----+ Testbeam 2015 Analysis page

Description of the data

Beamline

Runs

The list of runs can be found in the ATLAS Tile Run Information Database. To get the list of runs that have been taken during this testbeam, request `tb='Oct-2015'` and `type='Phys'` (list of physics runs). The database gives you the following information for each run :

`run`	run number from 510008 to 510853
`energy`	beam energy : 50, 150, 180 GeV
`beam`	type of beam : `mu`, `e`, `pi` for muons, electrons, pions respectively
`events`	number of events in the run. We usually consider only runs with more than 5000 events.
`module`	`='M0'` for module 0, `'EB'` for extended barrel
`eta`	Value of pseudo-rapidity at which the beam enters in the module. It is filled only for projective runs
`theta`	Incidence of the beam with respect to the front face of TileCal : 20°, 90°, -90°
`cell`	For runs at theta=20°, this is the name of the cell in which the beam is entering A1 to A10 in module 0, A12 to D4 in Extended Barrel. For runs at theta=90°, this is the tile row number from 1 to 11.
`z`	For runs at theta=90°, it is the encoded position of the table with respect to the beam. z=18070744 is the edge of tile 11, z=18081250 is the edge of tile 1.

A list of runs for physics analysis is available here.

You have also the possibility to generate your own list of runs accessing the TileCal Info database from lxplus. Ex :

```
/usr/bin/mysql -h pcata007.cern.ch tile -e 'select run, events, beam, energy, module,theta,cell,
```

Testbeam ntuple

The ntuples can be found at :
`root://eosatlas//eos/atlas/atlascerngroupdisk/det-tile/testbeam/2015/tiletb_` *run number* `.root`

The ntuples from the demonstrator can be found at :
`root://eosatlas///eos/atlas/atlascerngroupdisk/det-tile/demonstrator/2015/rawData/Data_=_time stamp_=_testbeam_=_run number_=_.root`

Ntuple variables

Beamline scintillators

Variable name	Description	Suggested cut
`S1cou`	signal in S1 scintillator, in adc	`1000<S1<2500` adc
`S2cou`	signal in S2 scintillator, in adc	`500<S2<1500` adc
`S3cou`	signal in S3 scintillator, in adc	

Cherenkov counters

Cherenkov counters 1 and 2 provide a useful information for particle identification. They can be used at low energy (50 GeV) where the gas pressure in are such that electrons and muons give a cherenkov signal, while protons and kaons give a pedestal.

WARNING : check the distribution of the signal in the cherenkov counters before applying a cut : the values might change after run 510374.

`Cher1`	signal in the first Cherenkov counter (in adc)	`Cher1<300` : pedestal, `Cher1>300` : signal
`Cher2`	signal in the second Cherenkov counter (in adc)	`Cher2<350` : pedestal, `Cher2>350` : signal

Beam chambers

Beam chambers 1 and 2 give the coordinate at which a particle passed. X and Y are the horizontal and vertical axis respectively (X=0;Y=0 approximately corresponds to the geometric centre of the beam spot).

Variable name	Description
`btdc1[8]`	Time (in adc) between the gate and the arrival of the first hit in the BCs. [0-3] : BC1 left,right,up,down; [4-7] : BC2 left,right,up,down
`Xcha1`	X position in BC1 (in mm)
`Ycha1`	Y position in BC1 (in mm)
`Xcha2`	X position in BC2 (in mm)
`Ycha2`	Y position in BC2 (in mm)
`Ximp`	Extrapolated X-position of the beam at the level of the TileCal table.
`Yimp`	Extrapolated Y-position of the beam at the level of the TileCal table.

Suggested cut
Limit the extension of the beam to a spot of radius R : `sqrt(Ximp*Ximp + Yimp*Yimp)<R`
Remove particles that are not parallel to the beam axis : `Xcha1-Xcha2<Cut`, `Ycha1-Ycha2<Cut`

In addition, you might want to check and reject events with multi hits in the beam chambers. The distributions of `btdc1[0]+btdc1[1]`, `btdc1[2]+btdc1[3]` (BC1) and `btdc1[4]+btdc1[5]`, `btdc1[6]+btdc1[7]` (BC2) should show a narrow peak at a given value. Events far away from this peak correspond to multi-hits in the chamber and should be rejected.

TileCal variables

WARNING : the index from 0 to 47 corresponds to the pmt number -1 : see TileCal mapping.

Variable name for module 0 (M0) and Extended Barrel (EB)	Description
`EoptC01[48]`, `EoptE02[48]`	Energy in femto Coulomb (fC) reconstructed by optimal filter.
`ToptC01[48]`, `ToptE02[48]`	Timing in ns reconstructed by optimal filter.
`GainC01[48]`, `GainE02[48]`	0=low gain, 1=high gain.
`SampleC01[48][7]`, `SampleE02[48][7]`	Signal in adc for the 7 timing samples, for each pmt.
`PedoptC01[48]`, `PedoptE02[48]`	Pedestal (in adc) obtained by optimal filter.
`Chi2optC01[48]`, `Chi2optE02[48]`	Chi2 of the fit.

Analysis

90° muons in each Tile row

180 GeV muon runs have been taken at +/-90°, in each of the 11 tile rows of Module 0 and Extended barrel. The goal of the 90° muon analysis is to compute the energy loss in the scintillators (dE/dx) for each TileCal cell. The dE/dx is measured in each cell, by dividing the response to muons in the cell by the number of scintillators in the corresponding tile row. Ideally (ie if the cells response have been inter-calibrated by Cs scan), dE/dx should be the same in each cell. If not, an inter-calibration factor has to be applied.

Persons in charge of the analysis :

Tamar Zakareishvili (for Module 0) Shannon Towey (for Extended Barrel)

Help : analysis from previous test-beams ATL-TILECAL-2004-007

Tile rows in Module 0 and in EB, number of tiles (periods) per cell (see here for more details).

Compartment	Long Barrel	Extended Barel
A	1-3	1-3
BC	4-9	4-7
D	10-11	8-11
ITC C10	-	7-9
ITC D4	-	10-11

Table 3.1: The tile rows contained in various LB and EB calorimeter compartments.

Cell	# periods per cell	Cell	# periods per cell	Cell	# periods per cell
A12	9	B11	16	C10	5
A13	25	B12	27		
A14	28	B13	30	D4	17
A15	30	B14	32	D5	65
A16	48	B15	35	D6	75

Table 3.4: The numbers of periods in sub-cells for Extended barrel module

Tile-row	A+6/A-6	A+7/A-7	A+8/A-8	A+9/A-9	A+10/A-10
1	16/15	16	17/18	19/18	16
2	15/16	16	18/17	18/19	16
3	16/15	16	17/18	19/18	16
	BC+6/BC-6	BC+7/BC-7	BC+8/BC-8	BC+9/BC-9	
4	18	19/18	20	17/18	
5	18	18/19	20	18/17	
6	18	19/18	20	17/18	
7	20/21	22/21	20		
8	21/20	21/22	20		
9	20/21	22/21	20		

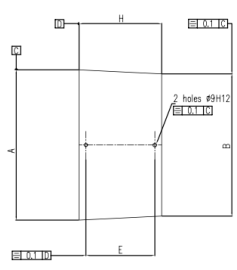
Table 3.3: The numbers of periods in sub-cells for Long Barrel module positive/negative(2/2)

90° muons, z-scan in Extended Barrel

The goal of this analysis is to evaluate the difference of response with respect to the position of the beam in the tiles. A scan in the longitudinal axis (axis crossing the two holes) has been performed with muons (runs 510644 to 510727) and electrons (runs 510579 to 510643).

Persons in charge of the analysis : Lasha Pantskhava

Help : Size of each tile



tile #	A (mm)	B (mm)	H (mm)	E (mm)	weight (kg)
1	231	221.3	97	70	0.0698
2	240.8	231.3	97	70	0.0721
3	250.6	241	97	70	0.0751
4	262	249.5	127	100	0.1023
5	274.8	262.3	127	100	0.1074
6	287.5	275	127	100	0.1125
7	302.3	287.8	147	120	0.1366
8	317	302.6	147	120	0.1434
9	331.7	317.3	147	120	0.1503
10	350.4	332	187	160	0.2010
11	369	350.7	187	160	0.2120

Comparison between 90° muons and projective muons

Persons in charge of the analysis :

20° electrons

Persons in charge of the analysis :

Help/documentation :

ATL-TILECAL-2004-013, ATL-TILECAL-PUB-2005-005

This topic: Sandbox > GiangiobbeVincentSandbox
Topic revision: r8 - 2015-11-23 - JaredDavidLittle