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Instructions for shifters!

Week1: No shifters. Just PACIFIC experts. Week2: TBD

Shift List

The shift list can be found here.

Aim of the test beam

Week1: a. To see what we can see with the pacific in beam. b. EPFL has the fibre telescope and BGV module in the beam.

Week2: a. see the light yield of fibre modules with best aligned sipms. determine hit efficiency and resolution at A & C, 0,10,20,30 degrees b. see the light yield from the irradiated half of the 6-layer module. determine hit efficiency and resolution at A & C, 0,10,20,30 degrees c. see the light yield and hit efficiency of the the 8-layer module. determine hit efficiency and resolution at A & C, 0,10,20,30 degrees determine hit efficiency.

Fibre Mats/Modules

Week1: 8-layer module readout by the PACIFIC Week2: 6-layer (one half irradiated), 8-layer

Read-out

Week1: PACIFIC Week2: Spiroc

Telescopes

Week1: TimePix triggers. No synced tracks yet. Week2: Fibre Telescope and TimePix

Linear table and mechanics

Long Modules on X-Y table BGV on X-Y table Fibre Telescope on UA9 table

Position definition

Measurement plan

Beam setting for Nov 2015:

Week1: <https://lbtwiki.cern.ch/bin/view/Testbeam/SettingsJuly2015> beam has ~4mm width, 10^6 /spill, 180 GeV/c 20% pion/80%proton

Contact: Mark Tobin (GSM: 161858)

Photos

Images courtesy of R. Ekelhof and J. Müller

Full size files can be found in the CERNBOX folder:

<https://cernbox.cern.ch/public.php?service=files&t=3ae3fbd4554c58b0362b0e70fa5c62ba>

Google photo album link (lower resolution, temporary until the CERNBOX upgrade):

<https://goo.gl/photos/NELQZ4JJ3dRPy8aZ9>

Instructions for shifters!

- Arrive promptly!
- Discuss previous data taking with current shift crew.
- Determine the plan for the next shift.
- Beam control and other general LHCb testbeam information is found here:
<https://lbtwiki.cern.ch/bin/view/Testbeam/Testbeam2015>
- Copy of DAQ Logbook: <http://lblogbook.cern.ch/SciFi/77>
- HOWTO_2015

Shift list

The shift list can be found here.

Aim of the test beam

- Hit efficiency and spatial resolution as function of:
 1. y for 3 points along the fibres (A = mirror, B = 1m from mirror, C = 2m from mirror)
 2. x (for gaps between SiPMs)
 3. angle
- ~~Read out with 8 channel PACIFIC prototype (if possible)~~

Fibre Mats/Modules

- 2.5 m 6-layer coverlay mat from CERN (used in 2014 test beam). (**CERN4**)
- Two 2.5 m 5-layer mat, 2010 fibres, casted and mounted between panels (HD2 used in 2014 test beam). (**HD1 & HD2**)
- DUT: 2.5 m 6-layer mat, 2015 fibres, casted and mounted between panels (NEW) (**SLAYER3**)
- Latest generation Hamamatsu SiPMs on all modules.

Module	SiPM (lower)	(SiPM upper)	LED bar	LED Driver	Uplink (lower1)	Uplink (lower2)	Uplink (upper1)	Uplink (upper2)
HD2	30	28	3	3	5 (000-063)	5 (064-127)	6 (000-063)	6 (064-127)
HD1	H07	H03	1	1	7 (000-063)	7 (064-127)	8 (000-063)	8 (064-127)
CERN4	H02	H01	4	4	1 (127-064)	1 (063-000)	2 (127-064)	2 (063-000)
SLAYER3 (DUT)	33	35	5	2	3 (000-063)	3 (064-127)	4 (000-063)	4 (064-127)

Read-out

- Read out 4 modules modules with two SiPMs simultaneously. Arrays are centered on the inner 7cm.
- 8 SPIROC cards (4 from HD, 6 from AC).
- One USB board (available).

Telescopes

1. 3 AMS silicon ladders, scintillator trigger, outer veto (2cm x 2cm hole)
There is a comprehensive description of the proposed set up available in Roman Greim's presentation [☞](#) at the test beam kick-off meeting .
2. Telescope offline software
<https://lbtwiki.cern.ch/bin/view/VELO/Tpx3TestbeamSoftware> [☞](#)
3. Timepix3
<https://lbtwiki.cern.ch/bin/view/VELO/VeloTestbeam2014> [☞](#)

Linear table and mechanics

1. DESY table for Aachen telescope
Allows for vertical and horizontal displacement by +/- 0.5 m. Motorised and remote-controlled.
2. New translation table for modules from EPFL
Allows horizontal and vertical translations of 2.5 m and 0.8 m, respectively. ~1cm steps are possible in vertical and horizontal.

Position definition

Horizontal positions (in table coordinates, module is 2424mm long):

A: 225.5cm (beam is near mirror) B: 125.5cm C: 30.5cm (beam is near SiPMs)

Vertical position:

Default Y-Table Position: 72.4cm

Measurement plan

Hit Efficiency/Resolution

at the following points (600k with VeLo, overnight only)

1) Do position A and C first, at 0°, 10°, 20°, 30°!!!! 2) Continue with angles in between 3) Position B is last (same order concerning the angles)

	-30°	-25°	-20°	-15°	-10°	-5°	0°	5°	10°	15°	20°	25°	30°
	towards VELO (no VELO sync)							towards AMS					
A							done	done	done		done	done	done
B			done		done		nearly done					done	
C							done	done	done		done	done	done

Attenuation Length Scan

(150k during morning/afternoon shifts)

	30.5	35.5	45.5	55.5	65.5	75.5	85.5	95.5	105.5	115.5	125.5	135.5	145.5	155.5	165.5	175.5	185.5	195.5
0°	done	done	done	done	done	done	done	done	done	done	done	done	done	done	done	done	done	done

Vertical Scan

Position A (150k during morning/afternoon shifts)

Absolute height	0°	10°	20°
68cm	done	done (2x)	done
69cm	done	done (2x)	done
70cm	done	done (2x)	done
71cm	done	done (2x)	done (2x)
72cm	done	done (2x)	done
73cm	done	done (2x)	done

Position B (150k during morning/afternoon shifts)

Absolute height	0°
68cm	done
69cm	done
70cm	done
71cm	done
72cm	done
73cm	done

Position C (150k during morning/afternoon shifts)

Absolute height	0°	10°
68cm	done(2x)	done
69cm	done	done
70cm	done	done
71cm	done	done
72cm	done (2x)	done
73cm	done (2x)	done

Overvoltage Scan

(150k during morning/afternoon shifts)

	+1.5	+2.0	+2.5	+3.0	+4.0	+4.5	+5.0
A	done	done	done	done	done	done	done
C	done	done	done	done	done	done	done

fine Overvoltage Scan

(50k during morning/afternoon shifts)

	+3.3	+3.4	+3.5	+3.6	+3.7
A	done 3x	done 3x	done 3x	done 3x	done 3x
C					

Gap Scan

(600K during morning/afternoon shifts) For different angle, we need to search for a proper height, so the beam can cover the gap position (uplink4 slayer3Upper) first do point A + C, if more time get point B

	0°	10°	20°
A	68.75cm (done)	69.5 (done)	70.3cm (done)
B			70.3cm (90k)
C	68.75cm (almost done)	68.8 (done)	70.3cm (done)

Analysis and Software

Some of the analysis software is in a git repository. Ask Roman Greim for access. Max Neuner has also developed analysis software based on ntuples.

Data Set	Analysis Person	Link to Results
Hit Eff./ Resolution ABC@ 0°	Max Neuner	Link 1
Hit Eff./ Resolution AC@ 5°	-	-
Hit Eff./ Resolution ABC@ 10°	Dominik Mitzel	-
Hit Eff./ Resolution AC@ 15°	-	-
Hit Eff./ Resolution ABC@ 20°	-	-
Hit Eff./ Resolution ABC@ 25°	-	-
Hit Eff./ Resolution AC@ 30°	-	-
Attenuation Length Scan	Ana Barbara	Link 1
Vertical Scan ABC@ 0°	-	-
Vertical Scan AC@ 10°	-	-
Vertical Scan A@ 20°	-	-
Over-voltage Scan	Axel Kuonen	-
Gap Scan (other array) AC@ 0°	-	-
Gap Scan (other array)AC@ 10°	-	-
Gap Scan (other array)ABC@ 20°	-	-

Data structure: The data is saved in root-files that are read out with Roman's software. It needs Qt and the class definition in which the data is saved. The data files have also been converted into flat ntuples without any structure where the TTree just contains the leaves for all channels of all Scifi uplinks. These files have the same name as the original file but with the ending `***ntuple.root`. They have also been backed up to EOS. A simple script that only needs root, C++11 and the boost library is called "cluster_analysis". It is also in a git repository that Max can give you access.

Instructions for installing the software are available [here](#).

-- MarkTobin - 2015-04-20

Backing up the data to EOS

More information on EOS can be found on

<https://cern.service-now.com/service-portal/article.do?n=KB0001998> and <http://eos.cern.ch/>

XROOTD must be installed on a local machine with OPENSSL and KERBEROS5 to move it there from EOS.

1. Copy the files from the server to the client machine (to `/data/testbeam_data/`).

2. Open a terminal on the "scifionline" client machine. In the `/data/testbeam_data` directory on the client where the files have been copied:

```
$ ls *.root > filelist.txt
```

SciFiTrackerTestBeam2015 < LHCb < TWiki

```
$ xrootd -c xrootconfig.cfg # this starts the xroot server daemon. ctrl-c after to close it or ad
```

3. Open a terminal on lxplus.cern.ch:

```
$ eos ls -l /eos/lhcb/testbeam/scifi/May2015 #lhcb-scifi-tracker-testbeam has
$ xrdcp root://128.141.174.100//data/testbeam_data/filelist.txt filelist.txt
```

4. On lxplus, create the following bash script 'script_xrdcpfilelist.sh':

```
#!/bin/bash
filename="$1"
while read -r line
do
    name=$line
    xrdcp root://128.141.174.100//data/testbeam_data/$name root://eoslhcb.cern.ch//eos/lhcb/testb
    echo "copying $name to root://eoslhcb.cern.ch//eos/lhcb/testbeam/scifi/May2015"
done < "$filename"
```

5. Then run it there:

```
$ chmod a+x script_xrdcpfilelist.sh
$ ./script_xrdcpfilelist.sh filelist.txt # it will not transfer or overwrite pre-existing files
$ eos ls -l /eos/lhcb/testbeam/scifi
```

If you want to download a selection of the files you can run the command:

```
eos ls -Al /eos/lhcb/testbeam/scifi | grep datarun_ntuple | while read filename; do xrdcp "root:
```

where the word behind the "grep" indicates which files are copied. In this case every file that contains datarun_ntuple in its name.

Beam setting for May 2015:

Scintillator counter: 1E05 (about 1000-1500 triggers per spill) Beam spot: 3.3mm(square) x 14mm (FWHM)

- beam setting for scifi 2015:

Explorer [Magnets]	Read	BeamRef	Max	Polarity	Info	F	Comments
QUAD.042.026	-526.7	-526.9	1000	S	QUAD01		
QUAD.042.033	526.8	526.9	1000	N	QUAD02		
QUAD.042.036	-241.5	-241.5	500	N	QUAD03		
QUAD.042.045	-12.4	-12.3	500	N	QUAD04 0=75MM.VAC		
BEND.042.049	0.0	564.0	1500	N	BEND01 (R1+R2)V-DEF		Faulty / RB / STANDBY / Veto / <->BeamRef
BEND.042.061	0.0	565.4	1500	N	BEND02 NO FIELD IND.		Faulty / RB / STANDBY / Veto / <->BeamRef
QUAD.042.083	-127.9	-127.9	500	N	QUAD05		
TRIM.042.094	0.1	0.0	250	N	TRIM11 Horizontal Cap		
QUAD.042.096	174.5	174.6	500	N	QUAD06		
QUAD.042.125	-406.1	-406.2	750	N	QUAD07		
TRIM.042.133	0.0	0.0	250	N	TRIM01 Horizontal		
TRIM.042.134	0.0	0.0	250	S	TRIM02 Vertical		
QUAD.042.141	-406.0	-406.2	750	N	QUAD21 newIn 2012 (
QUAD.042.170	174.7	174.6	500	N	QUAD08		
QUAD.042.182	-127.9	-127.9	500	N	QUAD09		
TRIM.042.203	0.0	0.0	250	N	TRIM03 Horizontal		
QUAD.042.208	174.6	174.6	500	N	QUAD10		
TRIM.042.318	9.8	10.0	250	N	TRIM05 Horizontal		
QUAD.042.320	-127.9	-127.9	500	N	QUAD11		
BEND.042.325	566.4	566.4	1500	S	BEND03 (R3+R4)V-DEF		
BEND.042.330	566.4	566.4	1500	S	BEND04		
QUAD.042.359	-131.1	-131.1	500	N	QUAD12		
QUAD.042.374	5.0	5.0	500	N	QUAD13		
TRIM.042.407	-19.9	-20.0	250	S	TRIM06 Vertical		
BEND.042.412	-414.8	-414.8	1500	S	BEND05 DEFLECTION+		
BEND.042.416	-414.8	-414.8	1500	S	BEND06		
QUAD.042.427	-177.0	-177.2	500	S	QUAD14		
QUAD.042.444	-159.1	-159.1	500	N	QUAD15		<->BeamRef
QUAD.042.457	-165.0	-159.6	500	S	QUAD16		<->BeamRef
TRIM.042.462	0.0	0.0	250	S	TRIM07 Horizontal		
TRIM.042.463	0.0	0.0	250	N	TRIM08 Vertical		<->BeamRef
QUAD.042.495	-209.7	-209.8	500	S	QUAD17		
QUAD.042.502	-162.6	-162.9	500	N	QUAD18		
TRIM.042.508	-50.0	-50.0	240	S	TRIM09 Horizontal		
TRIM.042.509	-5.0	-5.0	250	N	TRIM10 Vertical		
QUAD.042.513	-123.2	-123.2	1000	S	QUAD19		
QUAD.042.516	-299.9	-800.0	800	S	QUAD20		<->BeamRef

</verbatim>

Backing up the data to EOS

- collimator settings for scifi 2015 Setting I:

Tax Status [Explorer [Taxi]]
 No timing received - Values might be out of date
 Last timing: 24.05.2015 14:49:40
 Beam: HB / LHCb File: HBA.LHCb.000 Momentum: +180.00 INCONSISTENT_ENERGIES GeV/c Comment: 2014 FM beam for LHCb - Normal Intensity

Explorer [Taxi]	Read	BeamRef	Min	Max	Actual Range	Selected Range	Hole	Comments
XTAX.0	-140.1	-140.0	-140.0	144.0	LARGE	LARGE	2: -140.0mm	
XTAX.0	-140.1	-140.0	-140.0	140.0	LARGE	LARGE	3: -140.0mm	

Collimator Status [Explorer [Collimators]]
 Beam: HB / LHCb File: HBA.LHCb.000 Momentum: +180.00 INCONSISTENT_ENERGIES GeV/c
 Last timing: 25.05.2015 09:01:04
 Comment: 2014 FM beam for LHCb - Normal Intensity

Explorer [Collimators]	Read jaw 1	Read jaw 2	BeamRef jaw 1	BeamRef jaw 2	Min	Max	Info	F	Comments
XCSH.042.054	-1.1	1.1	-1.0	1.0	-50	50	COLL01 Horizontal Acceptance		
XCSH.042.128	-1.1	1.1	-1.0	1.0	-50	50	COLL02 Horizontal - (new 2)		
XCVV.042.132	-2.1	2.1	-2.0	2.0	-50	50	COLL03 Momentum Slit Vert		
XCVV.042.185	-2.0	2.1	-2.0	2.0	-50	50	COLL04 Vertical Acceptance		
XCHV.042.192	-2.1	2.1	-2.0	2.0	-55	55	COLL05 Horizontal		
XCHV.042.203	-2.1	2.1	-2.0	2.0	-55	55	COLL06 Vertical acceptance		
XCVV.042.404	-2.1	2.1	-2.0	2.0	-50	50	COLL07 Please let open		
XCHV.042.406	-3.1	3.1	-3.0	3.0	-55	55	COLL08		
XCHV.042.407	-2.1	2.0	-2.0	2.0	-55	55	COLL09 Momentum Slit_Vert		
XCSH.042.424	-2.0	2.0	-2.0	2.0	-50	50	COLL10 Horizontal		
XCSH.042.442	-2.1	2.1	-2.0	2.0	-50	50	COLL11 Horizontal		

Run Hold Refresh Refresh All Refresh Selected Set Jaw Positions SET TO BEAM REP Store to e-logbook

Explorer [Collimators] Explorer [Doors] Explorer [Doors] Explorer [Doors] Explorer [Doors]

INFO: All Safety Elements (Priority 3) have been set to SAFE
 INFO: No Safety Elements (Priority 4).
 INFO: No Secondary Elements.
 INFO: All chains have been set to SAFE
 INFO: PRES3B: prepared to be OPENED
 WARN: [BEND.042.061] STANDBY
 WARN: [BEND.042.049] STANDBY

</verbatim>

This topic: LHCb > SciFiTrackerTestBeam2015
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