

**Current Status  
of  
LAr HEC+EMEC TestBeam software**

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## Current Status

### ♣ Freezing hectbmon CVS repository (~hectbmon/myCVSROOT) and moving to ATLAS CVS repository since **5.2.0**.

- hectbmon CVS repository is still readable, but cannot be modified after Jan. 13, 2003.
- A document for how to use TB software with release 5.2.0 can be obtained from

[http://particle.phys.uvic.ca/~nkanaya/athena\\_tb/doc/memo5.2.0.html](http://particle.phys.uvic.ca/~nkanaya/athena_tb/doc/memo5.2.0.html)

### ♣ Collected tags for 5.2.0

- \* LArHECTBCnv-02-00-01
- \* LArHECTBPed-02-00-02
- \* TestLArHECTBCnv-02-00-01
- \* LArHECTBAna-02-01-01

in hectbmon/myCVSROOT  
→ Equivalent to Release-01-00-00

The following tag is also available.

- \* LArHECTBAna-02-01-02

→ Equivalent to HEAD version

## Current Status (continue)

### ♣ LArHECTBAna-02-01-01 (tagged to release 5.2.0)

**This release is equivalent to Release-01-00-00 in `~hectbmon/myCVSROOT`.**

- Signal reconstruction with TDC is available.
- Available for 2000-2002 TB data.

### ♣ LArHECTBAna-02-01-02

**Timing adjustment and synchronization can be performed using peaking time calculated by cubic fit.**

**The following classes are developed by Menke and Bartko for this work.**

- LArTBTiming (Algorithm)
- LArTimeSubtract (sub-Algorithm)
- LArTBTimingObject, LArTimeOffset

**Use DataVector instead of ObjectVector and ContainedObject.**

- LArTBSignalContainer **CLASS\_DEF ID = 2791**
- LArTBTimingObject **CLASS\_DEF ID = 2792**

## Current Status (continue)

### ♣ Pedestal file production

- 1,140 files for HEC
- 1,922 files for EMEC (middle and high gain)

The production is completed and they are located in

</afs/cern.ch/user/h/hectbmon/public/tb/aug02/ped>

### ♣ Database of run information (LArBookkeeping)

- Database is created according to “run summary sheet” which is generated at the end of DAQ.  
It is also updated referring to runs.pdf (from Kurchaninov) and log books.
- AMI interface is useful to search run information.  
(This interface is developed by Albrand and Fulachier.)
- The document is available from

[http://particle.phys.uvic.ca/~nkanaya/athena\\_tb/doc/database.html](http://particle.phys.uvic.ca/~nkanaya/athena_tb/doc/database.html)

(The web page of AMI interface is linked there.)

# Conditions DataBase for HEC+EMEC TestBeam

## ♣ Necessary constant data

Following constant data are required for signal reconstruction of the HEC+EMEC combined TestBeam data.

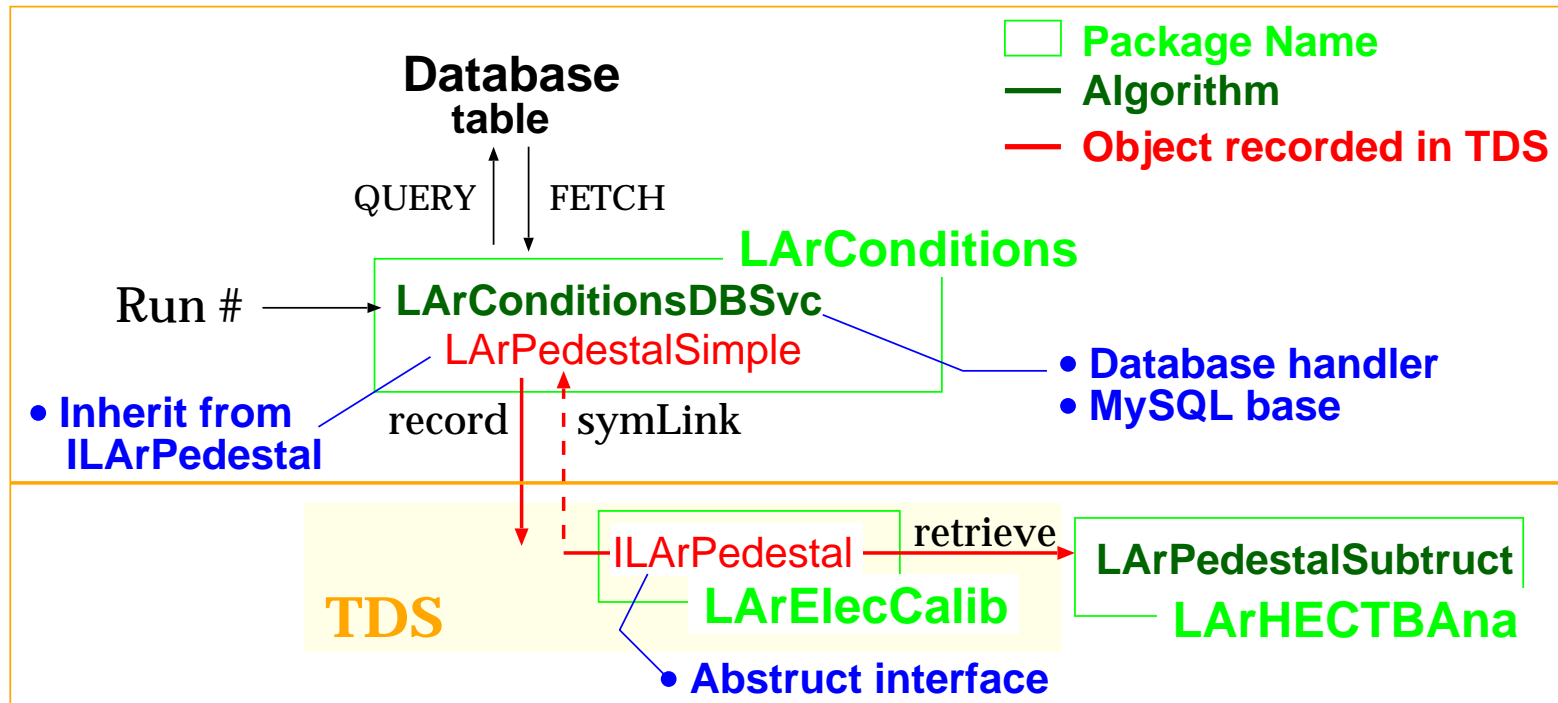
- (1) Pedestal data
- (2) Calibraton coefficient (ADC to current)
- (3) Digital filtering weight parameters
- (4) Wrap around constant (correct time phase)
- (5) Peaking time difference between cells

→ There might be many different (time-dependent) version, and user have to specify correct data by hand....

**Conditions DB is helpful to load correct constant data triggered by run number or time stamp.**

**TestBeam data is also useful to study detector performance in athena framework as well as Monte Carlo data.**

# Conditions DataBase in LAr



- Run number (time)-dependent constant data is recorded in database, and managed by **LArConditions**, which is based on MySQL.
- Constant data can be accessible with an interface, **LArElecCalib**. **LArHECTBAna** does not have dependency on **LArConditions**.
- Correct constant data is fetched by run number.  
→ It is not implemented yet.

# Conditions DataBase

## ♣ Table description

- Cell dependent data is fetched by Atlas identifier, Identifier class, which have detector indexes of  
detector , region , sampling , eta , phi  
for HEC and EMEC.

## ● Basic Fields

<i>Field</i>	<i>Type</i>	<i>Null</i>	<i>Key</i>	<i>Default</i>	<i>Extra</i>
<i>id</i>	<i>mediumint(9)</i>		<i>PRI</i>	<i>NULL</i>	<i>auto_increment</i>
<i>trun</i>	<i>timestamp(14)</i>	<i>YES</i>		<i>NULL</i>	
<i>tmod</i>	<i>timestamp(14)</i>	<i>YES</i>		<i>NULL</i>	
<i>gain</i>	<i>int(11)</i>			<i>0</i>	
<i>detector</i>	<i>int(11)</i>			<i>0</i>	
<i>layer</i>	<i>int(11)</i>			<i>0</i>	
<i>region</i>	<i>int(11)</i>			<i>0</i>	
<i>eta</i>	<i>int(11)</i>			<i>0</i>	
<i>phi</i>	<i>int(11)</i>			<i>0</i>	

**Constant data is available for only CONNECTED channels.**

# Conditions DataBase

## ♣ Fields contents

### (1) Pedestal and rms (separated)

<i>Field</i>	<i>Type</i>	<i>Null</i>	<i>Default</i>
<i>nsamp</i>	<i>int(11)</i>		<i>0</i>
<i>p1</i>	<i>float(10,4)</i>		<i>0</i>
...			
<i>p&lt;nsamp&gt;</i>	<i>float(10,4)</i>		<i>0</i>

$p_i$  is pedestal or rms for  $i$ -th sample

### (2) Calibration coefficients

<i>Field</i>	<i>Type</i>	<i>Null</i>	<i>Default</i>
<i>npara</i>	<i>int(11)</i>		<i>0</i>
<i>p1</i>	<i>float(14,6)</i>		<i>0</i>
...			
<i>p&lt;npara&gt;</i>	<i>float(14,6)</i>		<i>0</i>

### (3) Digital filtering weight parameters

<i>Field</i>	<i>Type</i>	<i>Null</i>	<i>Default</i>
<i>nsamp</i>	<i>int(11)</i>		<i>0</i>
<i>nwpar</i>	<i>int(11)</i>		<i>0</i>
<i>samp1</i>	<i>int(11)</i>		<i>0</i>
<i>tbin</i>	<i>float(8,3)</i>		<i>0</i>
<i>p1</i>	<i>float(14,6)</i>		<i>0</i>
...			
<i>pX</i>	<i>float(14,6)</i>		<i>0</i>

$$X = \text{nsamp} \times \text{nwpar}$$

**Reference cell ID is necessary?**



## Conditions DataBase Fields (continue)

### (4) wrap around constants (global)

<i>Field</i>	<i>Type</i>	<i>Null</i>	<i>Default</i>
<i>ref</i>	<i>int(11)</i>		<i>0</i>
<i>c</i>	<i>int(11)</i>		<i>0</i>
<i>epi</i>	<i>int(11)</i>		<i>0</i>
<i>mu</i>	<i>int(11)</i>		<i>0</i>

### (5) delta peaking time and error

<i>Field</i>	<i>Type</i>	<i>Null</i>	<i>Default</i>
<i>deltat</i>	<i>float(7,3)</i>		<i>0</i>
<i>error</i>	<i>float(7,3)</i>		<i>0</i>

### ♣ Agreeable?

- Constant data for only **CONNECTED** channels  
→ subAlgorithm loops over **CONNECTED** channels.
- Table structure and field type are ok?
- Others?

Both usage of ascii file and conditions DB are supported.

When ascii file name is not given in jobOptions files, conditions DB is used.

# Status of Conditions DataBase

## ♣ Implementation of conditions DB is ongoing.

Host : db1.usatlas.bnl.gov  
DataBase : atlas\_tb\_hec, atlas\_tb\_emec

## ♣ Things to do

- Fix table files.
- Database production
  - Software to record data into a table is prepared. (MySQL base, not in athena framework).
  - A few tables for pedestal were created as trial.
- Implement usage of conditions DB in LArHECTBAna.
  - It was tested for only pedestal data. (i.e. LArPedestalSubtract subAlgorithm).

# Proposal of Ntuple structure for combined TB

In HEC+EMEC combined TestBeam, different type of calorimetry is included and there are many properties related to signal reconstruction.

→ Ntuple structure should be updated...

## ♣ Ntuple blocks

<i>block name</i>	<i>block ID</i>	
	<i>HEC</i>	<i>EMEC</i>
<i>global run header</i>	100	
<i>detector dependent run header</i>	1000	2000
<i>events</i>	101	201
<i>slow control</i>	102	

### ● Global run header block

- \* *runno*
- \* *runpd* (run period)
- \* *beame*
- \* *cryox* (horizontal position)
- \* *tabley* (vertical position)
- \* *parttype* (particle type)

### ● Event block

- \* *evtno*
- \* *trig(5)* = {*phys*, *e*,  $\pi$ ,  $\mu$ , *random*}
- \* *nchan*
- \* *signal(1:nchan)*

### ● Slow Control block

- \* *time stamp*
- \* *lartemp(:)*
- \* *press(:)*
- \* *adc\_used*
- \* *hvcor(1:adc\_used)*

# Proposal of Ntuple structure for combined TB

## ● Detector dependent run header

- \* *shower* (flag of MC or TB)
- \* *peakf* (signal reconstruction method)
- \* *cal\_version*
- \* *dig\_version*
- \* *tp\_version*
- \* *wac\_version*
- \* *eunit* (ADC, nA or GeV)
- \* *first FEB serial channel no*
- \* *last FEB serial channel no*
- \* *ncells\_used*
- \* *rms(1:ncells\_used)*
- \* *ieta(1:ncells\_used)* <TB index>
- \* *iphi(1:ncells\_used)* <TB index>
- \* *iz(1:ncells\_used)* <TB index>
- \* *ieta\_at(1:ncells\_used)* <ATLAS index>
- \* *iphi\_at(1:ncells\_used)* <ATLAS index>
- \* *iz\_at(1:ncells\_used)* <ATLAS index>
- \* *eta(1:ncells\_used)*
- \* *phi(1:ncells\_used)*
- \* *z(1:ncells\_used)*

- There are 31 properties specified in jobOptions file, and they can be included in this block (optional).
- Others?

# Summary and Outlook

- ♣ **Timing correction is done by Menke and Bartko.**
  - **Ready to study calorimetry performance.**
  - LArHECTBAna-02-01-02 is collected for release 5.3.0.**
- ♣ **Database for run information (LArBookkeeping) is completed.**
- ♣ **Implementation of conditions DB is planned.**
  - **Test is ongoing.**
  - **Table structure and variable type are appropriate?**
- ♣ **New ntuple structure is proposed.**