

October 15, 2015

08:30

Experiment Setup:

We install the shashlik cell equipped with DSB1 fibers connected to clear fibers and then attached to 4 SiPMs. Photek is put behind the shashlik cell as a timing reference.

The table is placed at location ($X = 50\text{mm}$, $Y = 445\text{mm}$) for the shashlik cell to be in the beam spot. This was measured by eye. We will perform a scan to confirm this position.

Warning: Table default X position is too far to the right and will pull on cables. So do not move the table to default position in X.

Data online :

data is on pcethtb3.cern.ch

user: cmsdaq

PW: .cms.daq.2014

/rawdata/raw/DataTree/...

Data offline :

pccit31

/home/bornheim/CERNTB/Fall2015/DataTree

eos :

/eos/cms/store/group/dpg_ecal/alca_ecalcalib/ECALTB_H4_Fall2015/raw/DataTree/

9:00

We found one area upstream of us that was in access. turns out nobody was there. we close the area.

We select Beam option 052.

Beam doesn't seem to coming to us. We call the main control room and they discovered some beam block that wasn't in the right position. After this we see beam. But getting 50,000 counts per spill. Adi says this is too much and suspects it's not electrons.

09:20

We start a run and see what happens.

Run 4253: don't see any pulses. hodoscope shows the beam profile is correct.

09:30

Actually we do see some pulses, but they are very rare. most likely we're not aligned. photok has some pulses, scintillator has some pulses.

09:51

Move table to X=510, Y=445

Run: 4254

photok has some pulses, scintillator has some pulses.

Move table to X=520, Y=445

Run: 4255

photok has some pulses, scintillator has some pulses.
adi says it is less pulses and smaller now.

Move table to X=530, Y=445

Run: 4256

10:20

We did access to re-measure the position. Placed aluminum bars below the box to raise the box because the table is at.

Move the table to position

Run: 4257

Run: 4258 (position X=500, Y=399)

Run: 4259 (position X=510, Y=399)

Code to analyze the CAEN data is committed on github:

<https://github.com/CaltechPrecisionTiming/CPT-CERN-October2015>

to compile, run make. Then run with:

“./analyze_Shashlik inputFileName.root outputFileName.root”

Run 4260 to 4288 : Table alignment.

A handwritten table in a notebook on grid paper. The table has six columns: #Run, X, Y, # (#7), Events, and a percentage. The data is as follows:

#Run	X	Y	# (#7)	Events	
4289	50	380	~6/10	~111368	~68.5%
4290	55	380	~4	~48K	~62%
42891	45	380		~15K	~37%
42892					
42893	51	380		~14K	68.3%
42894	<u>51</u>	<u>385</u>		~11K	82.5%
42895	51	390		~8K	53.3%
42896	51	384		~54K	82.4%
4297	48	385		~27K	80.0%
4298	48	385		~50K	75.4%
4299	54	385		error ~22K	
4300	54	385		52K	80.7%
4301	51	382		~7K	

Good table position is $x=51$, $y=382$

from 100 GeV electron data with DSB fiber

digi channel 0, LR : small amplitude, large SiPM 1st batch

digi channel 1, UL : ~ 1000 ADC counts, large SiPM, 2nd batch

digi channel 3, LL : \sim few 100 ADC counts, small SiPM, 2nd batch

digi channel 4, UR : ~ 1000 ADCcounts, small SiPM, 1nd batch

15.10.2015, 19:00

put in capillaries :

ch0 : S084

ch1 : S091

ch3 : S086

ch4 : S085

in this process, realised that ch0 fiber on SiPM might not have been inserted fully into support tube and facing the SiPM.

scan cell with 100 GeV :

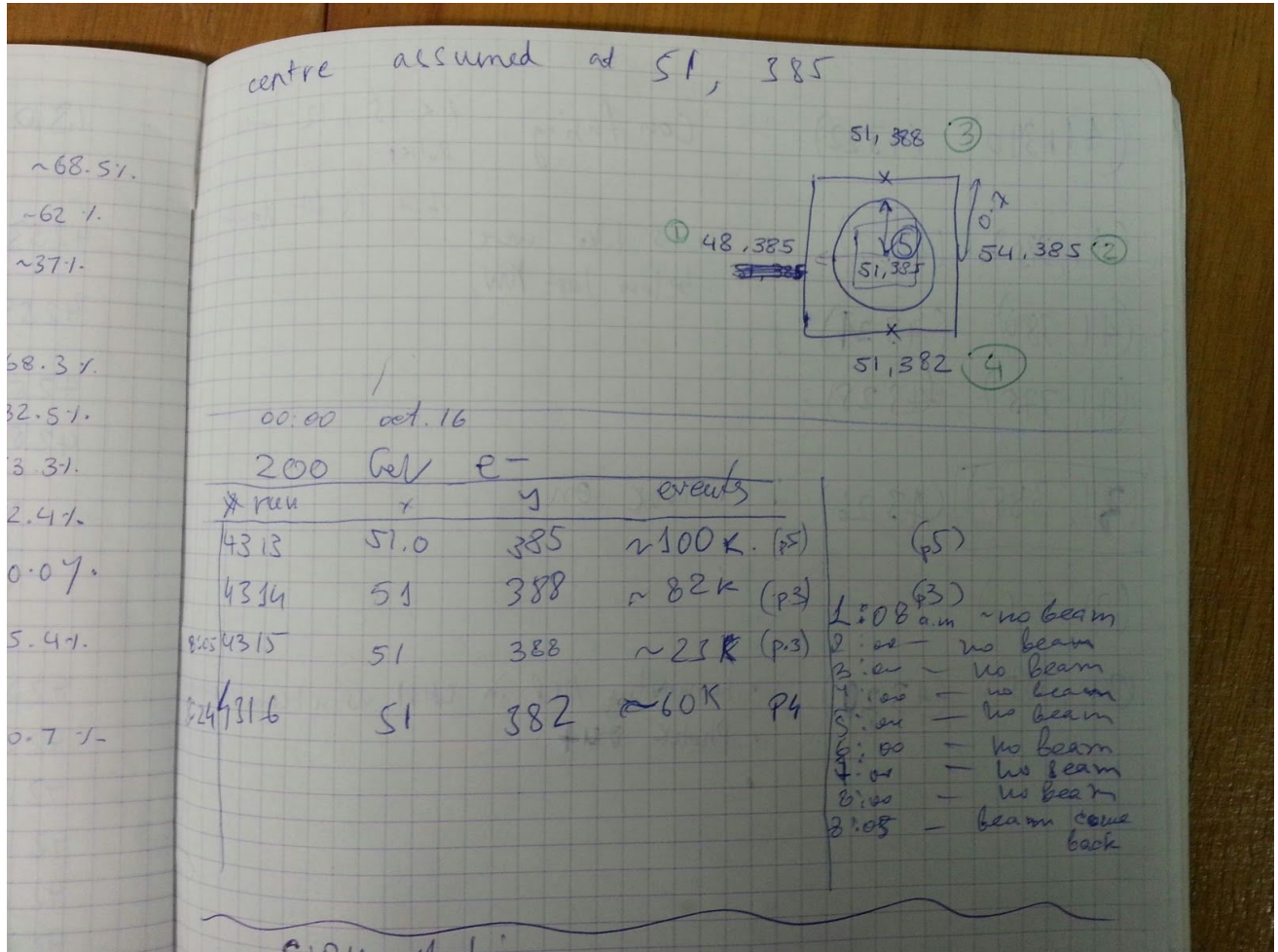
4302 $x=51$, $y=382$, 60k

4303 $x=51$, $y=382$, 40k

4301 51 382

capillaries, 100 GeV electrons

4302	51	382	~60k	} 4
4303	51	382	~40k	
4304	51	385	~90k	} 5
4305	51	385	~18k	
4306	51	388	~ 30 103k	3
4307	48	385	~13k	} 1
4308	48	385	~13k	
4309	48	385	~100k	
4310	54	385	~5k	} 2
4311	54	385	~15k	
4312	54	385	~100k	



4394 x=51, y=385,

23:00 start scan with 200 GeV

4313 x=51, y=385

October 16, 2015

10:00

We set up the SiPM matrix.

2:00 - no beam
 2:05 - no beam
 2:08 - beam come back

SIPM Matrix.

51, 385 : (4317) some signals in pix 2,3,4.
 Very few in pix 6,7,8
 nothing in pix 3,14,15,16

4	8	11	15
3	7	10	14
1	5	9	13
12	11	10	12

51, 380 (4318) : went wrong way.

56, 385 (4319) : went wrong way.

46, 385 (4320) : better. pulses in 2,3,4, 6,7,8.
 none in 14,15,16.

41, 385 (4321) : ~~seems~~ seems to be ~~centered~~ centered in ~~the~~ ^X around.
~~the~~ ~~matrix~~. Column 2 and 3.

(41, 390) (4322) : Confusing. pix 15, 12 have pulses.

(41, 395) (4327) : seems like were below last row.

(41, 380) (4324) :

(41, 375) (4325) :

(31, 385) (4326) : Photek on.

(21, 365)

(31, 385) (4330) : • hamamatsu MCP in CH11 as a beam counter
• Photek out
•

(43, 385) 4336 GOOD LOCATION

- we can firm ^{max} voltage is 71.9V.

- we get amplitude ~ 100mV.

- other SiPM matrix behaves consistent with current one

- laser test from ~~Monday~~ Tuesday also gave 200mV signals.

- probably these SiPMs simply have low response.

(43, 385) Run 4340. SiPM matrix at 71.9V.
16 GeV. 3x tungsten, trenched

* 4343, 4344 Golden Runs. LY50.

12 hrs

1A don't

4345: thinner LYSO cube,
no tungsten.

11:56 PM Removed LYSO, put Tungsten (6A)
plates directly on SiPM matrix.

(43, 385): 4346. beam seems to be low (centered below pix 5)

(43, 380): 4347 we moved it up a bit. (5mm)

(43, 377): 4348 move it up 3mm more (now near pix 5 or 7)

4349: ended in flashing GUI.

4350:

4351: same as previous

beam counter

Move the table to left, to center the
beam ^{more} on pixels (10,9)

(37, 377)

signals

Run 4352: ended in flashing GUI

4353: same as previous

71.9V

4354: add lead block between tungsten and SiPM.

71.8V SiPM (leakage current was higher)
(went into error)

4355: same as above

ed

Saturday : October 17, 2015 8:00

Put back SH cell. SiPM on SH cell same cabling as before. CH5 : scintillator, CH7 : Photek. Scan at 150 GeV

Oct 17, Saturday

- Shashlik module placed in box (replacing SiPM matrix) - 8:54 am
 Channels on - 0, 1, 3, 4 (data); 5 (trigger); 7 (mcp)

- We will now scan to find the beam (align)
 - 8:55 am

- Commencing scan

Run #	X (mm)	Y (mm)	# Ev	Comments
4365	50	200 (mm)		~~~~~
4366	50	385		
x x	Didn't work x x cast the sample x x			

Interruption (check cables)

Now it works! 9:02 am

150 GeV

4370	50	385	25K	All channels have some signal
4373 (three)	50	385	20K	
4374	50	385	29K	
4375	50	385	45K	

14

30

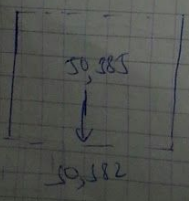
150 GeV

Position scan

Run #	X	Y	# EV	Comments
4376	50	388 (+2)	~9K	Looks worse than last, moving in other direction.
4377	50	382 (-6)	~10K	Norse than starting position. Moving back. Looks like we had it from the start!
4388	54 (+4)	385 (+3)	~9K	Much lower (more other direction)
4379	48 (-6)	385	~100K	
4380	54	385	~100K	
4381	51	382	~102K	
4382	51	388	~101K	

150 GeV

Scan complete



(going to 50 GeV next)

50 GeV ~~st~~ beamfile loaded 11:12 am

Run #	X	Y	# μ Ev	Comments
4383	51	388	106 K	
4384	51	385	102 K	
4385	51	382	103 K	
4386	48	382	103 K	
4387	54	382	103 K	

Loading beamfile 20 GeV 12:44 pm
20 GeV

4388	51	385	100 K
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Loading beamfile for 200 GeV 1:44 pm

4389	51	385	69 K	2:36 pm
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No Beam (LINAC intervention)

200 GeV 6:10 PM

4390	48	385	~4.5 K
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Photek had a 20 dB attenuator left on it from SIM board expt. Take out pos 2 100n

200 GeV Shashlik

4391

48

385

~100K

4392

54

385

~100 K

4393

51

385

~10k

250 GeV

4394

51

385

~118k

100 GeV

4395

51

385

~62k

150 GeV

4396

51

385

~20 K

150 GeV

4397

51

385

~30 k

150 GeV

4398

51

385

~50 k

50 GeV

4399

51

385

~50k

50 GeV

4400

51

385

~54 k

20 GeV

4401

51

385

200 GeV

Fast back DSB fiber, mon + MCP Hamamatsu

4402

51

385

~9k

200 GeV

4403

51

385

~13k

200 GeV

4404

51

385

~100k

100 GeV

4405

51

385

~80k??

150 GeV

4406
4407
4408

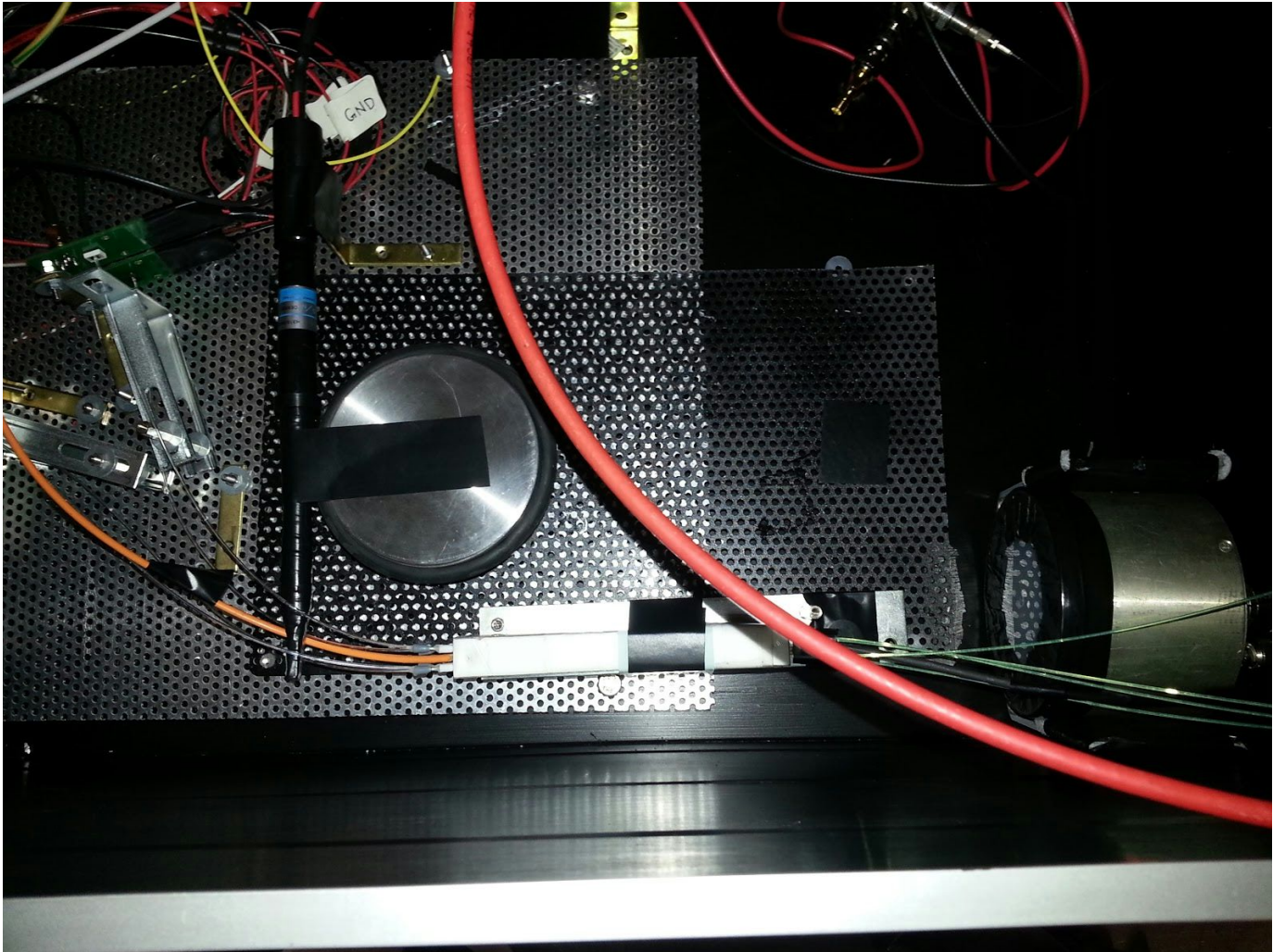
Insert Y11 fibers. They are slightly thicker and do not fit into the clear fiber coupler.

	X	Y	#Fibers	E
4406	51	385	~103k	150 GeV
4407	51	385	~103k	50 GeV
4408	51	385	~25k	20 GeV
<hr/>				
	put Y11	without	clear fiber	coupler
4410	51	385	~25k	200 GeV
4411	51	385	~102k	150 GeV
4412	51	385	~110k	100 GeV
4413	51	385	~100k	50 GeV
4414	51	385	~35k	20 GeV

4409
4410 200 GeV
4411 150 GeV
4412 100 GeV
4413 50 GeV
4414 20 GeV

End of Shashlik Cell timing test : Sunday, 18.10.2015, 9:30am

Pictures of the SH setup :



PbWO ultimate timing :

Initial channel mapping :

MCP TRIG	∅	
APD 12	1	DIGI GROUP ∅
APD 15	2	
NINO 1	3	
NINO 2	4	
MCP TRIG 2	5	
APD 13	6	
APD 14	7	
<hr/>		
SIPH ANA 1	∅	
SIPH ANA 2	1	
APD 3	2	DIGI GROUP 1
APD	13	
APD	16	
420	145	

Second round channel mapping :

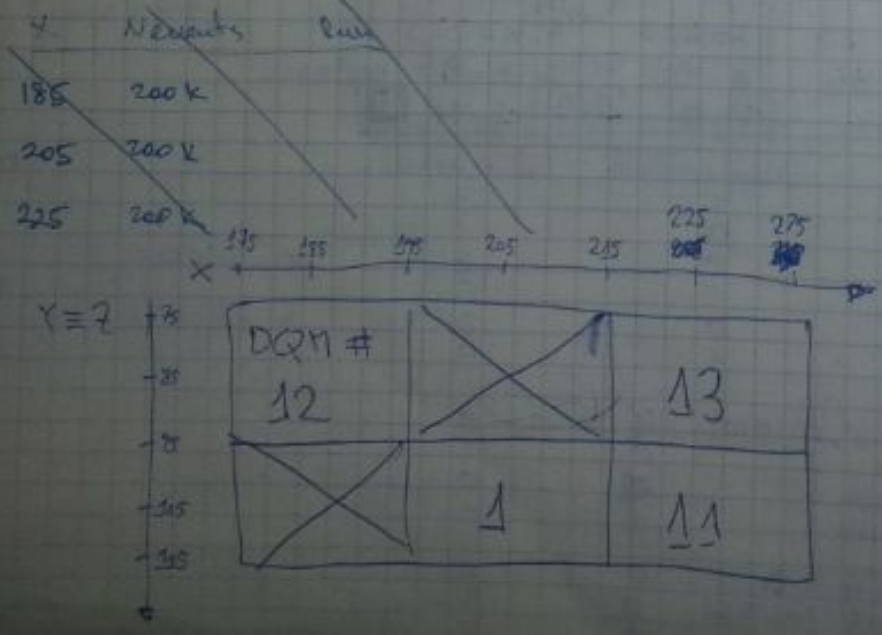
X scan $Y(a.k.a Z) = 105$ (center of the bottom row of X-tals)
 $E = 50$ GeV (beam file 51)

X	Nevents	Run	
195	100k	3865	Beam went away and was not stable
200	100k	3866 (54k) 3867 (5k)	2:08 "No beam before 3:30" 2:40 is back
205	200k	3868	
210	200k	3869	
215	200k	3870 (-96k) 3871 (-110k)	D12 error Beam switched to different spill structure
220	200k	3872 (-57k) 3873 (-197k)	D12 error
225	200k	3874	
230	100k	3875	
235	100k	3876	

$Y(a.k.a Z) = 85$ (center of the top row of X-tals)

X	N events	Run	
225	200k	3877	116k BEAM LOSS
185	200k	3882	108k BEAM LOST AT THE END

$Y(a.k.a Z) = 95$ (mid-point between top and bottom)

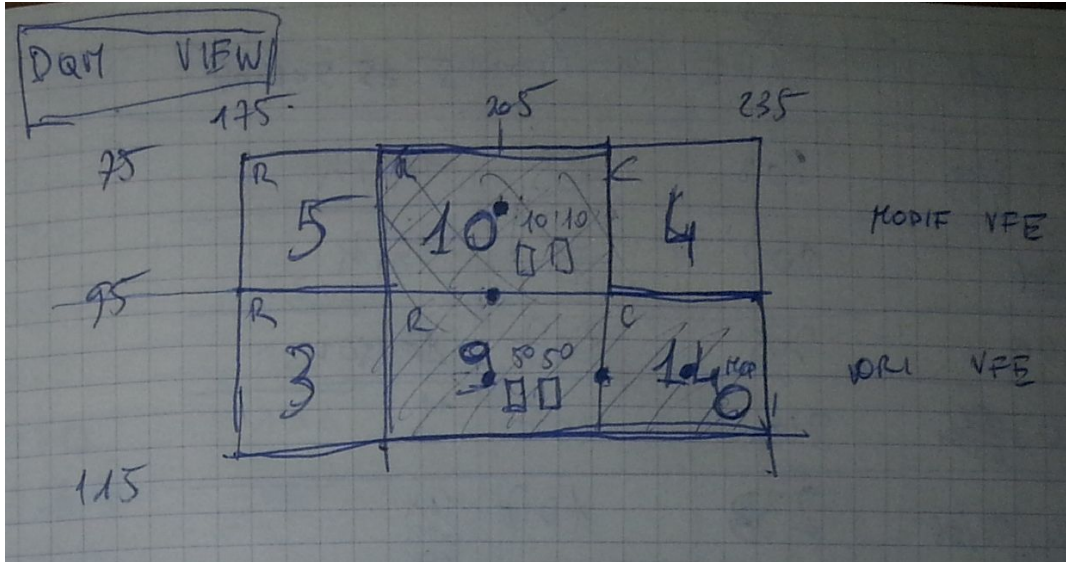


X	Z/r	AW #	N _{av}	MINI-SCAN INZ
225	80	3878	18K	
225	85	3877		
225	90	3879	21K	
225	95	3880	28K	
225	100	3881	10K	

220	85	3883	200K
225	85	3884	

CHANGED	DIGI GRASP	DIGI CHANNEL	PORT
* ch 11	∅	2	2
ch 12	∅	1	1
* ch 13	1	2	10
* ch 14	∅	6	6
* ch 15	1	4	12
ch 16	1	3	11
SIPM DIGI 1	∅	3	3
SIPM DIGI 2	∅	4	4
SIPM ANA 1	1	∅	8
SIPM ANA 2	1	1	9
MCP TRIG	∅	∅	∅
MCP TRIG BIG	∅	5	5
* MCP HEATCA	∅	7	7

	DIGI 1	DIGI 2	DIGI 3
ch 11	1	8	14
ch 12	1	1	9
ch 13	∅	3	3
ch 14	∅	4	4
ch 15	1	2	10
ch 16	∅	5	5
<hr/>			
SIPH DIGI 1	1	3	11
SIPH DIGI 2	1	4	12
SIPH ANA 1	∅	∅	0
SIPH ANA 2	∅	1	1
<hr/>			
MCP TRIG	1 1	∅	8
MCP TRIG SM	1 1	5	13
MCP HANA	1 1	7	15



XTAL POSITIONS

(186, 85)	(208, 85)	233 (220 , 85)
(186, 107)	(208, 107)	233 (220 , 107)

~~XXXXXXXXXXXX~~ SCAN @ 50 GeV NEW CHANNEL MAPPING

	X	Y	
3888	230	85	18K
3889	208.85	85	150k
3890/9.1/92	208	9.6	3890: 90K → DQ ERROR 3891: 18K → / / 3892: 57K
3893	208	107	131K
3894	219	107	148K
3895 3896	230	107	50K 84K
3896 3897	186	107	146K