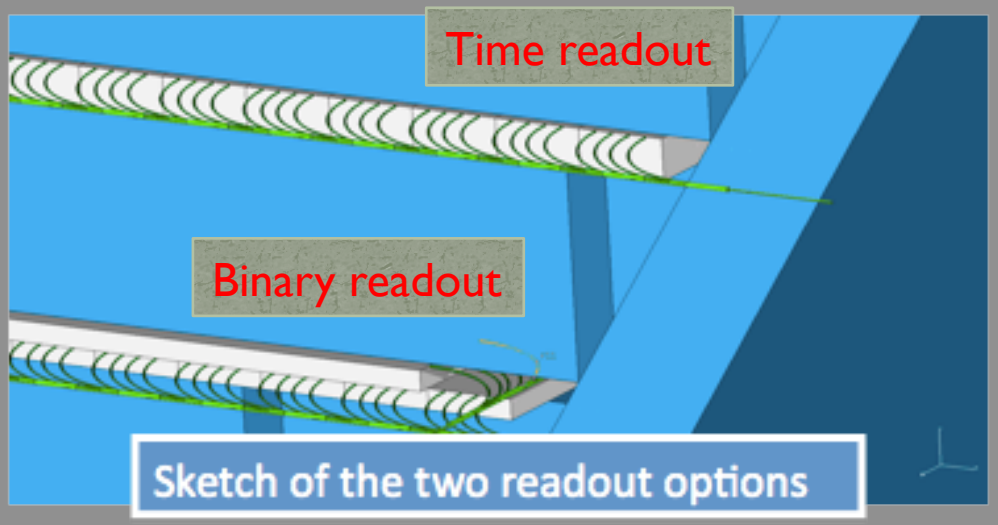
Timing and Binary readout

- Timing readout (Barrel): azimuthal coord ϕ measured from the hit bar, polar coord θ from the arrival time of the signal (read on both ends)

scintillator for Time Readout

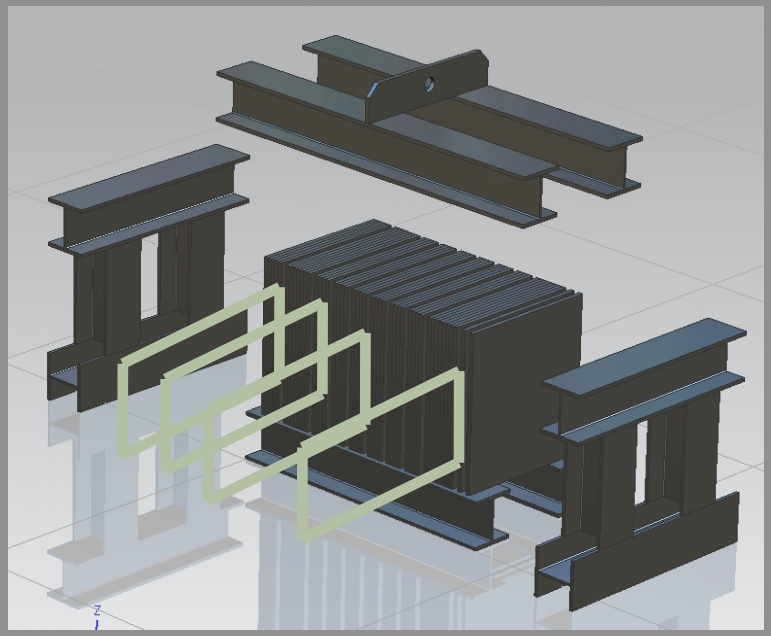


scintillator for Binary Readout



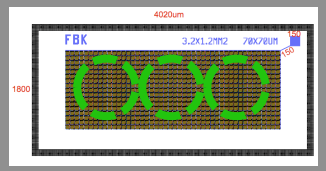
- Double coord binary readout (Endcaps): two layers of orthogonal scintillating bars provide directly the ϕ and θ coordinates (read each bar on one side only).

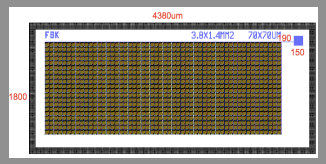
Prototype in a nutshell

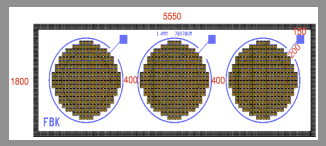


- Iron: 60x60x92 cm^3 , 3cm gaps for the active layers

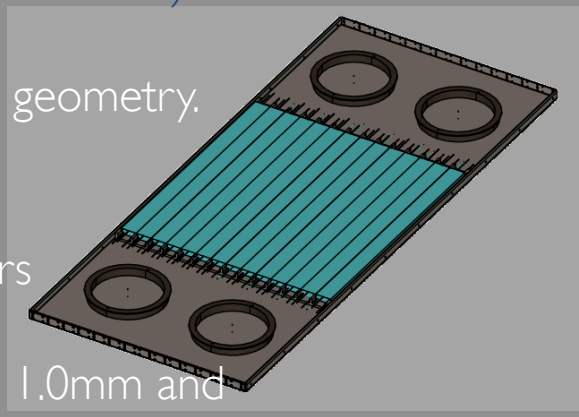
- Readout 9 active layers
  - 4 Layers Time readout (TDC-RO): 112 channels
  - 5 Layers Binary Readout (BiRo) 125 channels







Active layers housed in light tightened boxes (aka Pizza Box)



4 special modules to study different fibers or SiPM geometry.
Three types of SiPM with different geometry to be tested:

- 1.2x3.2 mm^2 to be coupled to 1.0mm fibers
- 1.4x3.8 mm^2 for 1.2mm fibers
- array of 3 round sensors: f=1.4mm for both 1.0mm and 1.2 mm fibers

Activities since last meeting

- In less than two months main efforts on:
  - Beam test data analysis (updated data/MC comparison)
  - Cosmic run in Ferrara (first data results and temperature studies)
  - Flux Return Mechanics (first draft of the report is ready)
  - Module assembly mechanics (some brainstorming and sketches)
  - Electronics (test with SPIROC - SiPM Integrated Read-Out Chip - from Orsay)
  - Background simulation (new production results)

Goal for this meeting (I)

- Review beam test and cosmics data analysis results
  - detection performances
  - muon ID capability
  - other issues

- Review advancements and status of all other areas
  - Mechanics (flux return and detector)
  - Electronics
  - Background simulation
  - Overall detector design

Goal for this meeting (II): TDR planning

- We have to provide a recommendation for the iron structure (based on prototype and simulation analysis, but with impact on mechanics and cost).

- We have to take some decision about the detector
  - scintillator bars, fibers, SiPM design
  - readout options
  - SiPM position

- We have to provide a complete description of the system in terms of
  - mechanics
  - electronics
  - performances
  - schedule, costs and manpower

TDR timing

- The TDR due date is continuously moving forward (now is ~1 year from now), but we cannot rely on that: we need to take action as soon as possible. Not in terms of writing but in terms of planning.
- TDR table of contents should be prepared.
- We need to evaluate the status of each section (in terms of missing information, work to be done, schedule and people involved) and set a list of action items to complete it.

BaBar TDR

IFR paragraphs of the BaBar TDR were almost 40 pages.

Although it's not a Bible it could be a useful reading to check if the level of details we have in mind is about right.

Not everything needs to final, but everything needs to be consistent.

IFR sessions

16:00->*17:30* Parallel: IFR (Convener: Roberto Calabrese (*FE*)) (Sala Biodola)
Description:
Phone number: +39 050 098 6204
or http://server10.infn.it/video/index.php?page=telephone_numbers
Meeting number: 1305

16:00	General Overview (10')	Gianluigi Cibinetto (*FE*)
16:15	Mechanics for the Flux Return (15')	Massimo Benettoni (*PD*)
16:35	Plans for detector mechanics (10')	Wander Baldini (*FE*)
16:50	Discussion about plan for TDR (I) (40')	

18:00->*19:30* Parallel: IFR (Convener: Roberto Calabrese (*FE*)) (Sala Biodola)
Description:
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Meeting number: 1305

18:00	Cosmic run test in Ferrara (15')	Wander Baldini (*FE*)
18:20	Update about IFR electronics (20')	Angelo Cotta Ramusino (*FE*)
18:45	Discussion about electronics plan (15')	
19:00	Discussion about plan for TDR (II) (30')	

16:00->*17:30* Parallel: IFR (Convener: Roberto Calabrese (*FE*)) (Sala Biodola)
Description:
Phone number: +39 050 098 6204
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Meeting number: 1305

16:00	Results from beam test: detector performances (15')	Gianluigi Cibinetto (*FE*)
16:20	Results from beam test: reconstruction and muon identification (15')	Nicola Gagliardi (*PD*)
16:40	Update about background simulation (15')	Valentina Santoro (*FE*)
17:00	Discussion about next beam test (30')	