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Analysis of the cosmics data taken in the pit

Cosmics analysis issues and information

For runs after M3 see: The new Tile Cosmics Analysis page

Reconstruction in Athena

All the ntuples with useful data are normally reconstructed and stored on CASTOR immediately after data taking. But if you want to run reconstruction yourself or to play with event display, follow the instructions given at TileMobiDAQReconstruction page. For Atlantis reconstruction details see https://twiki.cern.ch/twiki/bin/view/Sandbox/CosmicPulseShapeDisplayAtlantis?template=viewprint

timing corrections

TileCal timing corrections are currently not in the calibration database but are available for different run ranges as data files, which have to be copied to the reconstruction directory by hand. A list of valid timing corrections can be found here. The corresponding Tile2007.tdlas and Tile2007.tclas files can be found in the respective subdirectories here:

```
/afs/cern.ch/user/n/ngollub/public/timing
```

In addition the TileConditions package needs to be told to use calibration files with the "Tile2007" prefix in the reconstruction. This is done by adding the following two lines at the end of the RecExCommission_topOptions.py:

```
from TileConditions.TileConditionsConf import TileInfoLoader
TileInfoLoader.CalibFilePrefix = "Tile2007"
```

(The default in RecExCommission jobOptions is to use calibration files with the prefix "TileMobi", but no such files exist and thus defaults are loaded.) In order to verify which files are really loaded during running, one could also add

```
TileInfoLoader.OutputLevel = DEBUG
```

Looking for "Tile2007" in the log file should result in a lot of WARNINGs for non-existing Tile2007.* files, but the files Tile2007.tclas, Tile2007.tdlas and Tile2007.tcfib should be found and loaded. The WARNINGs about the non-existence of the other files can be safely ignored.

Task list

- Task list for calorimeter performance with cosmic ray muons: Task_list_for_calorimeter_performance_studies.ppt

Summary Talks

- Summary talk from September 2006: TEUSCHER_LAr_week_Combined_LAr_TileCal.ppt
- Combined LAr + TileCal Analysis November 2006: http://indico.cern.ch/conferenceDisplay.py?confId=8274

- Dedicated page on the method, usage and results of this algorithm for cosmic muon track reconstruction from the calorimeter data only.

Towering Mapping in the Cosmic Trigger Boards

For M5 week, the cosmic boards have the following tower mapping.

For top cosmics regions the module ordering is 13, 14, 15, 16, 17, 18, 19, 20, 11, 12, 21, 22.
For bottom cosmics regions the module ordering is 45, 46, 47, 48, 49, 50, 51, 52, 43, 44, 53, 54.

During M5 the LBA cosmic boards were connected to the Muon Output.

Board	Scaler 0	Scaler 1	Scaler 2	Scaler 3	Scaler 4	Scaler 5	Scaler 6	Scaler 7
LBA	T1	-	T7	T6	T5	T4	T3	T2
LBC	T1	T8	T7	T5	T4	T3	T2	T1
EBC	T1	-	-	T6	T5	T4	T3	T2

Where 'T' indicates the tower number within the module. There are eight scalers in the cosmic board per module. The first module on the board has scaler numbers 0-8, the second module numbers 8-15, etc.

Note: The mapping was incorrect for some time. The following reflects the mapping previous to M5 (Oct 23th, 2007) The towering mapping the cosmic trigger boards should be the same for all regions but bottom LBA and top EBC has a slightly different mapping for reasons that are still under investigation. The current mapping for top/bottom EBA and LBA and top EBC is listed as following. The mapping of LBC and EBC has not yet been verified.

For top cosmics regions the module ordering is 13, 14, 15, 16, 17, 18, 19, 20, 11, 12, 21, 22.
For bottom cosmics regions the module ordering is 45, 46, 47, 48, 49, 50, 51, 52, 43, 44, 53, 54.

Board	Scaler 0	Scaler 1	Scaler 2	Scaler 3	Scaler 4	Scaler 5	Scaler 6	Scaler 7
Top EBA	T1	-	-	T6	T5	T4	T3	T2
Bottom EBA	T1	-	-	T6	T5	T4	T3	T2
Top LBA	T1	T8	T7	T6	T5	T4	T3	T2
Bottom LBA	T7 (scaler 8)	T6	T5	T4	T3	T2	T1	T8 (scaler 15)
Top EBC (module 13)	T1	T6	T5	T4	T3	-	-	T2
Top EBC	-	T6	T5	T4	T3	T2	T1	-

Where 'T' indicates the tower number within the module. There are eight scalers in the cosmic board per module. The first module on the board has scaler numbers 0-8, the second module numbers 8-15, etc. In bottom LBA, tower 7 of LBA45 will appear on scaler 8 which should be LBA46 tower 1 for example. In the last module LBA54, tower 7 and 8 are missing.

Cosmics runs: used setups and available data

See also the LAr cosmic run list.

M3 Week

During M3 were used different triggers paired with the TileCal board trigger. TileCal trigger from EBA+LBA+LBC: 11-22 & 43-54 (8 towers in each barrel and 6 towers in each extended barrel: 8*12*4+6*12*2 = 528 towers able to give triggers) ;

Run list

Lists already compiled here:

- **WEEK 1** runs detailed in this linked wiki;
- **WEEK 2** in the attached **.xls** file in the same wiki;

Analysis

Looks at these and other runs have been shown (or stored) in:

- LAr Cosmics Analysis Meeting
- T4,5 meeting: 13010 vs 1205
- Offline Commissioning: several talks on M3 Analysis
- Virtual agenda of M3 analysis progress

General characteristics of analysed runs

A more detailed information on the runs (to be updated as analysis goes on)

- **10825** : 1679 events in 13 hours (2.1 ev/min);
- **11000** : 3912 events in 15 hours (4.2 ev/min);

Combined LAr+Tile Cosmic Runs in spring 2007

Setup (to be completed)

Easter setup Combined runs with Extended Barrel and LAr barrel and endcaps

Modules in readout:

EBA: 13, 14, 15, 16, 17, 18, 19, 20, 45, 47, 48, 49

LBA: 14, 15, 19, 20, 49, 50, 51, 52

LBC: 15, 16, 17, 18

Runs taken

Tilecal only ntuples (and log files) in **/castor/cern.ch/user/m/maneira/cosmics/2007/**. Reconstruction was done with 12.5.0 and tags according to TileMuonFitter#Present_software_structure. Runs above 10825 were

reconstructed with the athena setup described CosmicCommissioningReconstructionStatus.

The setup as seen in the ntuple is also given (**A** for **LBA**, **C** for **LBC**, **D** for **EBA**, **E** for **EBC**):

- **Run 4120**:
  - Started at 20:18 on April 4, stopped at 8:51 on April 5, ROD problems, 1320 events;
  - C15-C18 D13-D49;
- **Run 4198**:
  - Started at 17:08 on April 5, stopped on April 6 at 13:39, 769 events (0.6 /min);
  - A14-A15,A17,A19-A20 A49-A52 C15-C18 D13-D15,D17-D20 D45,D47-D49;
- **Run 4206**:
  - Started at 14:02 on April 6, stopped on April 7 at 17:41, ROD problems, 1053 events;
  - A14-A15,A17,A19-A20 A49-A52 C15-C18 D13-D15,D17-D20 D45,D47-D49;
- **Run 4218**:
  - Started at 17:51 on April 7, stopped on April 7 at 22:24, 173 events (0.6 /min);
  - A14-A15,A17,A19-A20 A49-A52 C15-C18 D13-D15,D17-D20 D45,D47-D49;
- **Run 4220**:
  - Started at 23:18 on April 7, stopped on April 10 at 08:44, 2151 events (0.6 /min);
  - A14-A15,A17,A19-A20 A49-A52 C15-C18 D13-D15,D17-D20 D45,D47-D49;
- **Run 4504**:
  - Started at 20:59 on April 13, stopped on April 14 at 00:14, 269 events (1.4 /min);
  - A14-A15,A17,A19-A20 A49-A52 C15-C18 D13-D15,D17-D20;
- **Run 4509**:
  - Started at 12:00 on April 14, stopped on April 14 at 14:08, 126 events (1.0 /min);
  - A14-A15,A17,A19-A20 A49-A52 C15-C18 D13-D15,D17-D20;
- **Run 4510**:
  - Started at 14:30 on April 14, stopped on April 16 at 09:25, 8555 events (7.5 /min);
  - A14-A15,A17,A19-A20 A49-A52 C15-C18 D13-D15,D17-D20;
- **Run 6709**:
  - Started at 10:47 on April 29, stopped on April 30 at 09:35, 4734 events (3.3 /min) (with 12.0.5);
  - A13-A20 A37-A44 C15-C18 D5-D16 D37-D52 D57-D64;

- **Run 14066**:
  - Started June 29 evening (around 19:30), stopped June 30 around 15:00;
  - EBA only, with revised trigger settings (removed masking of five towers per module) and thresholds; substantial improvement in rate
- **Run 14110**:
  - Started June 30 evening (around 15:00), stopped July 2 morning (around 10:00?);
  - Same as 14066, added FCAL * **Run 14834**:
  - Started at 19:41 on 6.7.2007, stopped 7.7.2007 morning due to ROS errors (12 events/minute);
  - First run with EBA, LBA, LBC, EBC;
  - see attached files: run14834_cellphivseta.eps and run14834_tmfdirvspos.eps

Combined Cosmic Runs in 2006

Setup

- Thresholds (mV) 07-oct-06 for coincidence boards: threshold07oct06.ps
- Conversion: 50 mV ~ 2 GeV
  - 5.0 * 4.6 mV/pC * 1.05 pC/GeV = 24.15 mV/GeV
    whereTrigger Boards Gain = 5 ; mv/pC = 4.6 ; pC/GeV for Fit Method = 1.05)
- Description of TileCal trigger word (tower threshold bits):

    - ♦ **AUGUST** runs: trigger_word_description.txt
    - ♦ **OCTOBER** runs: October_trigger_word_description.txt
- Cabling map between drawers- trigger cables and cosmic boards:
    - ♦ Map-trigger-cables-to-cosmic-boards.ppt: Map-trigger-cables-to-cosmic-boards.ppt
- Module Status:
    - ♦ Online: http://solans.web.cern.ch/solans/TileOnlineStatus/
    - ♦ Offline Team 4-5: http://atlas-php.web.cern.ch/atlas-php/NOVA/TBAnalysis/TileCommAnalysis/version1.3/index.php
- TileCal Commissioning ELOG

+ LAr information

- ELOG including LAr run list: http://pcatlas227.cern.ch:8080/Barrel+Phase+III+Soft%26Analysis/?mode=full&reverse=0&reverse=1&npp=
- LAr cosmics analysis Wiki: https://twiki.cern.ch/twiki/bin/view/Atlas/LArCosmicMuonAnalysis

+ Muon system

- Job options https://twiki.cern.ch/twiki/bin/view/Atlas/MuonCommRecoInstructions
- Muon Analysis wiki: https://twiki.cern.ch/twiki/bin/view/Atlas/MuonCommSoftware#Reconstruction_of_cosmic_data_wi

List of combined LARG+Tile, where to find the data

The raw data files endup on the online machine pc-lar-ros-mbl-03 in directory: /tmp/ExpertWeek/data

In CASTOR they are stored in /castor/cern.ch/atlas/LargFec/BarrelP3C/

Cosmic Runs in 2005

Ntuples ready for analysis

- You can get reconstructed root files for runs on /castor/cern.ch/user/t/tilebeam/cosmics/jun05 and july05. These were made using pmt ordering and not channel ordering, so the data arrays are named A13, C45 and so on. No correction was made for the double or triple-gain runs, so you should see double or triple the energy. Here's a list of runs, with info taken from http://pcata007.cern.ch:8080/mobidaq/.

  We are in the process of understanding the July 2005 data. Please see/edit TileMobiCosmicAnalysisJuly05 for a list of current issues.

  September 2005 Cosmics runs:

    - Run 3036 back-to-back trigger, variable threshold, MobiDAQ readout, 114 events, nominal PMT gain
    - Run 3037 back-to-back trigger, variable threshold, MobiDAQ readout, 40 K events, nominal PMT gain
    - Run 3038 back-to-back trigger, variable threshold, MobiDAQ readout, 31 K events, nominal PMT gain, no LBC13
    - Run 3039 back-to-back trigger, variable threshold, MobiDAQ readout, 40 K events, nominal PMT gain, LBC13 included in run
    - Run 3048 single-tower trigger, variable threshold, MobiDAQ readout, 300K events, nominal PMT gain

- Run 3072 single-tower trigger, variable threshold, MobiDAQ readout, 300K events, nominal PMT gain
- Run 3074 back-to-back trigger, variable threshold, MobiDAQ readout, 150 events, nominal PMT gain
- Run 3225 back-to-back trigger, ROD + MobiDAQ readout, 99 events
- Run 3232 back-to-back trigger, ROD + MobiDAQ readout, 3154 events
- Run 3233 back-to-back trigger, ROD + MobiDAQ readout, 26374 events
- Run 3244 back-to-back trigger, ROD + MobiDAQ readout, 7155 events, TDAQ errors by L1ID jumps in ROD
- Run 3252 back-to-back trigger, ROD + MobiDAQ readout, 5669 events, HV off at the end of the run
- Run 3265 back-to-back trigger (threshold 33 mV), ROD + MobiDAQ readout, 21243 events
- Run 3306 single-tower, variable threshold, 15 Hz, ROD + MobiDAQ readout, 500K events, nominal PMT gain, HV on in modules LBA49 and LBC17 only

July 2005 Cosmics runs:

- Run 2005 back-to-back trigger, variable threshold (see file below cosmics7-29.dat), 30 events, MobiDAQ
- Run 2006 back-to-back trigger, variable threshold, 110 events, MobiDAQ
- Run 2007 back-to-back trigger, variable threshold, 17 events, MobiDAQ, ROS event fragment
- Run 2015 back-to-back trigger, variable threshold, MobiDAQ,
- Run 2016 back-to-back trigger, variable threshold, long run, MobiDAQ
- Run 2018 back-to-back trigger, variable threshold, MobiDAQ
- Run 2021 back-to-back trigger, variable threshold, MobiDAQ, fixed L1ID problem in full event
- Run 2119 back-to-back trigger, variable threshold, ROD partition
- Run 2120 back-to-back trigger, variable threshold, ROD partition
- Run 2140 back-to-back trigger, variable threshold, long run, ROD partition
- Run 2143 back-to-back trigger, variable threshold, ROD partition
- Run 2145 back-to-back trigger, variable threshold, ROD partition, correct ROD data format from here on
- Run 2147 back-to-back trigger, variable threshold, ROD partition, correct ROD data format, but BCID errors observed

September 2005 CIS runs:

- Run 3031 monoCIS 40k events, MobiDAQ readout
- Run 3032 CIS scan 40k events, MobiDAQ readout
- Run 3061 monoCIS 40K events, MobiDAQ readout
- Run 3064 CIS scan 35K events, MobiDAQ readout

July 2005 CIS runs:

- Run 2002 monoCIS 40k events, cap=100pF dac=200, full event number always 0
- Run 2003 monoCIS 40k events, cap=5.2pF dac=100, full event number always 0
- Run 2004 CIS run 35k events, full event number always 0
- Run 2009 monoCIS 40k events, cap=100pF dac=200, event numbers fixed
- Run 2010 monoCIS 40k events, cap=5.2pF dac=100, event numbers fixed
- Run 2011 CIS run 35k events, event numbers fixed

September 2005 Pedestal runs:

- Run 3030 - pedestals, 40k events, bigain, MobiDAQ readout
- Run 3060 - pedestals, 40k events, bigain, MobiDAQ readout

- Run 3237 - pedestals, 40k events, bigain, ROD + MobiDAQ readout, EB errors, BCID errors observed
- Run 3245 - pedestals, 40k events, bigain, ROD + MobiDAQ readout, EB errors, BCID errors observed
- Run 3247 - pedestals, 40k events, bigain, ROD + MobiDAQ readout
- Run 3249 - pedestals, 26934 events, bigain, ROD + MobiDAQ readout
- Run 3251 - pedestals, 34123 events, bigain, ROD + MobiDAQ readout, BCID errors observed
- Run 3253 - pedestals, 40k events, bigain, ROD + MobiDAQ readout, EB errors, BCID errors observed

July 2005 Pedestal runs:

- Run 2008 - pedestals, 10k events, bigain

June 2005 Cosmics runs:

- Run 1108 is back-to-back, 35mv threshold, 45C no HV, 500 events (likely noise)
- Run 1109 is single-tower triggered (50 mV, 2.0 GeV), nominal gain, about 12 hours (?)
- Run 1110 Cosmics back-to-back, 84 events, threshold ?
- Run 1114 is back-to-back tower triggered (threshold 38 mV, 1.5 GeV), nominal gain, 14 hours
- Run 1126 is back-to-back tower triggered (threshold 38 mV, 1.5 GeV), 2*nominal gain, no 45A, 160 events
- Run 1134 is back-to-back tower triggered (threshold 38 mV, 1.5 GeV), triple gain, 3115 events, almost 64 hours

June 2005 CIS runs:

- Run 1102 10k events
- Run 1105 monoCIS 2k events
- Run 1112 35 k events, no module LBC45
- Run 1154 monoCIS 1k events, trigger word, LBC45C, LBC46, LBA46
- Run 1155 CIS run 35k events, trigger word, LBC45C, LBC46, LBA46

June 2005 Pedestal runs:

- Run 1106 - pedestals, high gain only, 2000 events
- Run 1113 - pedestal run, 35K events, no module LBC45

Summary of July 2005 Expert Week

LVPS

Three working finger power supply assemblies were used on bottom modules (LBA49, 50, 52) over several days pedestals, CIS, cosmics. The LVPS assembly for LBA51 failed and was replaced by an external supply. The reasons for the failure are being investigated.

Installation of LVPS assemblies in fingers requires special care to avoid restricting cooling.

Several LVPS assemblies passed QC at Prevessin but failed in UX15. Again, the reasons are being investigated. Future tests in Prevessin should be with long cables to include capacitance, delays, etc.

On LBA50, the +15 V MB brick tripped at 9:49PM on Sat. 30.07.05 and was restarted successfully at 10:41PM on 31.07.05. This voltage is only used for charge injection. Earlier trips like this appeared to be

associated with application of HV but this one was not associated with HV activity. The -15V HV brick on LBA50 went out of regulation from 14:33 to 18:18 on 29.7.05.

Electronics noise from pedestal run (Run 2008) a. Module High gain Low gain Dead ch#[0] LVPS b. A49 1.47 0.63 - new c. A50 1.50 0.63 - new d. A51 1.17 0.48 8 (low?) old e. A52 (HV off) 1.43 0.65 - new w cores f. C17 1.23 0.54 25 old g. C18 1.24 0.51 - old h. C19 1.14 0.51 - old i. C20 1.15 0.51 - old

ROD

One ROD successfully tested to work in the LBC partition together with a TBM. Stand-alone mode with injected fake data no errors. Successfully integrated ROD in the online software 01-02-00. Combined partition to start both MobiDAQ and ROD segments. Many changes applied to the DSP code in order to get readable output data for the offline.

Could not upgrade monitoring applications on time for cosmic runs. Linkage errors with one of the fibres from the FE (FragId 0x130). Combined event building problems (smp kernel or network failure + wrong BCID because of fragment loss in fibre 0x130). Data from the last run corrupted since HV trip.

Front-End Electronics

C17 Pulse shape of channel 26 (25 counting from 0) low gain problem: all zeroes, both for monoCIS and pedestals. High gain looks fine. Likely a hardware problem in a digitizer?

HV

Constant overcurrent tripped state on 1 module (52A) Wild current fluctuations on 1 module (50A) o Verified with 2 different LV supplies (old+new) One trip at end (49A) after 3 days

DAQ

bug found in DAQ software, resulting in event number always zero for some of the data.

HLT

first use of event filter in PC

Cooling

Heater failed in cooling unit on C-side, replaced with temporary heater, part on order (end August). System ran stably throughout the data taking.

DCS

Difficult to recover from power cut / reset DCS to racks Need better on-line monitoring of LV, HV a. LVPS assembly monitoring is good but not integrated with external LV supplies, HV, Temperatures, or run data base b. Work needed on sense-line readout for MB voltages

Offline

Need to store HV values read from drawer during run into database

Example event displays

See attached files at bottom.

- Cosmic Run 7814 event 475. Example of a shower candidate:

- October_trigger_word_description.txt: Description of TileCal trigger word (tower threshold bits)
- October_trigger_word_description.txt: October_trigger_word_description.txt

%RESPONSIBLE% SanyaSolodkov
%REVIEW%

Major updates:
-- SanyaSolodkov - 14 Jun 2005 -- Main.maneira - 21 Jun 2005 -- SanyaSolodkov - 03 Aug 2005 -- JoseManeira - 17 Apr 2007

This topic: AtlasArchive > TileMobiDAQAnalysis
Topic revision: r70 - 2009-05-29 - JoseManeira