General Overview

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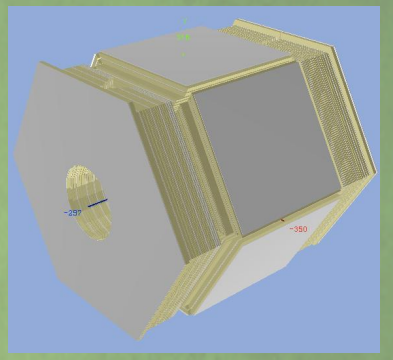
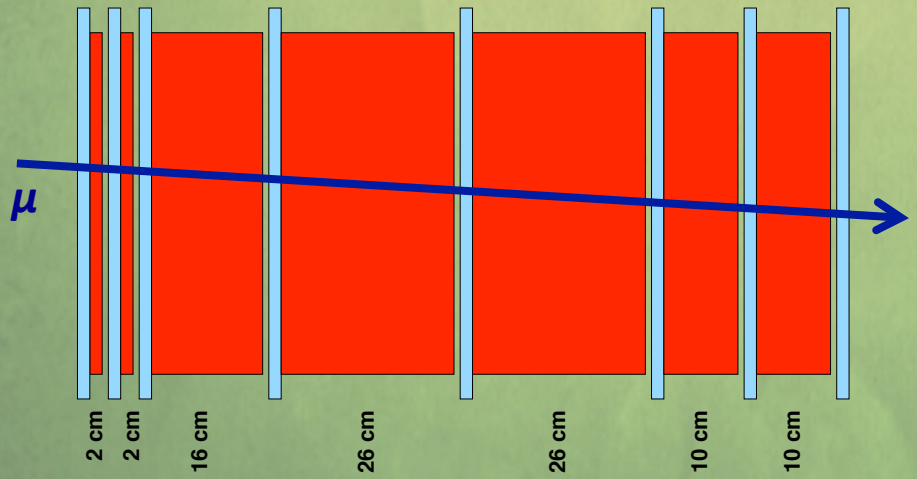
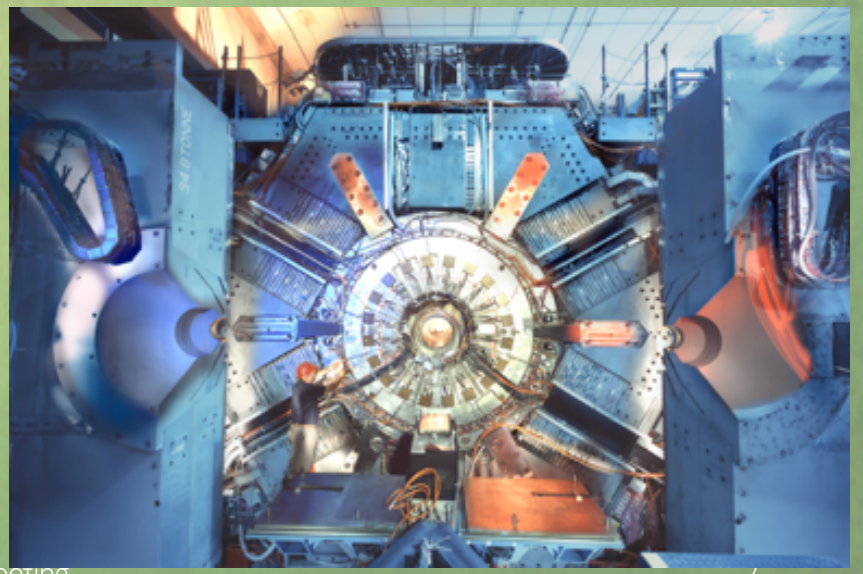
Introduction

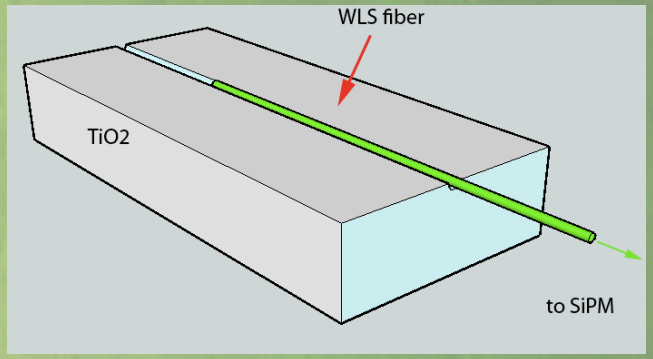


- Built in the magnet flux return, it will be composed by one hexagonal barrel and two endcaps
- Large active area
- Very high rates: hottest region up to few 100 Hz/cm^2
- Fine longitudinal segmentation in front of the stack for K_L ID capability (together with the electromagnetic calorimeter)
- Plan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

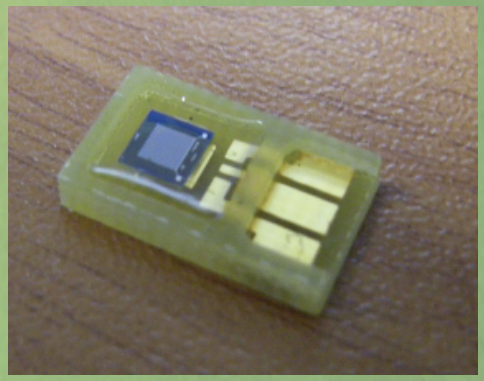




Detection technique

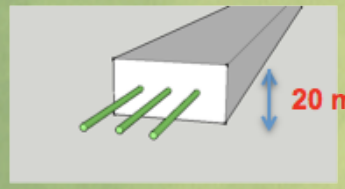


- **Scintillator:**
  - 2x4x400 cm^3 and 1x4x400 cm^3 scintillator bars
  - coated with TiO2
  - Light collection through WLS fibersFibers housed in embedded holes or grooves.
  - Made by FNAL NICADD facility.
- **WLS fibers:**
  - ϕ = 1.0 mm type Y11(300) (Kuraray)
  - ϕ =1.2mm type BCF92 (Saint Gobain)
  - Attenuation length λ ≈ 3.5m
  - trapping efficiency ε ≈ 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.

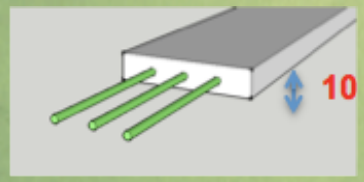


Timing and Binary readout

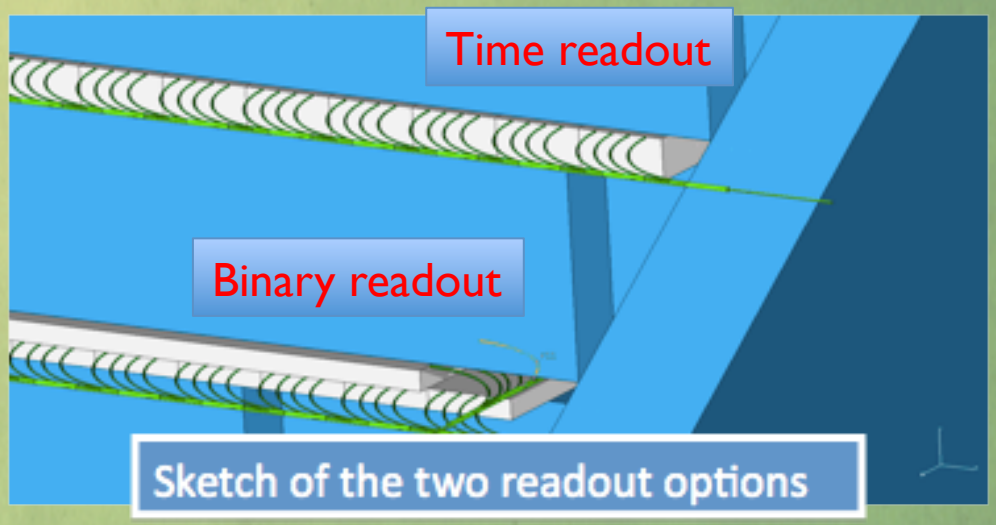
- Timing readout (Barrel): azimuthal coord ϕ measured from the hit bar, polar coord θ from the arrival time of the signal (read on both ends)



scintillator for Time Readout

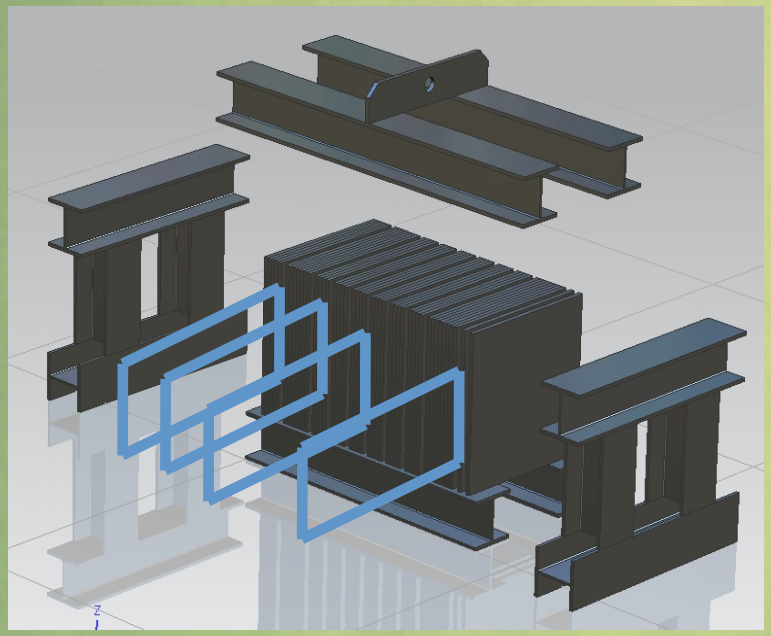


scintillator for Binary Readout



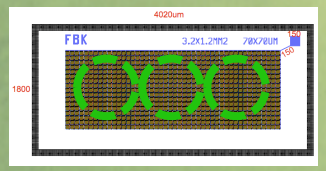
- Double coord binary readout (Endcaps): two layers of orthogonal scintillating bars provide directly the ϕ and θ coordinates (read each bar on one side only).

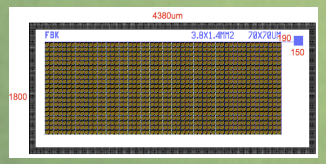
Prototype in a nutshell

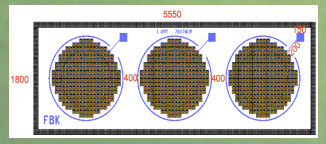


- Iron 60x60x92 cm^3 , 3cm gaps for the active layers

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



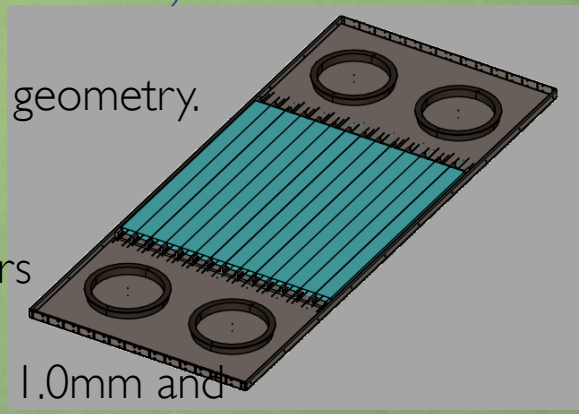




Active layers housed in light tightened boxes (aka Pizza Box)

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 the last months main effort on:
  - prototype construction (including SiPM characterization)
  - Electronics and DAQ development
  - Offline code for prototype developments
  - beam test preparation
  - beam test (installation and data taking)

- All other activities (essentially optimization studies with MC and background studies) slowed down.

Goal for this meeting (I)

- Review the prototype construction experience
  - mechanical issues
  - SiPM characterization procedure and results
  - electronics and data acquisition

- Review the beam test experience
  - installation of the prototype
  - operation of the prototype and running experience
  - operation of the Front End Electronics
  - DAQ and Online software
  - experience with Fermilab Test Beam Facility
  - measurement done and what's missing… and why.
  - first results

Goal for this meeting (II)

- What to do now
  - a complete analysis of the prototype data will need some months
  - in the meantime we have to plan the next beam test.
  - we have to fix/improve several things of the prototype and we have to perform cosmic ray tests.
  - develop our own TDC board.
- Not only prototype
  - iron optimization with simulation need to be finalized
  - KL studies should be done
  - the neutron background issue need to be addressed with both better simulation and tests
- We need a careful planning of the activities for next year

The path toward the TDR

- We have to provide a recommendation for the iron structure
- 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

IFR sessions

11:00->*12:30* Detector Systems I - IFR (Convener: Roberto Calabrese (*FE*)) (B237 - Baxter Room 237)

Description:

- Meeting URL http://evo.caltech.edu/evoNext/koala.jnlp?meeting=MvM2Ml2228DMDn9I9uDe9v
- Password: pasadena
- Phone Bridge
  ID: 265 2373
  Password: 0429

11:00	General Overview (10')	Gianluigi Cibinetto (*FE*)
11:15	SiPM characterization, prototype assembly and QC (20')	Wander Baldini (*FE*)
11:40	Test of neutron damage in Legnaro (15')	Enrico Feltresi (*PD*)
12:00	Discussion about plan for TDR (30')	

09:00->*10:30* Detector Systems II - IFR (Convener: Roberto Calabrese (*FE*)) (B237 - Baxter Room 237)

Description:

- Meeting URL http://evo.caltech.edu/evoNext/koala.jnlp?meeting=MtM8Ma2822DiD99B9tDs9t
- Password: pasadena
- Phone Bridge
  ID: 265 2586
  Password: 0429

09:00	Prototype installation and beam test (20')	Gianluigi Cibinetto (*FE*)
09:25	First results from beam test (20')	Mauro Munerato (*FE*)
09:50	Discussion about beam test (40')	