EMC summary

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Update on LYSO

Caltech has ordered 2 crystals for ring 8 at SIPAT, test them before to place the rest of the order (11 crystals), dimensions, FWHM resolution and L.O.

Type	V2 (cm³)	Price2/Xtal
Ring 10	$114.37	$4,574.92
Ring 9	$110.97	$4,438.99
Ring 8	$107.58	$4,303.05
Ring 7	$104.15	$4,166.09
Ring 6	$100.75	$4,030.16
Total	**2689.15**	**$107,566.01**

	E.R. (DOW Corning 200 fluid coupling) @ different points (%)							Mean value (%)
Sample ID	1	2	3	4	5	6	7	
CTI-1	11.5	11.1	11.0	10.8	10.8	10.8	10.9	11.0
SG-3	9.7	9.4	9.2	8.9	8.8	8.8	8.8	9.1
SIPAT-1	13.2	12.5	12.3	12.1	12.3	12.4	12.4	12.5
SIPAT-5	12.6	11.8	11.5	11.3	10.9	11.0	11.1	11.5
SIPAT-6	12.3	11.6	11.3	10.9	10.6	10.3	10.2	11.1

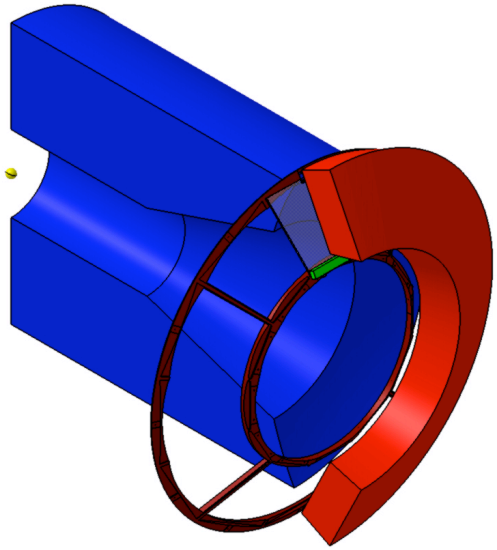
Price at St. Gobain 6.3Keuro/crystal
→ about 57euro/cc (40$/cc SIPAT) factor of 2!!!

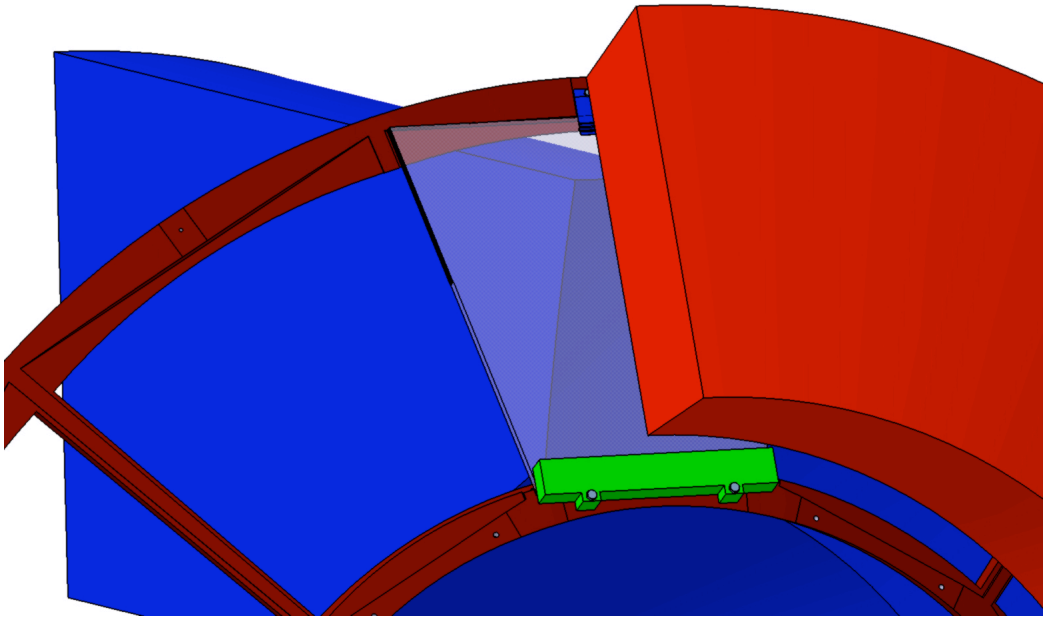
Crystals procurement is OK for BT

Mechanics

After the visit to the second company for the structure for the BT it seems that MS Composites will not be able to deliver the product within our deadline (delivery foreseen for mid May) → place the order at RIBA (29.5 Keuro).

M. Lebeau has visited engineers in Orsay working on the PID structure and there is now a proposal for a possible solution to fix the PID to the FWD EMC.





Electronics

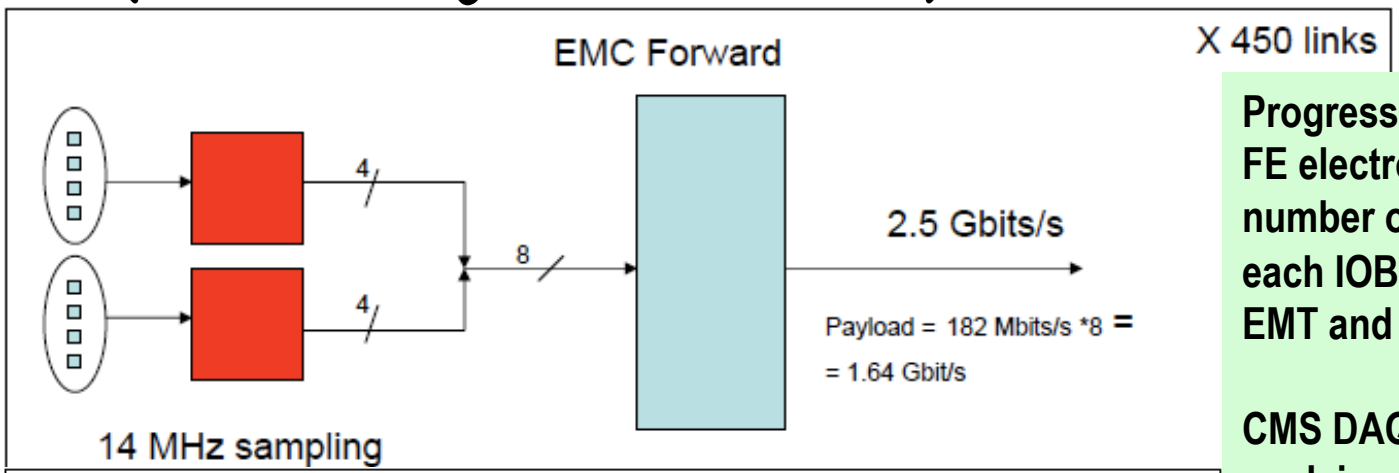
VFE board status:

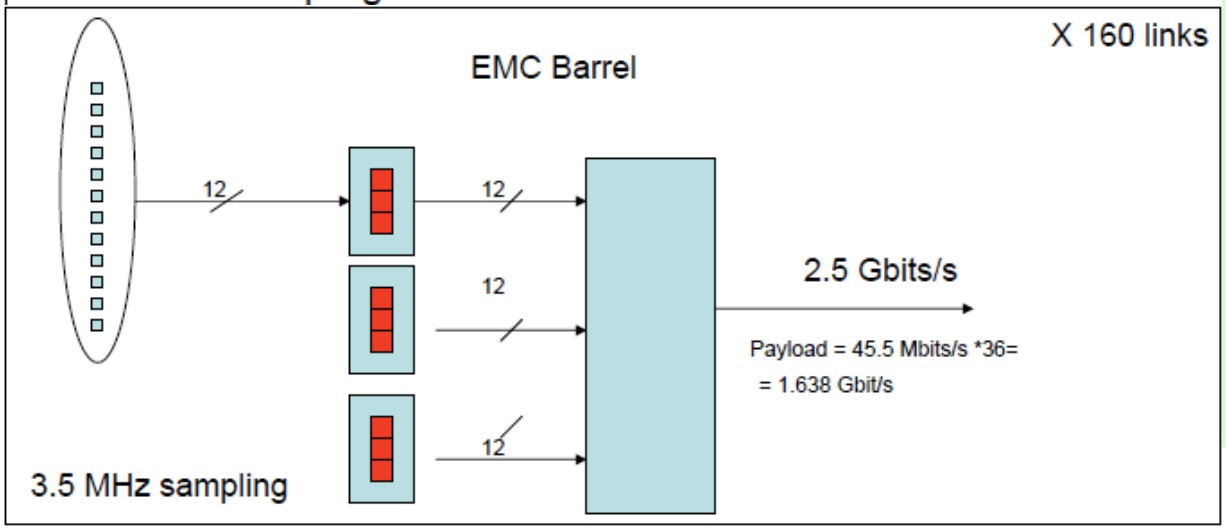
-Simulation of different circuits is done to study the basic principle used in the development of the boards

-Schematic are ready

-PCB footprint to the Allegro PCB

-integrate ECAL mechanics information to finalize board layout (M.L. at Perugia December 10th)



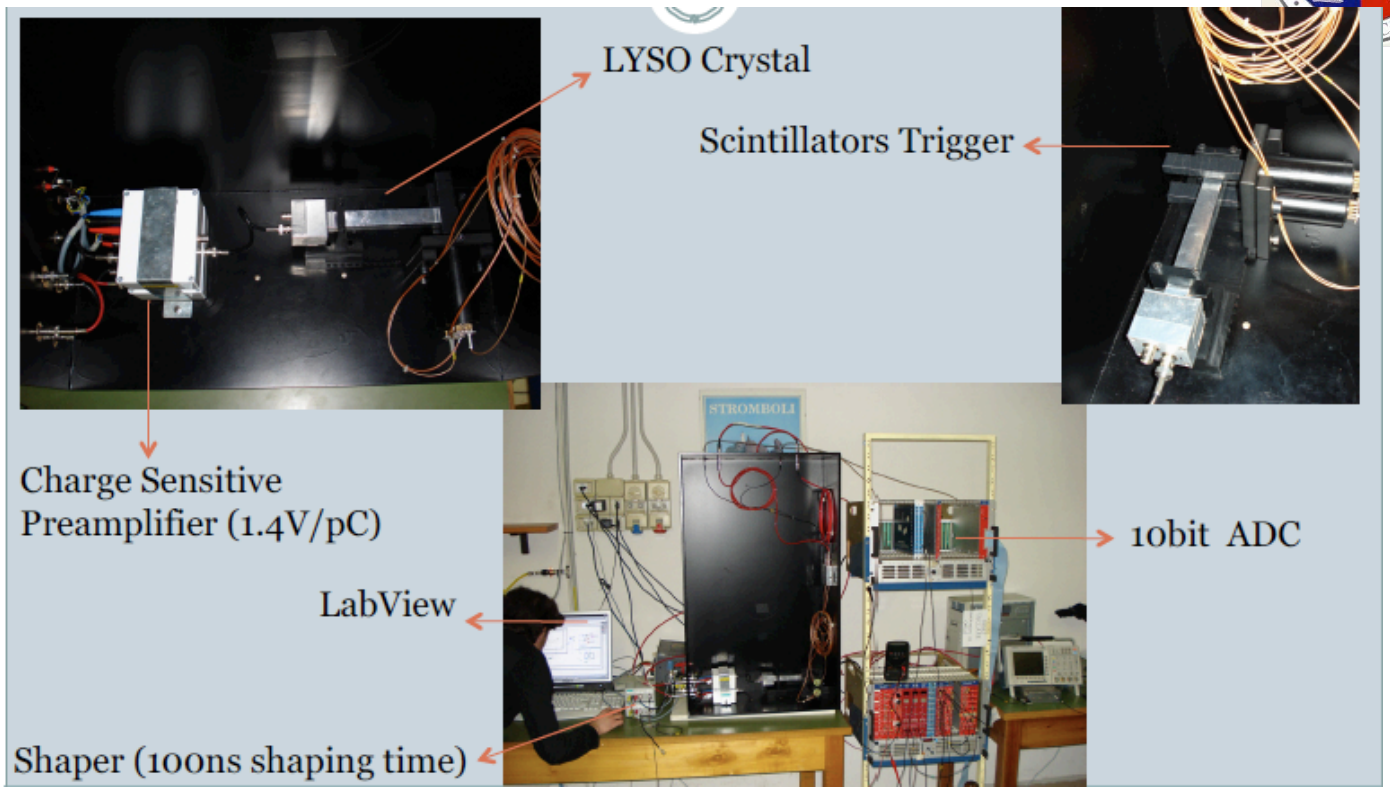


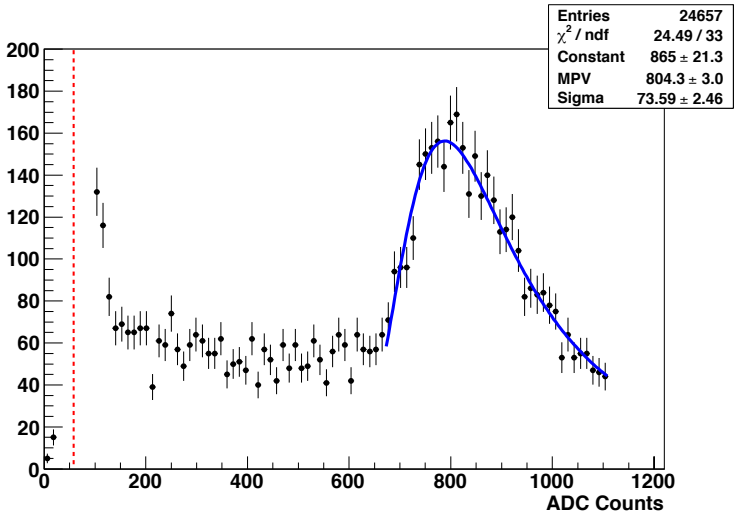
Progress in the design of the readout and FE electronics for the forward EMC, huge number of links possible solution:
each IOB sends one 1.25Gbits/s link to EMT and on 2Gbit/s link to ROM.

CMS DAQ system is under study, some work is needed to have it working for the beam test (OK Caltech will do it)

Integration with ancillary systems at BTF and CERN is
under investigation (possible solutions have been found and discussed during this meeting, OK Rome will do it)

System test at PG





-System is working well
-rate 2/3 events per minute
-Very useful system to study different readout
CREMAT CSP CR110 CR111
HAMAMATSU CSP H4085
…….

TB BTF(April 2010) and CERN (October 2010)

BTF (April 12th May 2nd) :

-fibrometer for the monitoring of the beam should be enough, DAQ is already available (DAQ is in place with 16 ADC channels)

-Scintillator to trigger

CERN (July 19th - August 9th or October 11th - 31st):

-wire chamber + scintillator are available upstream of the test area and are read by their DAQ for beam tuning

-thrershold Cerenkov counters 2 installed in T9, 1 optionally available at T10. Equipped with manual gas control and stanard PMT. Provide our own HV power supply and readout electronics

Crystals procurement ongoing

Electronics development ongoing

DAQ work is ongoing + solutions envisaged for integration of ancillary

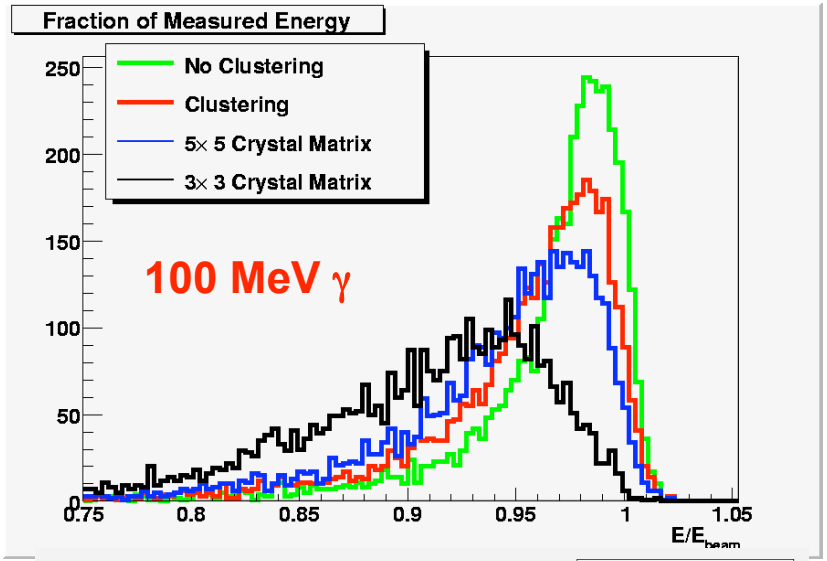
Mechanical structure place the order next week

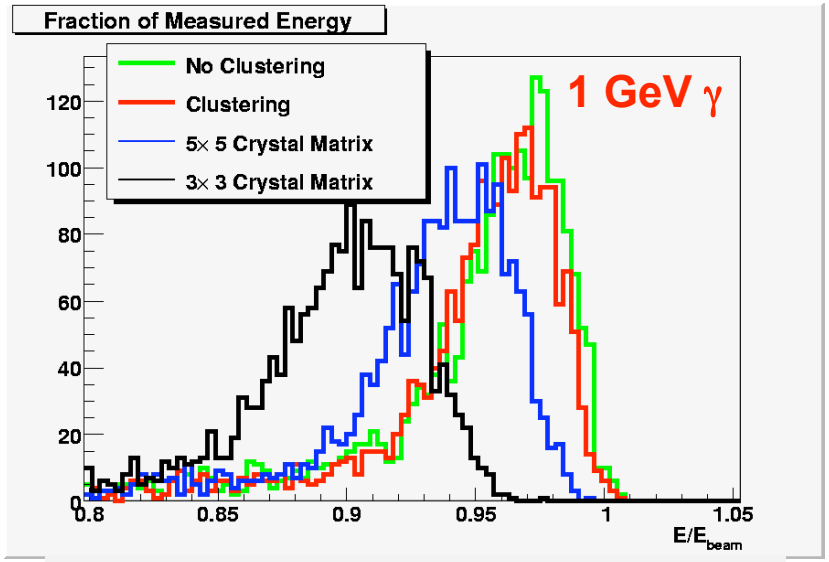
Silicon telescope work in progress ready for end of February 2010

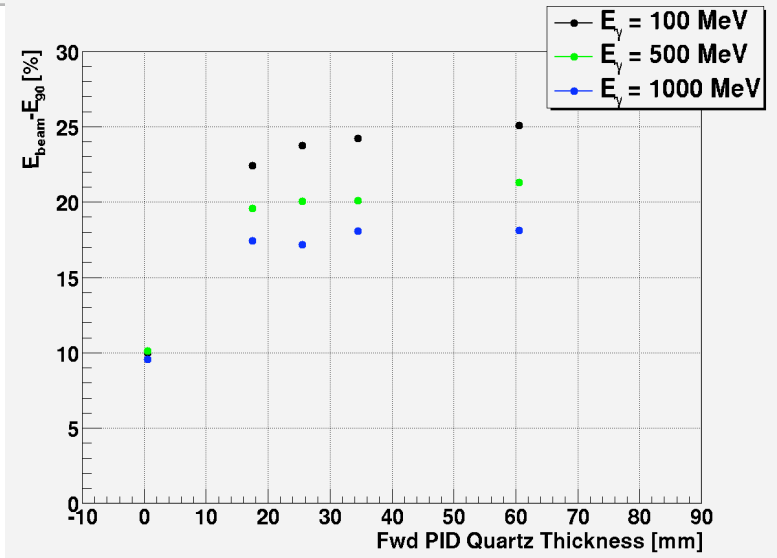
Simulation

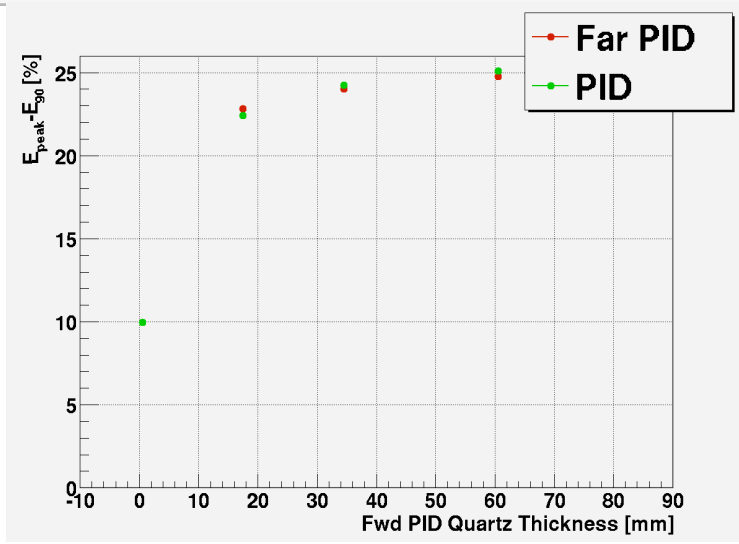
Starting from the problem of the PID material in front of EMC a clustering algorithm has been developed.

Remember not very clear and understandable results without clustering at SLAC meeting (resolution was better adding more material)





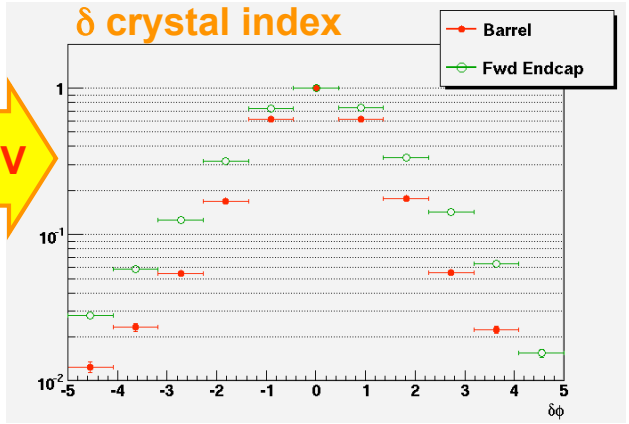


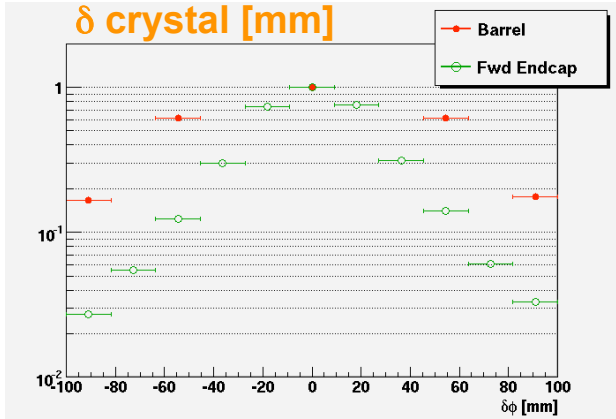


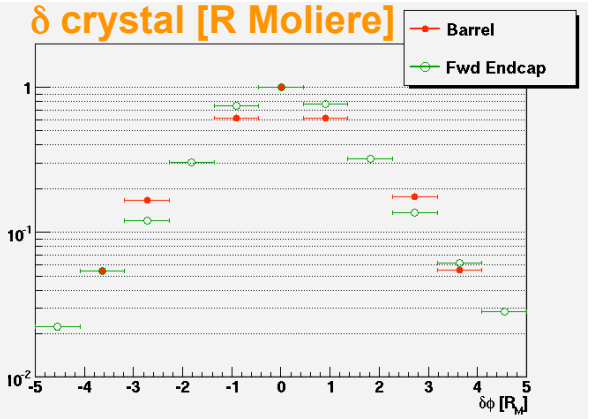
Simulation cont'd

- Projection (ϕ) of crystal distance from maximum energy crystal
- Distribution centered on the maximum energy crystal

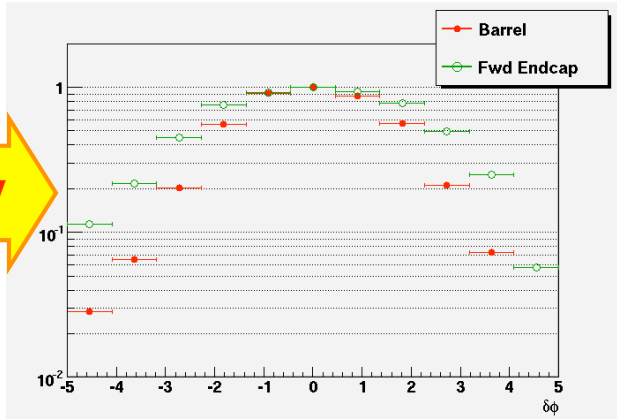
100 MeV

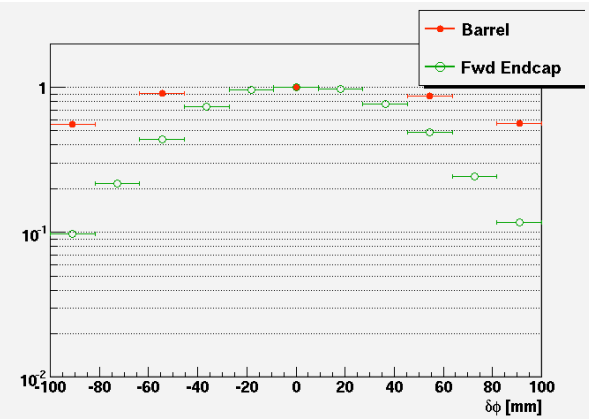


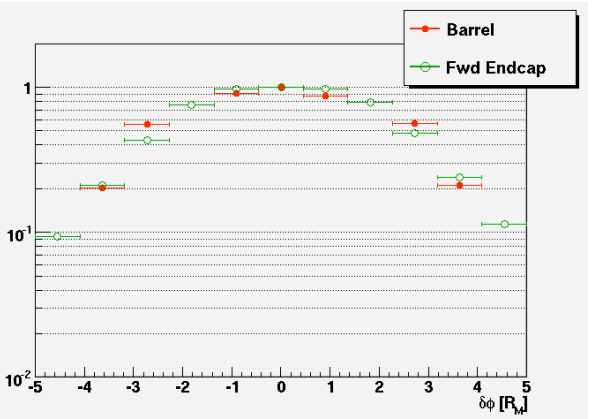




1 GeV







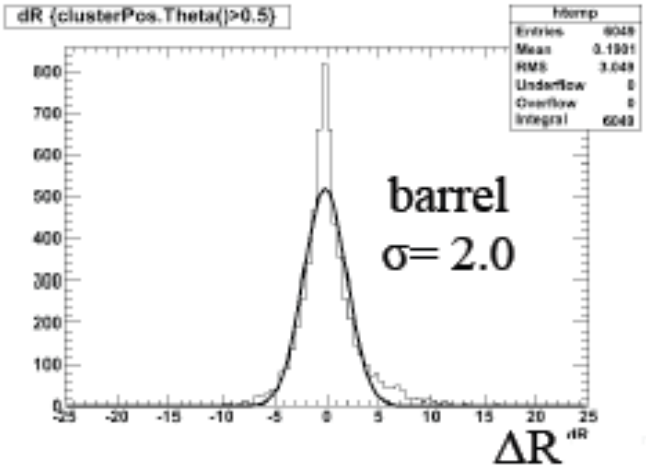
The Fwd Endcap has a wider distribution in terms of number of crystals but in term of Moliere Radii thw width is the same for Barrel and Encap

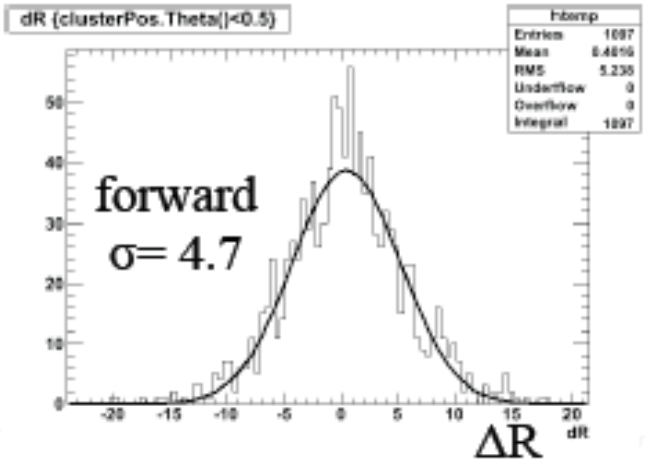
Fast Sim studies

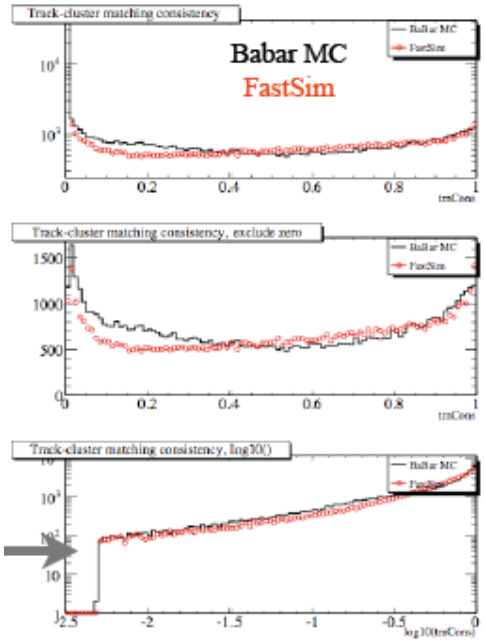
Status October 09:

-problem in the matching cluster-track bug fixed

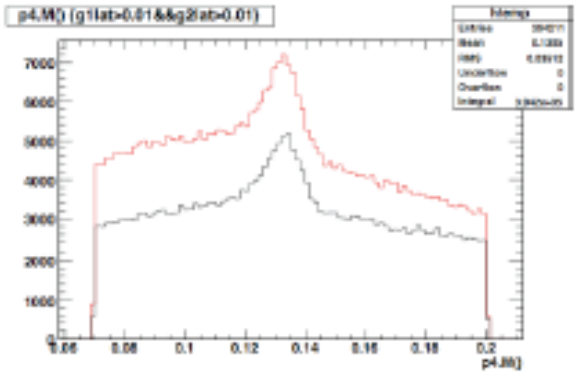
Study of the radial resolution set σ_R to 2 and 4 for barrel and fwd



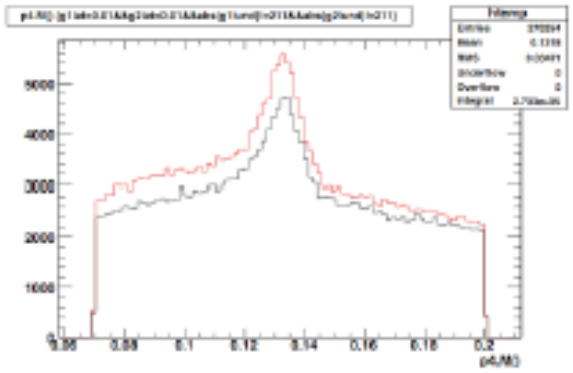




-$\pi^0 \rightarrow \gamma\gamma$ resolution OK but too much bckg most extra neutrals come from pions

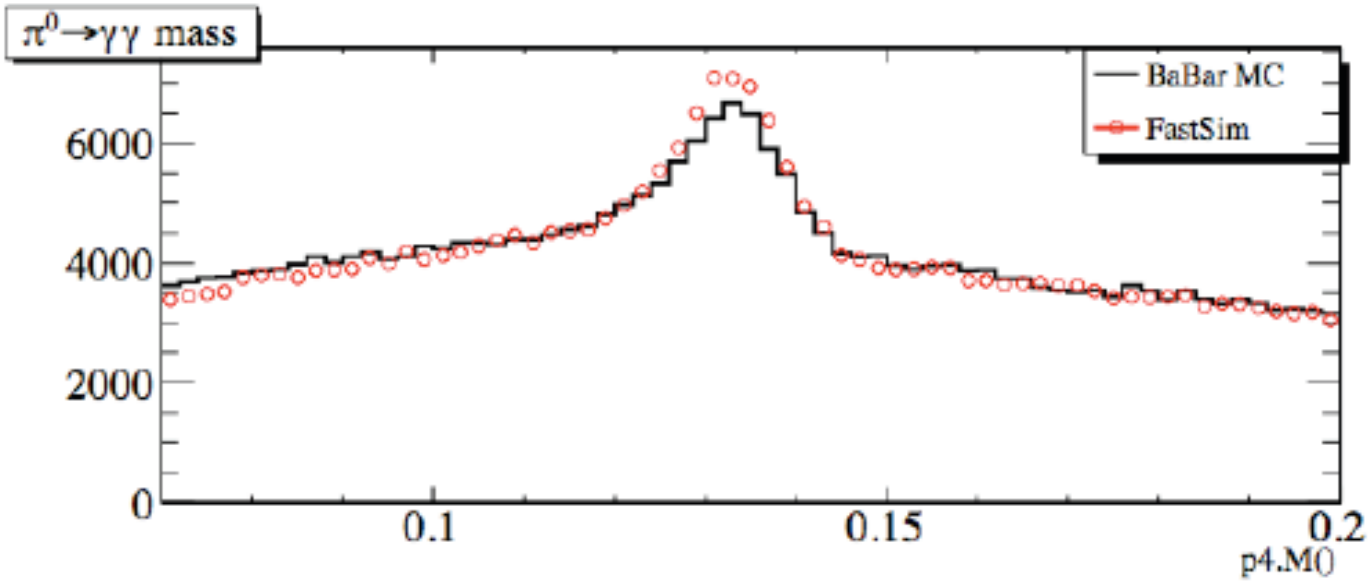


Remove neutrals from pions



Fast Sim studies cont'd

Splitting of clusters: clusters with N local maxima are splitted in N clusters → too many for low energy MIP

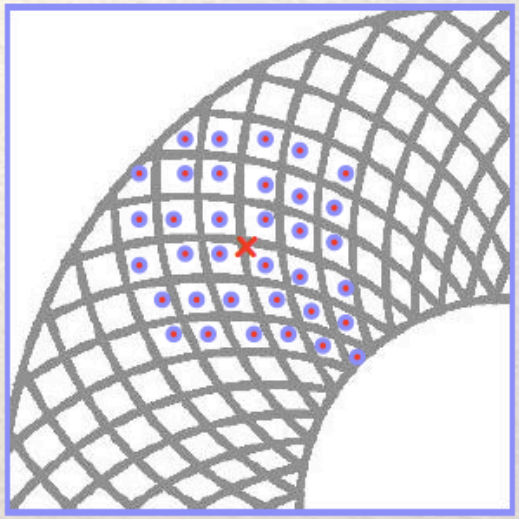


B0B0bar events

Backward endcap

Prototype Design

- Use 75 cm x 75 cm scintillator plates (24 layers)
- Use 75 cm x 75 cm lead plates (24 layers)
- Cut outer and inner circular edges
- Cut boundaries of the 6 strips
- Cut 6 grooves for fibers
- Instrument 6 strips in each layer with Y11 fiber and MPPC
- Place UV LED at inner edge
- Place temperature sensor near MPPC



➔ In this setup, scintillator & PB plates can be reused for full detector

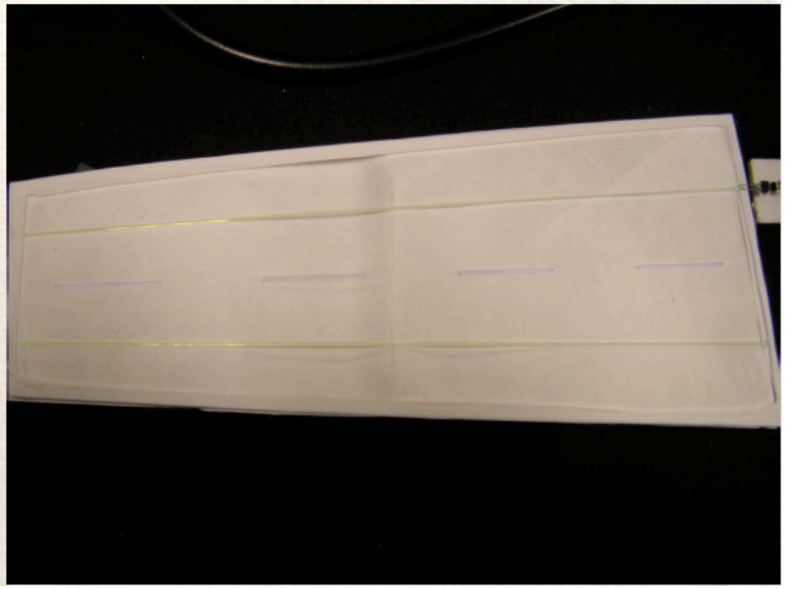
Cost estimate for prototype
67 K$ (49 already available)

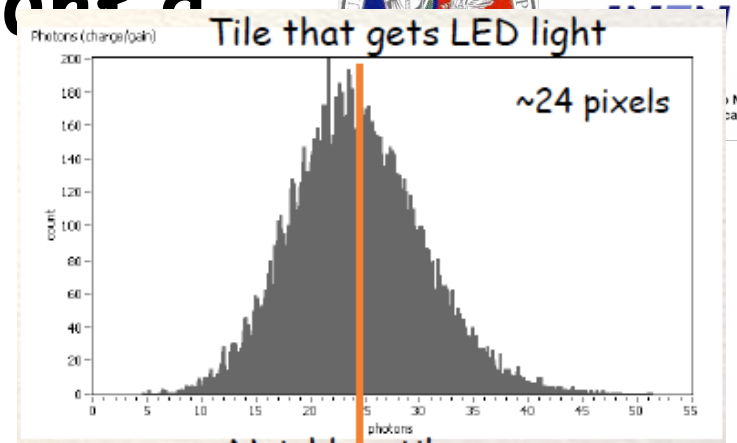
Order next week for:
scintillator
Y11 fiber
MPPC's
Diffuse reflector
1 preamplifier

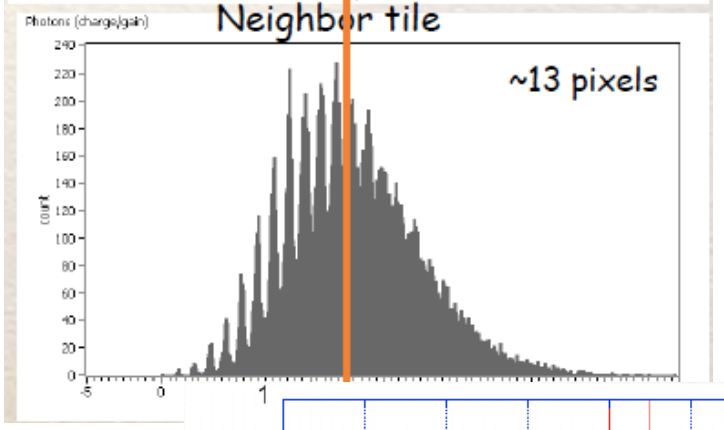
Backward endcap cont'd

Setup for Cross Talk Measurements

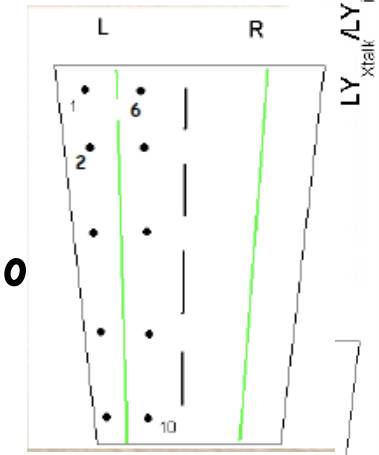
- 2 connected scintiilator strips
- Bridges are clearly visible
- Strips are covered with Tyvec sheets edges are wrapped with Teflon

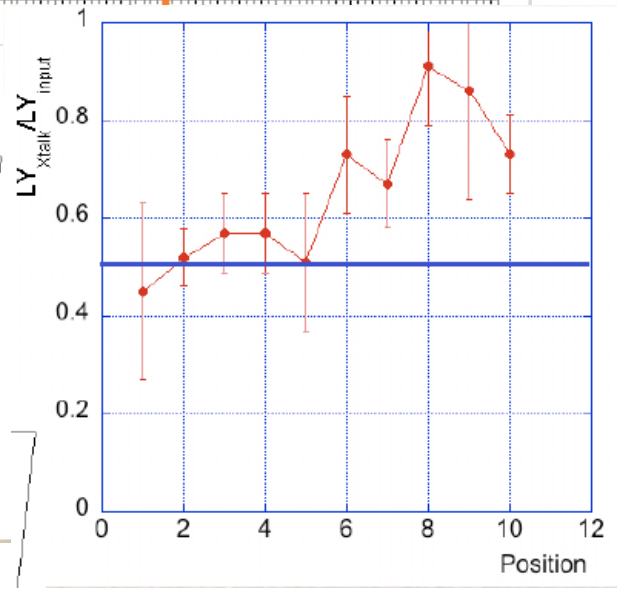




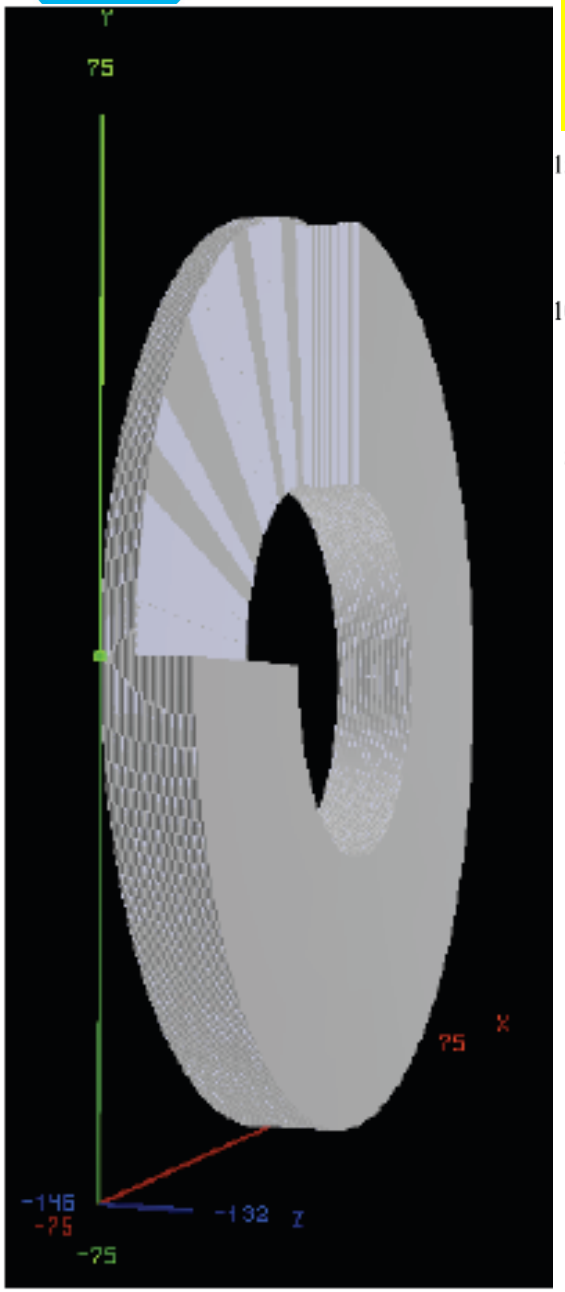


-2 tiles connected by bridges that covers 50% of the total length
-total length 12'
-shine light from a LED via clear fiber into tile
-measure with the same detector light to the illuminated tile and then neighbor
-repeat measure few time

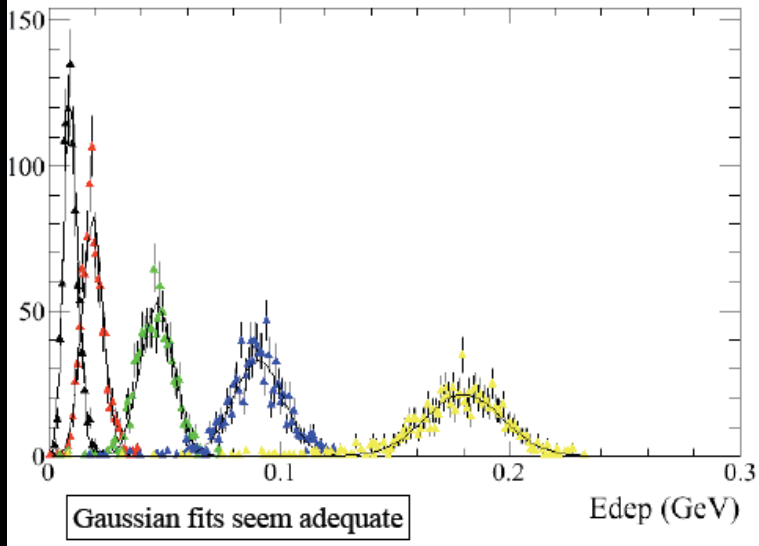


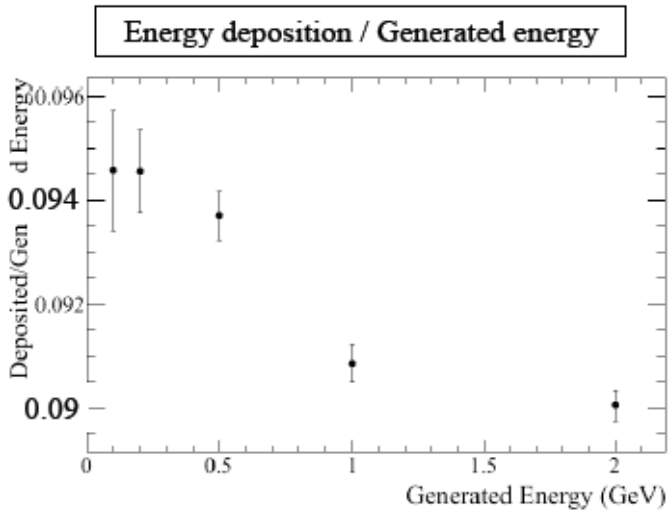


Full sim for Bkw endcap



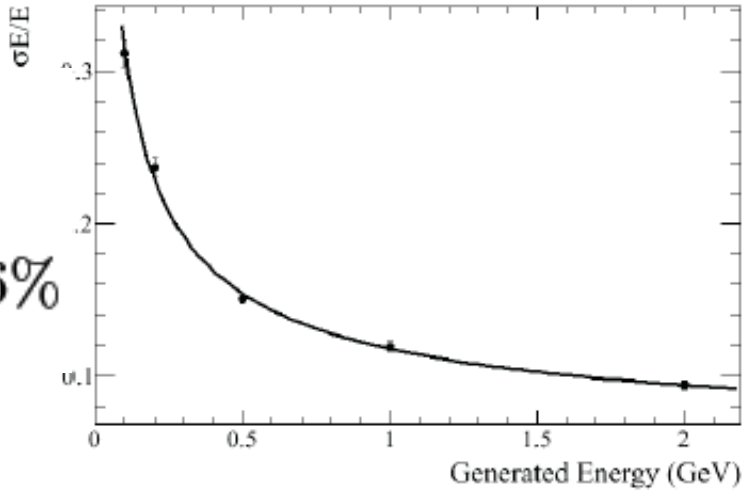
Geometry description in gdml file is now available



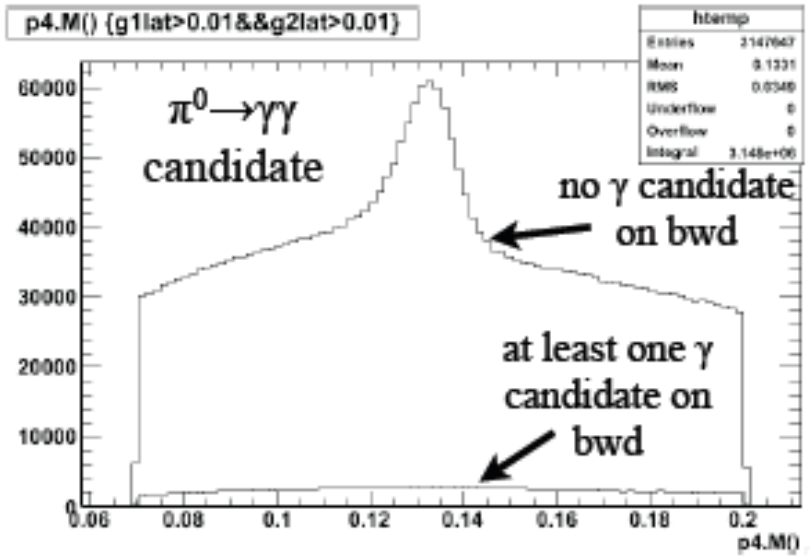


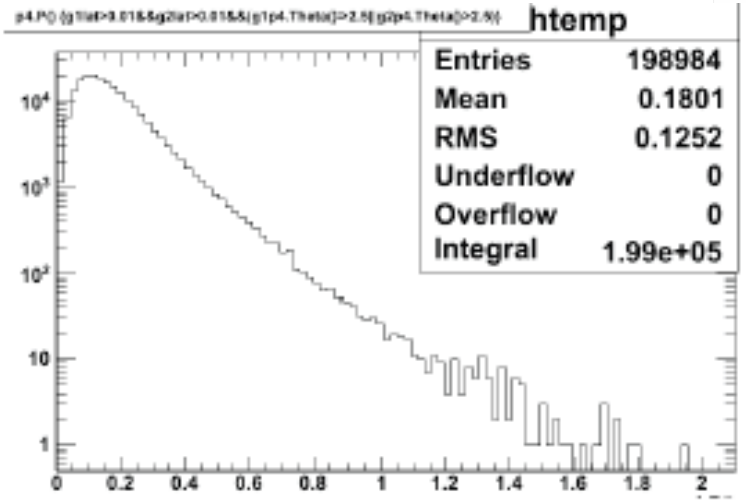
Gaussian fit width

$$\frac{\sigma_E}{E} = \frac{10\%}{E(\mathrm{GeV})^{0.485}} \oplus 6\%$$

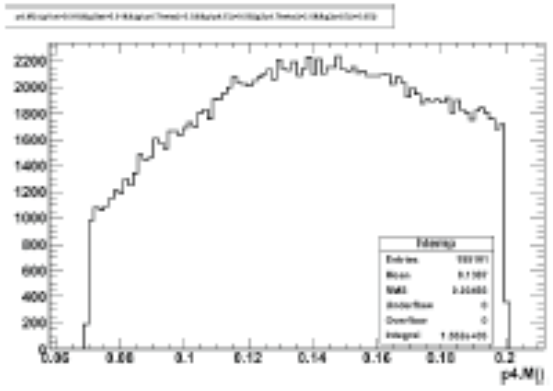


Fast Sim studies for BCKW

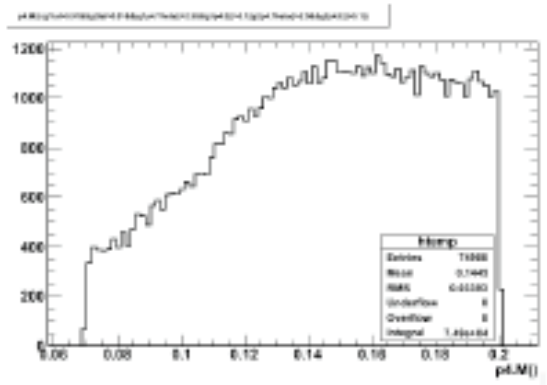




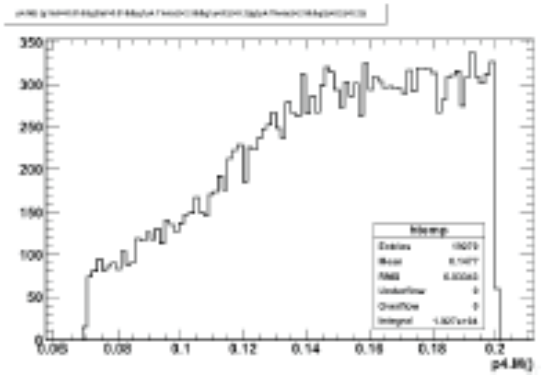
$\pi^0 \to \gamma\gamma$ candidate momentum with at least one γ candidate on bwd.



bwd Eγ > 50MeV



bwd Eγ > 100MeV



bwd Eγ > 200MeV

Quite difficult to reconstruct $\pi^0 \to \gamma\gamma$

White paper

First DRAFT is ready, to do:

-simulation studies

-update budget (electronics for Barrel in view of the changing of shaping time)

DRAFT
EMC Section for White Paper
Draft version 91130

0.1 Introduction

The SuperB electromagnetic calorimeter (EMC) provides energy and direction measurement of photons and electrons, and is an important component in the identification of electrons versus other charged particles. Three principle components make up this system, the barrel calorimeter, the forward endcap calorimeter, and the backward endcap calorimeter. [Reference general detector drawing in an earlier chapter]

Table 1 shows the solid angle coverage of each calorimeter. The total solid angle covered in the center-of-mass (CM) is 94.1% of 4π.

Table 1: Solid angle coverage of the electromagentic calorimeters. Values obtained assuming the barrel calorimeter is in the same location with respect to the collision point as for BaBar. The CM numbers are for nominal 4 on 7 GeV beam energies.

Calorimeter	$\cos\theta$ (lab)	$\cos\theta$ (CM)	Ω (CM)(%)
Backward	(-0.974,-0.869)	(-0.985,-0.922)	3.1
Barrel (BaBar)	(-0.786,0.893)	(-0.870,0.824)	84.7
Barrel (SuperB)	(-0.805,0.893)	(-0.882,0.824)	85.2
Forward	(0.894,0.965)	(0.825,0.941)	5.8