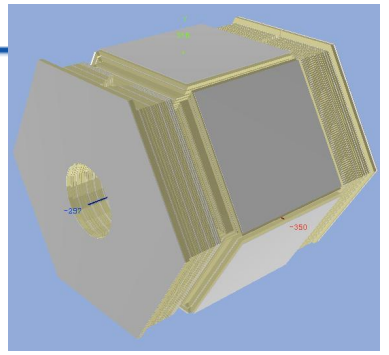
A sort of general overview

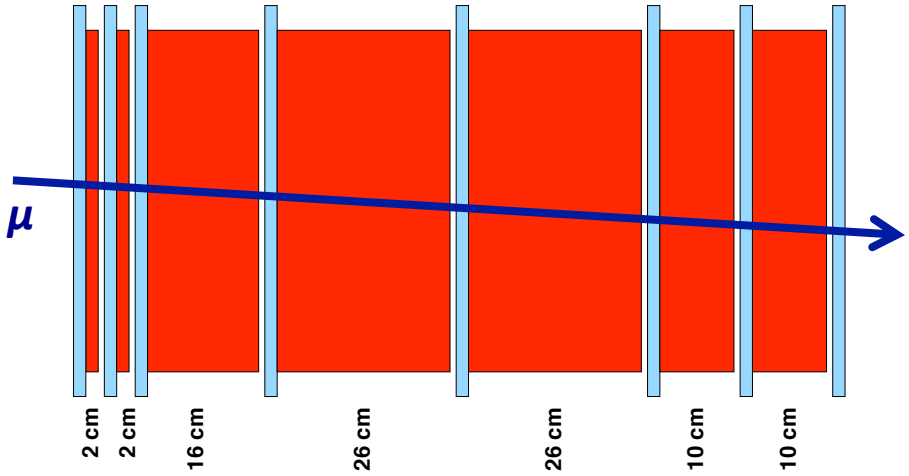
g. cibinetto

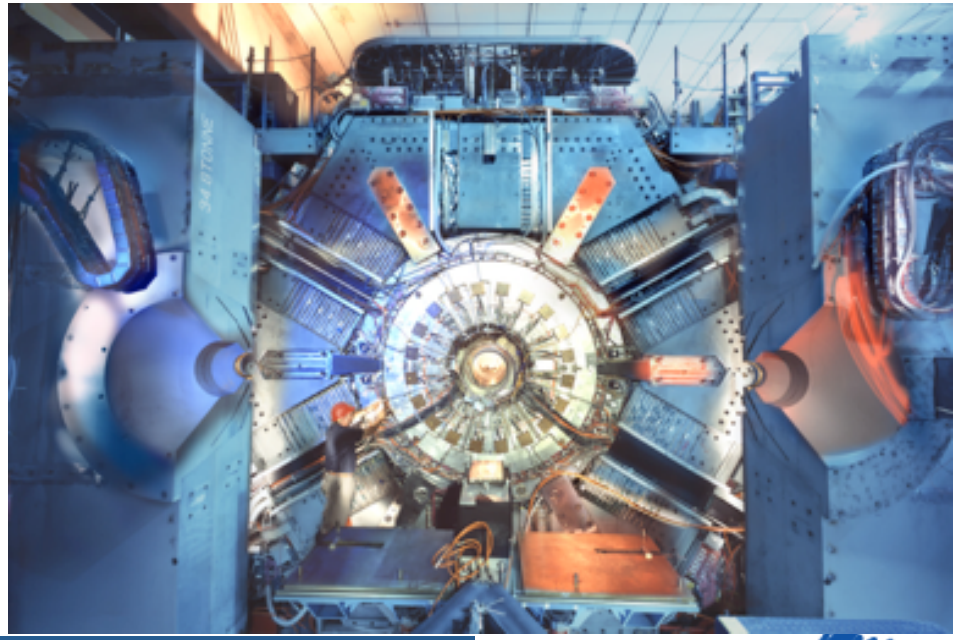
La Biodola – May 31 – Jun 4, 2012

The muon and K_L detector (aka IFR)

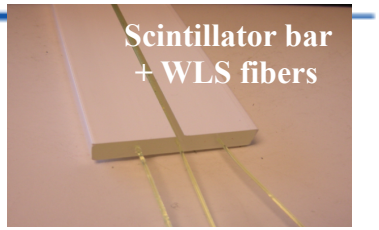


- Built in the magnet flux return, it will be composed by one hexagonal barrel and two endcaps
- Large active area
- Very high rates: hottest region up to few 100 Hz/cm^2
- Fine longitudinal segmentation in front of the stack for K_L ID capability (together with the electromagnetic calorimeter)
- Plan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



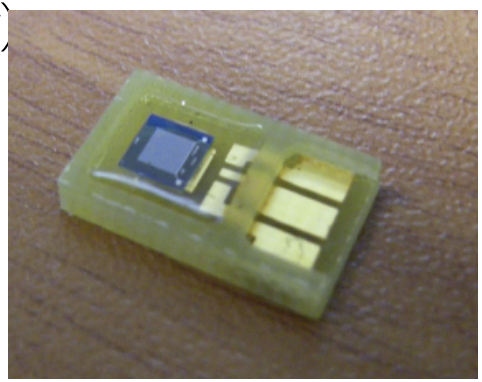


The detection technique



- **Scintillator:**
  - 2x4x400 cm^3 and 1x4x400 cm^3 scintillator bars
  - coated with TiO2
  - Light collection through WLS fibers housed in embedded holes or grooves.
  - Made by FNAL NICADD facility.

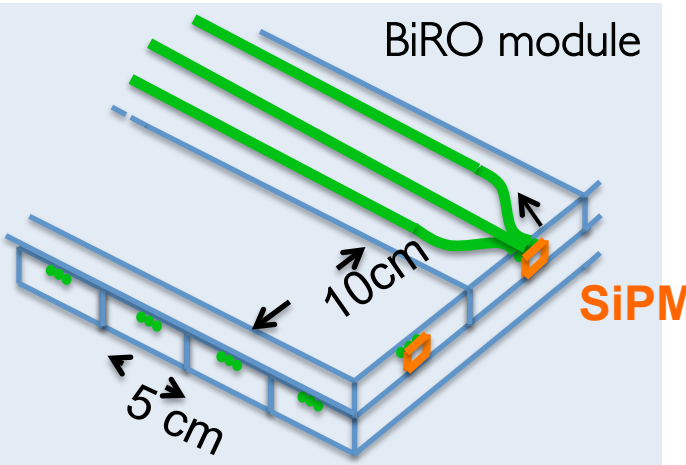
- **WLS fibers:**
  - ϕ = 1.0 mm ane 1.2 mm type Y11(300) (Kuraray)
  - Attenuation length $\lambda \approx 3.5$m
  - trapping efficiency $\varepsilon \approx 5.5\%$



- **Photodetectors:**
  - Silicon Photo Multiplier (FBK-IRST, Hamamatsu)
  - Gain $>10^5$
  - < 1ns risetime
  - Low bias voltage (30V – 70V)
  - Dark current rate @ room temperature few 10KHz @ 3.5 p.e.

IFR overall status

Critical issues for final detector design



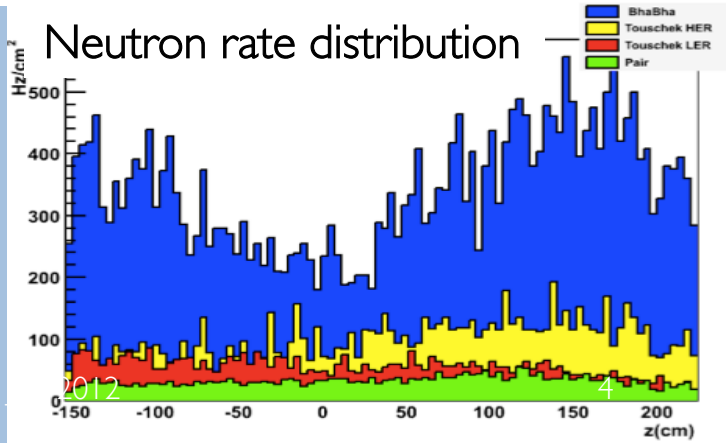
☑ Binary readout vs time readout for the barrel ➡ Binary readout is now our baseline

☐ Number of active layers: 8 vs 9 ➡ 9 active layers is the baseline for the TDR, but the 8-layer option is not discharged

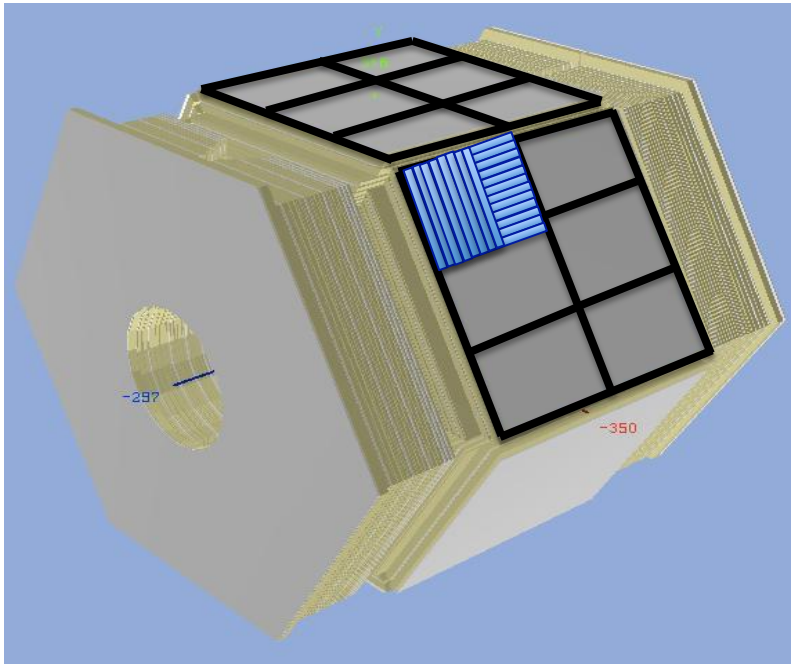
☐ Amount of absorber and flux return configuration ➡ 92cm of iron is the current baseline for the TDR. Under investigation the possibility to use less absorber. In any case the BaBar iron will be reused with no major modification.

☑ Position of the photodetectors

SiPM will be placed at the end of the scintillators inside the gaps. Neutron rate is high (up to some 100Hz/cm^2) but with the binary readout it's possible to rise the thresholds to reduce the increasing of the noise.

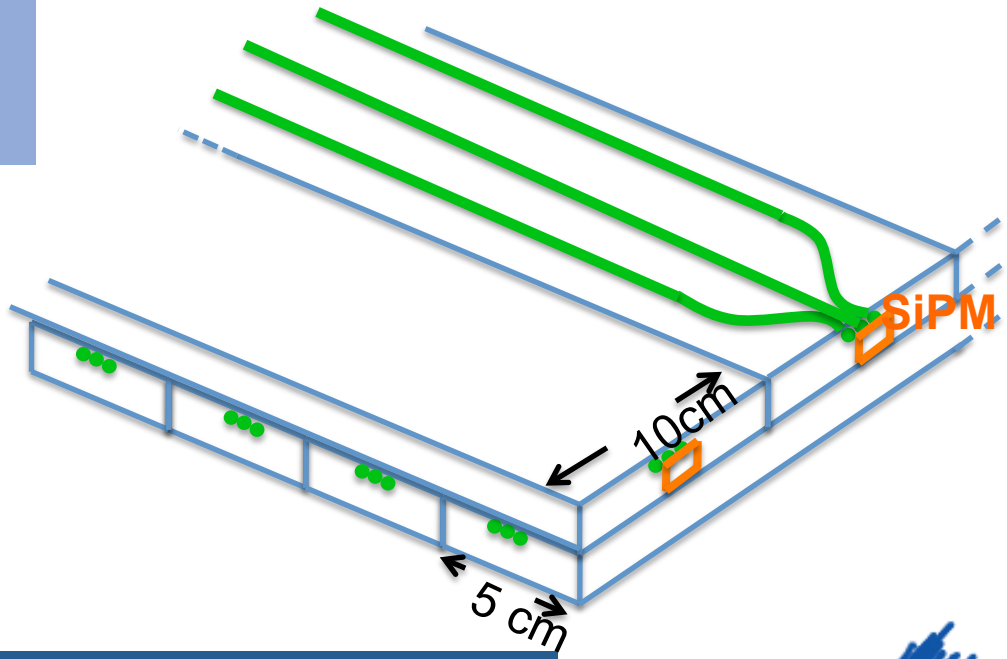


BiRO readout



- phi strips:
  - L≈2m
  - Thickness = 1cm
  - width = 5cm
- Z strips:
  - L= depends on layer
  - Thickness = 1cm
  - Width = 10cm
- Photodetectors only at one end of each strip

The binary readout is the baseline for all the detector.



Flux Return Mechanics

- Reuse of the BaBar iron as it is, filling the gaps with more material taking advantage of the additional space we may have.

- Is that viable? i.e. do we really have enough additional space (almost) everywhere?

R & D results

- New R&D results will be shown. Very useful crosschecks and interactions between the institutions involved; some longer term planning will be also discussed here.

- The ITEP group provided a different kind of scintillator that has been tested.

- New R&D results will be shown here.

Data analysis and software update

- Refinements of the development presented at the last meeting
  - possibility to handle MC and test beam data
  - improved clusterization
  - improved MC reconstruction
  - prototype hybrid readout implemented

- Other code upgrades have been done by Marcin to the
  - new 2D clusterizer
  - new BiRO hits clusterizer
  - new track fitter

- the data analysis largely benefits from the new features.

- data analysis is ongoing
  - prototype performances
  - digitization

Background simulation

- Rate update and new studies on rad BhaBha events will be presented.
- New background estimates from pairs, BeamGas sources.
- Background shielding has become a common issue, the new production has either thicker tungsten shielding either some neutron absorbers.

Electronics and SiPM irradiation tests

- New measurements neutron irradiation and remediation are foreseen for the next year at the Gelina Neutron Source at IRMM (Geel, Belgium) in July.
  - plan to irradiate SiPM, FEE and detector materials (scintillators, glue, optical grease, ….);
  - plan to study the effect of absorbers (probably provided by the facility);
  - energy spectrum from thermal neutron to ~100keV

- New tests are foreseen for the end of the year at ISIS with a beam spanning up to some MeV and with the possibility to select the neutron momentum range.

TDR preparation status

- IFR sections and subsections structure has been prepared at the London meeting. Responsible people for each part has been identified.

- A first draft is expected now (?) and the full report few months later.

- The present IFR situation is the following:
  - ?

- Please send me your write up as soon as you have it.

Goal for this meeting

- Review advancements and results on different activities so far.

- But… the main focus will be on the TDR preparation

IFR sessions

16:00->*17:30* Parallel 1: IFR (Convener: Roberto Calabrese (*FE*)) (Sala Elena) EVO meeting URL; EVO meeting information

16:00	General overview (20')	Gianluigi Cibinetto (*FE*)
16:20	Ongoing R&D Activities (25')	Wander Baldini (*FE*)
16:45	IFR electronics status (20')	Angelo Cotta Ramusino (*FE*)
17:05	Krakow electronics activities (20')	Wojciech Kucewicz (*AGH- KRAKOW*)

18:00->*19:30* Parallel 2: IFR (Convener: Roberto Calabrese (*FE*)) (Sala Elena) EVO meeting URL; EVO meeting information

18:00	Flux return design (15')	Massimo Benettoni (*PD*)
18:15	R&D in Bologna (20')	Alessandro Montanari (*BO*)
18:35	Module mechanics (15')	Vittore Carassiti (*FE*)
18:50	TDR status and discussion (40')	

08:30->*10:30* Parallel 3: IFR (Convener: Roberto Calabrese (*FE*)) (Sala Elena) EVO meeting URL; EVO meeting information

08:30	Background simulation status (20')	Valentina Santoro (*FE*)
08:50	Beam test data analysis (20')	Marcello Rotondo (*PD*)
09:10	Krakow workshop (10')	Tadeusz Lesiak (*IFJ-PAN - KRAKOW*)
09:20	TDR discussion (1h00')	

Other IFR talks

- IFR frontend electronics by Angelo Cotta Ramusino
- IFR: beam-gas background report by Valentina Santoro